

# Bachelor of Architecture First Year Syllabus, R22



**Jawaharlal Nehru Architecture and Fine Arts University  
Hyderabad.**

March 8, 2023

**Bachelor of Architecture**  
**First Semester Syllabus, R22**

(As Approved as by Board of Studies, Architecture on 07-11-2022)



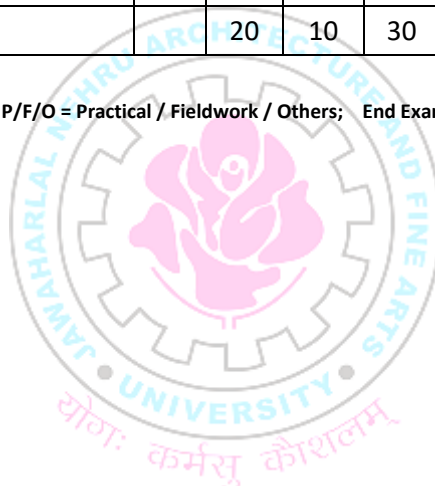
**Jawaharlal Nehru Architecture and Fine Arts University**  
Hyderabad

## Course Structure for B.Arch.

**(Under the OBE and CBCS, Effective from the Academic Year 2022-2023)  
FIRST SEMESTER**

| S.No. | Course Code | Course Title                          | CoA group | Periods/Hours per week |       |       | Credits | Marks |      |       | End Exam |
|-------|-------------|---------------------------------------|-----------|------------------------|-------|-------|---------|-------|------|-------|----------|
|       |             |                                       |           | L/T/S                  | P/F/O | Total |         | Int.  | Ext. | Total |          |
| 1     | AR22B1.1C   | Basic Design                          | PC        | 9                      |       | 9     | 9       | 100   | 100  | 200   | S        |
| 2     | AR22B1.2C   | Materials and Building Construction-I | BS        | 5                      |       | 5     | 5       | 50    | 50   | 100   | J        |
| 3     | AR22B1.3C   | Architectural Drawing - I             | PC        |                        | 4     | 4     | 4       | 50    | 50   | 100   | S        |
| 4     | AR22B1.4C   | Introduction to Art and Architecture  | PC        | 2                      | 1     | 3     | 3       | 50    | 50   | 100   | W        |
| 5     | AR22B1.5C   | Thinking for Architects               | PC        | 2                      | 1     | 3     | 3       | 50    |      | 50    |          |
| 6     | GN22B2.1A   | Communication Skills                  | SEC       | 1                      | 2     | 3     |         | 50    | 50   | 100   | P        |
| 7     | SP22B1.1A   | Basic Digital Tools                   | SEC       | 1                      | 2     | 3     | 2       | 50    |      | 50    |          |
|       |             |                                       |           | 20                     | 10    | 30    | 26      | 400   | 300  | 700   |          |

**Note:** L/T/S = Lecture/ Tutorial / Studio; P/F/O = Practical / Fieldwork / Others; End Exam W/J/S/P = Written (3 hours) / Jury/ Studio (5 hours) / Practical



## AR22B1.1C: BASIC DESIGN

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 9                | 0     | 9     | 9       | 100      | 100      | 200   | S             |

### Objectives of the Course:

- A. Develop expression and creative thinking among the students through exploration of elements and principles of design in simple design problem.
- B. Inculcating systematic problems solving methods in carpentry elements and principles 2D and 3D designs in different mediums, colours and textures.
- C. Sensitize the students to appreciate the architectural context of various building typologies and solve the problem related to building elements.
- D. Train the students to work in groups and put-up effective teamwork with inter-disciplinary approach.
- E. Train the students to express and communicate abstract ideas both graphically and orally.

### Course Contents:

#### Unit I: Design Elements and Principles

Theoretical introduction to Elements and Principles of design; Observation, exploration, appreciation and analysis of nature with respect to elements and principles of design through simple exercises; critical analysis of manmade objects and environment to understand the concepts underlying in design; Analysis and application of elements and principles of design using simple exercises;

#### Unit II: Shape and Form Transformation

Compositions in geometric and organic shapes using Elements and Principles of Design; Study of gestalt principles; Extrusion of shapes to form using 2D graphics and 3D forms; Exercises to explore shapes and patterns using grids, symmetry and asymmetry; rule of thirds in 2D graphics; Exploration of 3D forms through addition and subtraction, solids and voids; abstract forms; Making 3D compositions using model-making material;

#### Unit III: Application of Color in Design

Introduction to Color Theory, Color wheel, different schemes like monochromatic, analogous, complementary, split complementary, triadic, square, and rectangle (or tetradic); color coding systems and hue, value and intensity; psychological factors and their choices in architecture, color compositions in 2D&3D.

#### Unit IV: Introduction to Abstraction

Development of geometric patterns by division, subtraction, and addition, and express them with the use of colors; Two & Three dimensional Design Exercises involving abstraction of

real and imaginary objects, drawing compositions and models; understanding complex of forms using graphics and models.

### **Unit V: Building Elements**

Conceptualizing and designing of various building elements like railings, sun-shades, flooring patterns, grills, entrance portals, gates, murals and outdoor furniture appropriate to different building typologies with the understanding of architectural context.

### **References:**

1. Francis D.K. Ching, "Architecture-Form, Space and Order", Van Nostrand Reinhold Company, New York, 2007.
2. Simon Unwin, "Analysing Architecture", Roulledge, London, 2003.
3. YatinPandya,"Elements of Space making", Mapin 2007.
4. Krier, Rob. Architectural Composition, Academy Editions, London, 1988.
5. Meiss, Pierre Von. Elements of Architecture: From form to place, E and FN Spon, London, 1992.
6. Shibikawa, Ikuyoshi and Takahashi, Yumi. Designers Guide to Colour.
7. Smithies, K.W. Principles of Design in Architecture. Chapman and Hall, 1983
8. Chauhan, P.(2005). Learning Basic Design. Mumbai : Rizvi College of Architecture

### **COURSE OUT COMES:**

After the completion of this course, the student will be able to

1. Solve simple design problems creatively with clear expression within the frame work of elements and principles of design.
2. Solve 2D and 3D design problems with a systematic approach in different mediums, colour and textures.
3. Design building elements in different architectural contents for various building typologies.
4. Demonstrate the ability to work in group to put-up effective teamwork with inter-disciplinary approach.
5. Demonstrate the ability to express and communicate abstract ideas both graphically and orally.

## AR22B1.2C: MATERIALS AND BUILDING CONSTRUCTION – I

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 5                | 0     | 5     | 5       | 50       | 50       | 100   | J             |

### Objectives of the Course

- A. Imparting comprehensive knowledge to the students on the basic building materials while highlighting the current innovations and trends.
- B. Preparing the students for a systematic study of building materials in the scope of ingredients, properties, manufacturing process, uses, installation and market price and application in real life problems.
- C. Understanding the basic building components and the Structural Systems of buildings.
- D. Imparting Systematic methods of construction of buildings.
- E. Imparting how to represent building construction in the form of drawings, instructions and check the quality of work.

### Unit I: Building Blocks

Introduction and evolution (dimensions and quality testing with brief description of the manufacturing process) of building blocks;

Composition, properties and uses of various building block materials: red bricks, concrete blocks, hallow concrete blocks, Autoclaved Aerated Concrete blocks (AAC), Cellular light weight blocks, Fly ash bricks, Terracotta blocks, Compressed Stabilized Earth Blocks (CSEB), Fascia Blocks, qualitative parameters of building blocks.

Stone: Introduction and extraction, Classification of rocks, Properties and uses of Stone: Granite, Laterite, Quartzite, Marble, Slate.

Stone Blocks: finely finished, rubble.

### Unit II: Cementing Materials

Manufacturing process of cement and its importance in building construction

Different types of cement: Ordinary Portland Cement, Quick setting cement, Rapid hardening cement, Blast furnaces lag cement white cement, Portland pozzolana cement, Low heat cement, High alumina cement. Lime: Classification, Properties and uses, Sand: Sources of sand, characteristics, grading and bulking of sand. Cement mortar, lime mortar, composite mortar, surki mortar; Laticrete and other block binding adhesives

### **Unit III: Basic Structural Systems and Components of Buildings**

Introduction to basic structural systems and its components;

Building Structure: Substructure (Foundation), Plinth, DPC, Super structure (Flooring, walls, sill, lintel, sun-shade, the wall above the lintel, arches) and Roof: roof-beam, slab, weathering course, parapet, and gutters. Types of structures: load bearing, framed and combined construction systems, Load bearing structure- components, advantages and disadvantages. Other components: Windows, Doors, Ventilators, Grills, Columns, Jali, Railings, Portico, Porch;

### **Unit IV: Brick Masonry**

Tools and equipment used in masonry; Principles of construction in masonry walls;

Meaning and need of bonding; types of bonds: English bond, Flemish bond, Rat-trap bond. Technical drawings and instructions (to be followed on site) indicating the process of construction of single and half brick wall in the above bonds: straight wall and L- junction; Process of construction of walls using various building blocks with special emphasis on best practices; Curing and Quality testing of masonry construction;

### **Unit V: Stone Masonry and Foundations**

Stone masonry: masonry joints, stone walls, window sills, plinth, cornices, surface finishes.

Types of stone masonry: Ashlar, Coursed rubble and random rubble; Composite masonry: Brick backed ashlar, rubble backed ashlar, and concrete backed masonry; Best practices in stone masonry

Types of Foundations: stage-wise process of construction of foundations; basic principles of foundation design; CRS foundations for load bearing walls;

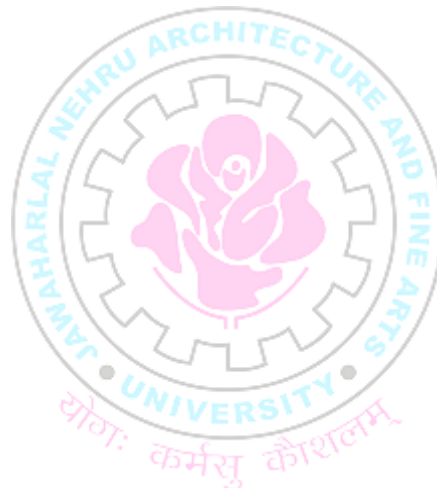
### **References:**

1. Barry. (1999). The Construction of Buildings, Vol- 1, 5th Edition. New Delhi: East West Press.
2. Mahaboob Basha S. (2015). Building Materials, Construction and Planning. Anuradha Publications.
3. Bhavikatti, S. (2012). Building Construction. New Delhi: Vikas Publications.
4. Bindra SP, Arora. SP. (2000). Building Construction: Planning Techniques and Methods of Construction, 19th ed. . New Delhi: Dhanpat Rai Pub.
5. Dr. BC. Punmia, E. A. (2016). Building Construction, 11th Edition. Laxmi Publications
6. Duggal, S. (2019). Building Materials, 5th Edition. Delhi: New Age International Publications PVT.
7. Mckay, W. (n.d.). Building Construction-V, Vol 1, Metric 5th Edition. Pearson India Edition, Services Pvt.
8. Dr. Gurucharan Singh. (2017). Building Construction and Materials, 16th Edition. New Delhi: Standard Book House.
9. Varghese. (2019). Building Construction, 2nd Edition. New Delhi: PHI Learning PVT.
10. Varhese. (2019). Building Materials, 2nd Edition. . New Delhi: PHI Learning PVT.
11. Rangwala, S.C. Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.
12. Sushil Kumar. T.B. of Building Construction, 19th ed. Standard Pub, Delhi, 2003.
13. Roy Chudley and Roger Greeno,. Building Construction Handbook,(11th ed.).London &New York:Routledge, Taylor & Francis Group, 2016

**COURSE OUT COMES:**

After the completion of this course, students will be able to:

1. Comprehensively learn knowledge on basic building materials with the current innovations and trends.
2. Carry out a systematic study of building materials in the scope of ingredients, properties, manufacturing process, uses, installation and market price with real life applications.
3. Understanding and graphic representation of basic components of buildings in formal methods.
4. Learning systematic methods of construction of buildings.
5. Learning to represent building construction in the form of drawings, instructions and check the quality of the work.





## AR22B1.3C: ARCHITECTURAL DRAWING- I

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 0                | 4     | 4     | 4       | 50       | 50       | 100   | S             |

### Objectives of the Course:

- A. Familiarize the students with different drafting tools and accessories and their usage.
- B. Introduce the students to theoretical, practical and pictorial aspects of architectural drawings.
- C. Impart systematic methods to construct basic geometrical shapes in an accurate way.
- D. Provide clear understanding about measuring and representing in scale the real world objects.
- E. Impart ability to make neat, accurate and impressive method of graphic representation of buildings.

### Unit I: Free Hand Drawing and Lettering

Learning: sketching, drawing and visual thinking.

Drawing medium such as pencil, charcoal, graphite, pastels, brush, pen etc. and applications; Line strokes, shading, hatching, Indoor and Outdoor sketching of existing art, built and natural forms, figure drawing.

Lettering: Typography and Anatomy of type, Architectural Lettering-Letter strokes. Exercises in lettering used in architectural drawings including different letter types. Expression through drawings and models;

### Unit II: Basic Architectural Drafting

Drafting instruments and their usage;

Principals of drafting: Line weights, Line tones, Line types, text hierarchy etc.

Introduction to Geometry drawing and construction- elements of Geometry, Construction of lines and shapes;

Construction of planes- circles, tangents, curves, sections and regular polygons and other complex figures.

Representation of architectural materials and elements, Symbols, Human figures, vegetation, entourage; Use of scale in representation;

Introduction to Pictorial Drawings-Isometric, Axonometric and Oblique views;

### **Unit III: Measured Drawing**

Understanding of scales- representation factor, types of scales, dimensioning and their use in drafting practice;

Measured drawing of simple objects (like furniture, entrance gates etc.) and building components.(like cornices, columns, doors, windows etc. );

Techniques of measuring buildings and their details, drawing to Scale;

Reduction and Enlargement of drawings

Building drawings: Plan, section and elevation;

### **Unit IV: Geometrical Constructions**

Construction of basic geometrical shapes- Triangle, Square, Rectangle, Quadrilateral, Polygons inscribed in a Circle;

Construction of plane curves like Ellipse, Parabola, Hyperbola, Ionic volute, spiral, and helix.

Representation of 2D and 3D elements in plan elevation and Sections of solids and true shape of section such as prism, pyramids, cylinder, cones and spheres etc.

### **Unit V: Fundamentals of Documentation**

Introduction to Documentation-need, objectives;

Identification of basic building elements and their representation;

Visual documentation techniques through sketches, freehand drawing and photography;

On-site documentation and visual analysis of basic building elements of a site;

*Note: Unit V. Fundamentals of Documentation is purely for internal evaluation.*

### **Reference:**

1. Fraser Reekie, Reekies Architectural Drawing, 2006. ISBN 81-7649-086-5.
2. N.D. Bhatt and VM Panchal, Engineering Drawing: Plane and Solid Geometry, 42<sup>nd</sup> Edition, 2000.
3. John A. Nelson, Wannstrand Reinhold, Handbook of Architectural and Civil Drafting, New York, 1983. ISBN-0-442-26865-3.
4. Nickdunn, Architectural Model Making, 2<sup>nd</sup> Edition, 2013. ISBN 9781780671727.
5. Thomas Obermayer, Architectural Drafting (Residential and Commercial).

### **COURSE OUT COMES:**

After the completion of this course, the student will be able to:

1. Measure the parts of the buildings, prepare and present different architectural drawings.
2. Demonstrate the ability to systematically construct basic geometrical shapes accurately.
3. Demonstrate the ability to measure buildings parts and graphically represent to scale.
4. Demonstrate the ability to make neat, accurate and impressive method of graphic representation of buildings.

## AR22B1.4C: INTRODUCTION TO ART AND ARCHITECTURE

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 2                | 1     | 3     | 3       | 50       | 50       | 100   | W             |

### Objectives of the Course:

- A. Introduce the students to art, its theories and philosophies.
- B. Explain relevance of art in architecture and their inter relationship.
- C. Familiarize the students with the basics of architecture.

### Unit I: Introduction to Art

Purpose and relevance of art, Art consciousness: Aesthetics, Perception, Symbolism, Expression, Style, Fashion, Appropriateness and Values. Understanding works of Art; Its role meaning and purpose in terms of basic characteristics and development as an expression of culture; An understanding of basic vocabulary that is needed to describe a work of Art; Appreciation, Analysis and Critiquing of artwork

### Unit II: History of Art

Development of art; Timelines of Art History; changing nature of art through time in terms of content, form and material; Characteristics of art in Pre-historic, Classical, medieval, modern and contemporary periods; Art as an expression of Socio-cultural and political scenario of its time;

### Unit III: Exploration of Art Forms

Understanding types of arts: fine arts and performing arts; abstract nature of art; art forms: folk, classical and pop; Nature and characteristics of art forms such as Painting, Sculpture Dance, Drama, Music, The Film and Literature; Relationship between art and architecture;

### Unit IV: Introduction to Architecture as a Profession

Understanding of architecture as a response to human needs, role of architect in a building project, Architect's relation with other consultants, contractors and client, the changing role of architects, evolution of the profession of architecture with time; Technical knowledge and skills required for an architect, various subjects to be learnt by architecture students, their relevance to practice;

### Unit V: Understanding Shelter Forms

Shelter as a protection from the ravages of nature, various factors influencing the shelter forms in a region; shelter-form as a response to climate; relationship between house-form and culture; temporary, semi-permanent and permanent shelter forms; Architecture as a response to social, cultural, technological and environmental factors;

### **Unit VI: Seminar on Shelter Forms**

Shelter forms in various regions of the world, Examples of vernacular architecture in the world with special emphasis on the vernacular architecture of India.

*Note: Unit VI: Seminar on Shelter Forms is purely for internal evaluation and not for external evaluation.*

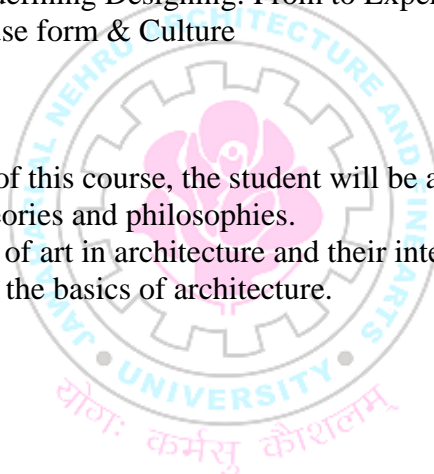
#### **Reference:**

1. Craven, C. Roy. Indian Art a Concise History.
2. Kumar, Raj (Ed.). Essays on Indian Art and Architecture. Discovery Pub., New Delhi, 2003
3. Fisher, E. Robert. Buddhist Art and Architecture. Thames and Hudson, London, 1993
4. Ghosh, A (Ed.). Jain Art and Architecture Vol. 1-3. Bharatiya Jnanpith, New Delhi
5. James C. Snyder, Introduction to Architecture, New York: McGraw Hill.
6. Christopher Alexander, Pattern Language, New York: Oxford University Press
7. Thomas Mitchell, Redefining Designing: From to Experience
8. Rapoport, Amos, House form & Culture

#### **COURSE OUT COMES:**

After the completion of this course, the student will be able to:

1. Understand art, its theories and philosophies.
2. Understand relevance of art in architecture and their inter-relationship.
3. Become familiar with the basics of architecture.



## AR22B1.5C: THINKING FOR ARCHITECTS

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 2                | 1     | 3     | 3       | 50       | 0        | 50    |               |

### Objectives of the Course:

- A. Develop thinking skills and familiarize learners with the importance of thinking in the field of Architecture.
- B. Develop techniques of critically analyzing the issues related to complex problems and real-world problems.
- C. Develop problem solving skills and abilities in a creative process using conceptual and graphic thinking.

### Unit I: Critical Thinking

Introduction to importance of thinking in Architecture, Critical thinking: Benefits of critical thinking, critical thinking as a tool and skill, critical thinking to encourage curiosity, creativity and problem solving ability; Components of critical thinking;

### Unit II: Creative Thinking

Creative thinking: disadvantages of depending on intuition, Convergent and Divergent thinking,, creativity as a skill and process, Lateral thinking as a tool for creativity, difference between vertical thinking and lateral thinking, the process of lateral thinking, techniques for generation of alternatives, problem solving in design.

### Unit III: Conceptual Thinking

Identifying patterns or connections between situations that are not obviously related, identifying the key or underlining idea or issues in complex situations; Challenging and improving the existing situation;

Looking for common factors in different situations and applying for problem situation, ability to recognize the value of problem solving in new ideas;

### Unit IV: Graphic Thinking

Visual thinking, use of graphic thinking in the process of solving complex problems; Use of graphics in the process of design; Use of graphics in abstraction, analysis, exploration and validation; Communication using graphics;

### Unit V: Problem Solving

Defining complex problems, understanding problems, prioritizing the problems, identification of potential causes for the problems, strategy and solutions, most feasible solutions, plan for implementing the solution, improving decision making skills;

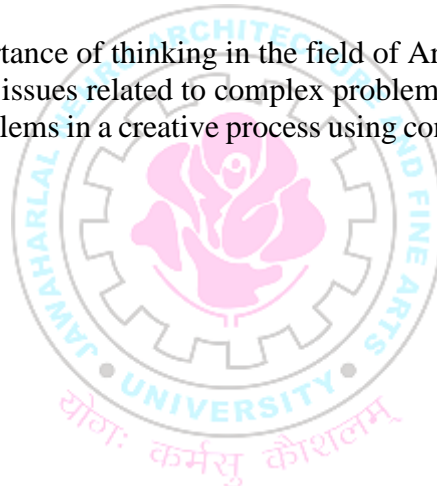
**Reference:**

1. Randy Deutsch, Think Like an Architect, RIBA publishing, London, 2020.
2. Jonathan Haber, Critical Thinking, The MIT Press, Cambridge, 2020.
3. Edward de Bono, Lateral Thinking: Creativity Step by Step, Harper & Row Publishers, New York, 1990.
4. John Adair, The Art of Creative Thinking, Kogan Page, London, 2007.
5. Daniel Kahneman, Thinking Fast and Slow, Farrar, Straus and Giroux, New York.
6. John S. Rhodes, Mind Maps, JJ Fast Publishing, LLC, 2013
7. Paul Laseau, Graphic Thinking of Architects & Designers, John Wiley & Sons, INC, New York, 2001.
8. Paul Klee, Notebook volume I, The Thinking Eye Lund Humphries, London, 1973.

**COURSE OUT COMES:**

At the end of this course, the student will be able to:

1. Understand the importance of thinking in the field of Architecture.
2. Critically analyse the issues related to complex problems and real-world problems.
3. Solve real-world problems in a creative process using conceptual and graphics thinking.



## GN22B1.1A: COMMUNICATION SKILLS

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 1                | 2     | 3     | 0       | 50       | 50       | 100   | P             |

### Objectives of the Course:

- A. Develop LSRW skills and familiarize with effective language usage.
- B. Learn techniques of formal communication- interpret, analyze and organize information.
- C. Introduce various genres of writing to the students.

### Unit I: Basics of Communication

Vocabulary: Collocations; Grammar: Sentence structures; Non-verbal communication: understanding how important our body language - gestures, posture, facial expressions are for effective communication.

Understanding Non-verbal Data (flow charts, tree diagram, tables) Speaking Skills: Pictionary or Describing Places / People/ Events

### Unit II: Basic Writing Skills

Vocabulary: Words often confused; Grammar: Tenses and their uses; Writing Skills: Essay writing – Types of Essay writing, How to write an essay. Letter writing (formal and informal) and Email writing (formal and informal), Minutes of the Meeting – What is MOM and format of MOM;

### Unit III: Professional Speaking Skills

Vocabulary: Idioms and Phrases. Grammar: Direct and Indirect Speech. Public speaking – Improve ability to communicate, overcome fear and anxiety, projecting confidence, develop leadership skill; Presentations – Guidelines for effective presentations and structuring the presentations;

### Unit IV: Professional Writing Skills

Grammar: Active and Passive Voice, Degrees of Comparison – Positive, comparative and superlative; Writing Skills: Self Expression – describing and conceptualizing students' work, Difference between Curriculum Vitae and Resume;

Review writing- descriptive and analytical review in nature, Resume writing: Writing a cover letter: what is a Covering letter and how to write one; How to write a Resume – positioning your resume to specific market and purpose;



## **Unit V: Reading Comprehension**

Vocabulary: Learning how to use a Dictionary (Both book and Online), Thesaurus- what is thesaurus and how to use it. Reading Comprehension – Unseen passages (Factual, descriptive and literary); Skimming, Scanning and SQ3R – understanding reading techniques and how to use them; Reading Books, Magazines, Newspapers, etc. and their interpretation; Social Media etiquettes; Attending academic and job interviews-Tips for attending interviews, Do's and Don'ts for an interview. How to start a conversation in interviews - Introducing one-self, Asking questions and giving polite replies;

### **Reference:**

1. Essential English–E.Suresh Kumar,P Sreehari,J Savithri
2. Practical Everyday English-Steven Collins
3. Introduction to English Phonetics and Phonology–Ulrike Gut
4. English Idioms in Use Advanced-Felicity O'Dell &Michael McCarthy
5. English Phrasal Verbs in Use-Michael McCarthy & Felicity O'Dell
6. Practice Makes Perfect-English Verbs- Loretta Gray
7. Speak Better Write Better English –Norman Lewis
8. Spoken English–Flourish Your Language- Robert Carmen
9. Make an Impact with your Written English- Fiona Talbot
10. How to Write Essays-A step-by-step guide for all evels with sample essays–Don Shiach
11. You Can Win- Shiv Khera
12. Who Moved My Cheese? An Amazing Way to Deal with Change in Your Work and in Your Life - Dr. Spencer Johnson

### **COURSE OUT COMES:**

At the end of this course, the student will be able to:

1. Demonstrate LSRW skills and familiarizing with effective language.
2. Interpret, analyze and organize information suitable for formal communication.
3. Articulate in different genres.



## P22B1.1C: BASIC DIGITAL TOOLS

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 1                | 2     | 3     | 2       | 50       | 0        | 50    |               |

### Objectives of the Course:

- Creating Digital awareness among the students that are important in the present competitive job market.
- Enabling the students to usage of the powerful content – creation tools which help them communicate their knowledge in the best way.
- Boosting student engagement in presenting their complex ideas quickly in visually compelling ways.
- Imparting the students with the evolving technology that allows them to create designs in 2D as well as 3D environments as well as simple flash animations.
- Introducing to the programming literacy and understanding web & mobile application technology which will develop ones career and drive growth for the business and work for own.

### Unit I: Basic Operations

Introduction to various software for documentation, presentation & drawing purposes; Operations such as creating, editing, formatting, saving in different file formats, compressions and security, exporting, importing, and printing documents; Familiarizing with the use of scanners, printers plotters etc;

#### Word Processing

Introduction to MS Word, toolbar, creating a new document, formatting text, inserting various objects, preparing the reports in MLA and APA formats, Proofing and Printing; Advanced word processing automatic indexing, merge documents, content page generation. PDFs

#### Spreadsheets

Introduction to Excel Spreadsheets, Formatting excel workbook, Perform Calculations with Functions, Create Effective Charts to Present Data Visually, Analyze Data Using Pivot, Protecting and Sharing the workbook, Proofing, and Printing, Databases / MS Access;

### Unit II: Powerpoint

Setting up PowerPoint Environment, applying themes, working with Objects, Animation and Slide Transition, Proofing, and Printing; Database packages MS-Access Introduction, Planning a Database, Creating Tables, Working with Forms, Creating queries, Reports, Printing–Importing data from other databases viz. MS Excel etc.;

Multi-media Presentations: Introduction to the multimedia presentation (like MS PowerPoint), creating a presentation, opening an existing presentation, creating a blank presentation, different PowerPoint views, slide manipulation, slide animation, slide transitions, view slideshow, navigating while in the slideshow, hyper-linking to other applications, scanning in different formats, setting of options, resolution settings, management of file size, integrating partial scans of large documents. Pack up a presentation for use on another computer, taking printouts;

### **Unit III: All Picture Formats**

**Graphical Concepts – I:** Raster Image based Software's (Adobe Photoshop/or Equivalent) Getting Acquainted with Photoshop, Basic Image Manipulation, Color Basics, Painting Tools, Brush Settings, Making Selections, Filling and Stroking, Layers, Advanced Layers, Text, Drawing, Using Channels and Masking, Manipulating Images, Getting to Know the Work Area, Basic Photo Corrections, Typographic Design.

**Graphical Concepts – II:** Vector Image based Software (CorelDraw/Adobe Illustrator / Equivalent) Photo editing and Desktop publishing (application) – Import and export of photo edited files, objects in photo editing, fills, outlines, total text control, basic toolbox of vector-based software (like CorelDraw or Equivalent), color management tools, starting your page right etc. Introduction to Adobe Animate / Equivalent;

**Graphical Concepts-III:** Document and Publication (Adobe InDesign / Equivalent) – Layouts, Alignments, Master Layout, Pages, Size, Document Layout, Graphics etc..

### **Unit IV: Sketchup (3D)**

Introduction to Sketchup, Understanding the Layout, Grouping and Components, Toolbar, Creating Basic Shapes, Painting, Materials, and Textures, Rendering, Adding Text and Dimensions, Importing plans and elevations, scale the plans, Aligning and Positioning Plans, Elevations, sections, modeling;

### **Unit V: Web & Mobile Applications, Basics of App Development, Introduction to Web Page Creation**

Programming languages

Introduction to C programming, Variables, standard library functions, I/O statements, branching statements (if, if-else, nested if, switch-case) and Looping controls (while, do-while, for), break and control statements.

Introduction to Python Script and Programming

### **Reference:**

1. Angela Rose, Microsoft Word In 30 Minutes, I30 Media Corporation, 2022
2. Alexander, Michael, and Dick Kusleika., Microsoft Excel 365 Bible. 1st ed., John Wiley & Sons, New Jercey, 2022
3. Donny Wise, Microsoft PowerPoint for Teachers and Students, Lulu.com, 2015
4. Allan Hanson, Learning Sketchup: A 3d Modeling Guide for Beginners, 2017
5. Greg Perry, C Programming Absolute Beginner's Guide, 3 rd Edition, Que Publishing, 2013
6. Eric Matthes, Python Crash Course, 2nd Edition: A Hands-On, Project-Based Introduction to Programming, No Starch Press, US, 2019.

### **COURSE OUT COMES:**

Upon successful completion of this course student will be able to:

1. Work with a word processing program and a desktop publishing software application which helps them to create on their own with quality, such as essays, resume, flyers, brochures, magazines, thesis reports.

2. Work with both raster and vector software which covers the gamut of image editing to creating banners, billboards, posters, digital artwork and designs, icons, logos, website graphics which can be widely used in advertising, branding or promotional content.
3. Compose effective presentations and slideshows and present complex concepts and ideas with clearly understandable graphs and pictograms.
4. Develop general 2D layout drawing and 3D modelling skills which can be used across various other platforms in any style they want.
5. Write simple computer programming and create simple shape animations.



**Bachelor of Architecture**  
**Second Semester Syllabus, R22**



## Course Structure for B.Arch.

**(Under the OBE and CBCS, Effective from the Academic Year 2022-2023)  
SECOND SEMESTER**

| S.No. | Course Code | Course Title                            | CoA group | Periods/Hours per week |           |           | Credits   | Marks      |            |            | End Exam |
|-------|-------------|---|-----------|------------------------|-----------|-----------|-----------|------------|------------|------------|----------|
|       |             |   |           | L/T/S                  | P/F/O     | Total     |           | Int.       | Ext.       | Total      | W/J/S/P  |
| 1     | AR22B2.1C   | Architectural Design – I                | PC        | 9                      |           | 9         | 9         | 100        | 100        | 200        | S        |
| 2     | AR22B2.2C   | Materials and Building Construction -II | BS        | 5                      |           | 5         | 5         | 50         | 50         | 100        | S        |
| 3     | AR22B2.3C   | Architectural Drawing – II              | PC        |                        | 4         | 4         | 4         | 50         | 50         | 100        | S        |
| 4     | AR22B2.4C   | Structural Mechanics                    | BS        | 3                      |           | 3         | 3         | 50         | 50         | 100        | W        |
| 5     | AR22B2.5C   | Site Surveying                          | BS        | 1                      | 2         | 3         | 3         | 50         |            | 50         |          |
| 6     | AR22B2.6A   | Model Making Workshop                   | PC        | 1                      | 2         | 3         | 3         | 50         |            | 50         |          |
| 7     | GN22B2.2A   | Environmental Studies                   | BS        |                        | 2         | 2         |           | 50         | 50         | 100        | J        |
|       |             |   |           | <b>19</b>              | <b>10</b> | <b>29</b> | <b>27</b> | <b>400</b> | <b>300</b> | <b>700</b> |          |

**Note:** L/T/S = Lecture/ Tutorial / Studio; P/F/O = Practical / Fieldwork / Others; End Exam W/J/S/P = Written (3 hours) / Jury/ Studio (5 hours) / Practical

## AR22B2.1C ARCHITECTURAL DESIGN – I

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 9                | 0     | 9     | 9       | 100      | 100      | 200   | S             |

### Objectives of the Course

- A. Understand design as a thinking and problem-solving activity
- B. Learn experientially the theoretical aspects of design from fundamentals.
- C. Learn the aspects of space-making interpreting form and function in design of spaces.
- D. Recognizing the determinants of form in architecture with the help of examples etc.

### Unit I: Design in Everyday Life

Basic definition (understanding) of Design, Basic definition (understanding) of Architecture: commodity, firmness and delight; appreciation of Design in nature and manmade things, Design at various levels: Urban Design, Architectural Design, Interior Design, Fashion Design, Product Design, Graphic Design; purposes of Design, Design as a problem solving exercise.

### Unit II: Unmeasurable and Measurable Aspects in Architecture

Quantitative and qualitative nature of aspects in architectural spaces,

Qualitative aspects: cultural, social, economic, comfort and convenience, psychological, aesthetics; temporal, contextual.

Quantitative aspects: dimensions, area, volume, Anthropometrics, Ergonomics, clearances, air velocity, temperature, light, noise; environmental response, structural.

Meaning of architectural spaces as an outcome of interaction between qualitative and quantitative aspects.

### Unit III: Differentiating and Delineating Spaces

Fluid nature of space, different types of spaces in built-environment, relationship between spaces, meaning and symbolism of spaces in different contexts: sacred and profane, men and women, front and back, private and public, habitable and inhabitable; concept of servant and serving spaces

Open, semi-covered and enclosed spaces; Elements of Space making: floor, walls, openings and roof

Architecture: the art of shaping space, concept of physical space, conceptual space and behavioural space.

### Unit IV: Form and Function

Form as physically manifested thing. Form as the outer shape and aesthetic expression of things; form as an outcome of ordering and composition, components of form in design.

Function as the utility of space. Form as an outcome of the functional aspect. Form as a complex set of relationship of spaces to be organized consciously so that the building performs the task. Understanding form and function as inseparable aspects of architecture and how they come together at various scales.

## **Unit V: Determinants of Form in Architecture**

Environment of the building; functional aspect; region, climate, landscape and natural lighting condition; materials; psychological demands of the space; spirit of time as explained by Paul Rudolph.

### **Guidelines for learning:**

Students learning progresses from a universal language of design to specific contexts in architecture. Design is introduced as a Problem-solving activity which requires effective methods. Design process and methodologies are introduced to help students learn experientially problem solving in architecture. Knowledge of Anthropometry is applied on small spatial settings. New concepts such as cognitive maps, bubble diagrams, Circulation patterns, space clearances, User requirements, Case-studies and Desk- Studies are introduced so as to integrate them into the thinking process.

### **Assignments to be formulated:**

Small problems in design are introduced to help students integrate theory and observations such as Form and Function into Architectural Design. Creative explorations are to be encouraged. Some exercises introduced to this level are: Critical appraisal of small residence; ATM, General store; florist; bakery; Coffee Shoppe, watchman's cabin, bus shelter, Petrol bunks, pavilions crutch etc.

At least two major exercises and two minor design/ time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

**Integration:** The design portfolio shall consists of doors and window details of the spaces designed. The specifications of the materials to be written and a line estimate based on carpet area, built up area has to be indicated.

### **References:**

1. James C. Snyder and Anthony J. Catanese, Introduction to Architecture, McGraw-Hill, New York, 1979.
2. Donald A. Norman, The Design of Everyday Things, MIT Press Cambridge, 2013.
3. Stephen Pheasant, Body Space: Anthropometry, Ergonomics and the Design of work, Taylor & Francis, London, 2003.
4. Yathin Pandya, Elements of Space making, Mapin Publishing Pvt. Ltd, 2007.
5. Francis D.K. Ching & James F.Eckler, Introduction to Architecture, John Wiley & Sons, Inc, New Jersey, 2013.
6. Leeland M.Roth and Amanda C. Roth Clark, Understanding Architecture Its Elements, History and Meaning, Roulledge, Newyork, 2018.
7. Francis D.K.Ching, Architecture Form, Space and order, John Wiley & Sons, Incs, New Jersey, 2007.
8. Brian Edwards, Understanding Architecture Through Drawing, Taylor & Francis, New York, 2008.
9. Alban Janson & Florian Tigges, Fundamental concepts of Architecture: The vocabulary of spatial situations, Birkhauser, 2014.
10. Charles Jencks and Karl Krompt, Theories and Manifestoes of Contemporary Architecture, Academy Editions, New York, 1997.

## E-resources:

|   |  |
|---|--|
| <a href="https://www.oxfordartonline.com/page/1394">https://www.oxfordartonline.com/page/1394</a>   | Artist's Work/Artist's Voice: Louis I. Kahn: Further Consideration   |
| <a href="https://www.oxfordartonline.com/page/artists-work-artists-voice:-louis-i.-kahn:-lesson-1/artists-work-artists-voice-louis-i-kahn-lesson-1">https://www.oxfordartonline.com/page/artists-work-artists-voice:-louis-i.-kahn:-lesson-1/artists-work-artists-voice-louis-i-kahn-lesson-1</a>   | Artist's Work/Artist's Voice: Louis I. Kahn: Lesson 1 What is Architecture?  |
| <a href="https://www.chiararubessi.com/works/proxemics-spacedesign/#:~:text=According%20to%20Hall's%20definition%20%E2%80%9CProxemics,The%20Hidden%20Dimension%2C%201966).">https://www.chiararubessi.com/works/proxemics-spacedesign/#:~:text=According%20to%20Hall's%20definition%20%E2%80%9CProxemics,The%20Hidden%20Dimension%2C%201966).</a>                       | The space Between The Proxemic in Space Design   |
| <a href="http://article.sapub.org/pdf/10.5923.j.ijpbs.20130304.04.pdf">http://article.sapub.org/pdf/10.5923.j.ijpbs.20130304.04.pdf</a>   | Ergonomics and Design A Reference Guide  |
| <a href="https://ftp.idu.ac.id/wp-content/uploads/ebook/ip/BUKU%20ANTROPOMETRI/Bodyspace%20Anthropometry,%20Ergonomics%20and%20the%20Design%20of%20the%20Work,%20Second%20Edition.pdf">https://ftp.idu.ac.id/wp-content/uploads/ebook/ip/BUKU%20ANTROPOMETRI/Bodyspace%20Anthropometry,%20Ergonomics%20and%20the%20Design%20of%20the%20Work,%20Second%20Edition.pdf</a> | Bodyspace Anthropometry, Ergonomics and the Design of Work   |
| <a href="https://iopscience.iop.org/article/10.1088/1757-899X/1090/1/012095/pdf#:~:text=Introduction%20Servant%20and%20served%20spaces,storage%2C%20or%20similar%20secondary%20space.">https://iopscience.iop.org/article/10.1088/1757-899X/1090/1/012095/pdf#:~:text=Introduction%20Servant%20and%20served%20spaces,storage%2C%20or%20similar%20secondary%20space.</a> | The Relationship between the Servant Spaces and the Served Spaces in Single Families Residential Patterns: Baghdad as a Case Study |
| <a href="https://www.thoughtco.com/form-follows-function-177237">https://www.thoughtco.com/form-follows-function-177237</a>   | The Meaning of 'Form Follows Function'<br>The famous architectural phrase said design should reflect activities                    |
| <a href="https://omrania.com/insights/the-multiple-meanings-of-function-in-architecture/">https://omrania.com/insights/the-multiple-meanings-of-function-in-architecture/</a>   |  |
| <a href="https://www.youtube.com/watch?v=lZGOyBzy5c8">https://www.youtube.com/watch?v=lZGOyBzy5c8</a>   | Louis Kahn's Architecture of the Room [Trenton Bath House, Esherick House, Exeter Library]   |

## Course Outcomes:

Upon successful completion of this course student will be able to:

1. Develop experiential relationship between theory and design in architecture.
2. Interpret human needs and experiences both qualitatively and quantitatively into spatial aspects.
3. Experience architecture as differentiating and delineating Spaces
4. Understand the significance of form and function in architecture
5. Interpret the determinants of form in architecture from real-world examples.



## AR22B2.2C MATERIALS AND BUILDING CONSTRUCTION – II

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 5                | 0     | 5     | 5       | 50       | 50       | 100   | S             |

### Objectives of the Course

- A. Impart comprehensive knowledge to the students on the building materials while highlighting the current innovations and trends.
- B. Prepare the students for a systematic study of building materials within the scope of ingredients, properties, manufacturing process, uses, installation and market price and application in real-life situations.
- C. Construction of building components and the Structural Systems of buildings.
- D. Impart systematic methods of building construction.
- E. Represent building construction in the form of drawings, instructions and check the quality of work.

### Unit I: Wood

Timber, types of sources of timber and properties, drying and seasoning, moisture contents, purpose of seasoning, natural and artificial methods; sawing of timber, shrinkage and distortion in timber, wastage, methods of sawing, defects in timber; Use and application of timber in construction such as doors and window frames, shutters, stair cases, floors, partitions, panelling and false ceiling; alternative materials as substitute to timber; relevant IS standards.

### Unit II: Plywood and Engineered Boards

Types of plywood and manufacturing process; types of laminates; laminated wood, veneers from different varieties of timber, their characteristics and uses; Industrial timber, engineered wood, black boards, MDF, HDF; gypsum and Processed Boards: Synthetic boards, properties and their applications; Insulating boards

### Unit III: Carpentry and Joinery

Terms defined; mitring, ploughing, grooving, rebating, veneering; various forms of joints in wood work: such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon, joinery schedule.

### Unit IV: Doors

Definition of terms, types of wooden doors their making and fixing: ledged, ledged and braced, panelled; hinged: single and double shutters; sliding, folding, revolving, pivoted doors, louvered doors, rolling shutters; flush door and UPVC doors

### **Unit V: Windows in wood and metal**

Fixed windows, Casement, top and bottom hung pivoted and sliding sash, cornered window, french window, louvered window, bay window, clerestory window, dormer window, gable window, skylights, fan lights, UPVC and PVC windows. Metal (steel and aluminium) windows, Preparation of shop-drawings for metal windows. Fixing mosquito screens, grills etc.

Hardware: fixtures, locks, hinges, fastenings for doors and windows

### **References:**

1. Barry. (1999). The Construction of Buildings, Vol- 2, 5th Edition. New Delhi: East West Press.
2. Mahaboob Basha S. (2015). Building Materials, Construction and Planning. Anuradha Publications.
3. Bhavikatti, S. (2012). Building Construction. New Delhi: Vikas Publications.
4. Bindra SP, Arora. SP. (2000). Building Construction: Planning Techniques and Methods of Construction, 19th ed . . New Delhi: Dhanpat Rai Pub.
5. Dr. BC. Punmia, E. A. (2016). Building Construction, 11th Edition. Laxmi Publications.
6. Duggal, S. (2019). Building Materials, 5th Edition. Delhi: New Age International Publications PVT.
7. Mckay, W. (n.d.). Building Construction-V, Vol 3, Metric 5th Edition. Pearson India Edition, Services Pvt.
8. Dr. Gurucharan Singh. (2017). Building Construction and Materials, 16th Edition. New Delhi: Standard Book House.
9. Varghese. (2019). Building Construction, 2nd Edition. New Delhi: PHI Learning PVT.
10. Varhese. (2019). Building Materials, 2nd Edition. . New Delhi: PHI Learning PVT.
11. Rangwala, S.C. Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.
12. Sushil Kumar. T.B. of Building Construction, 19th ed. Standard Pub, Delhi, 2003.
13. Roy Chudley and Roger Greeno,. Building Construction Handbook, (11th ed.).London&New york:Routledge, Taylor & Francis Group, 2016
14. Willibald Mannes, Techniques Of Staircase Construction,1st ed. London&New york: Van Nostrand Reinhold Company, 1979

### **COURSE OUTCOMES:**

After the completion of this course, students will be able to:

1. Gain knowledge on building materials and the current innovations and trends.
2. Carryout a systematic study of building materials in the scope of ingredients, properties, manufacturing process, uses, installation and market price with real life applications.
3. Represent graphically the components of buildings in formal methods.
4. Appraise systematic methods of construction of buildings.
5. Represent building construction in the form of drawings, instructions and recognise the quality of the work.

## AR22B2.3C ARCHITECTURAL DRAWING -II

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 0                | 4     | 4     | 4       | 50       | 50       | 100   | S             |

### Objectives of the Course:

- Appraise on the theoretical, practical, and visual aspects of architectural drawing
- construct orthographic projections applying precise techniques
- Comprehend the need for measuring real-world objects and spaces and their visual representation in drawings prepared to scale
- Acquire graphic skills and presentation techniques by using different artistic media and methods to depict built environments in a realistic manner.

### Unit I: Orthographic Projections

Introduction to Orthographic Projections, conventions. Orthographic Projections of points, lines, planes and solids. Introduction to Architectural drawings- Simple Floor plans, Sections, Elevations.

Development of Building drawings to depict important detailing- Furniture layout, hidden elements, built-in furniture labelling, etc.

### Unit II: Graphic Skills and Presentation Techniques

Composing of slides for presentation, sheet composition of drawings and designs for professional presentations, Presentation techniques for basic architectural drawings like bubble drawing, zoning map. Figure ground map, site plan, ground floor plans, sections, elevations etc.

### Unit III: Graphic Techniques

Data presentation techniques such as use of charts, diagrams and other info graphics  
Using graphics and text to represent design idea and clearly communicate the details and essential aspects Sheet background using title, story and content, composing for visual appeal.

### Unit IV: Basic Rendering Techniques

Introduction to Black and White Medium- Pen and Ink; Pencil; Pastels etc.

Introduction to rules of composition, study of Light, colors and tones, shades, tints in rendering exercises, Entourage. Tone styles-stippling, hatching, dots, overlapping, blending etc. Exercises in rendering of 3D forms and documented works including scene setting.

### Unit V: Basic Sciagraphy Techniques

Introduction to Sciagraphy - principles of shade and shadow. Shadow of lines, planes and simple solids. Shadows of architectural elements- shades and shadows. Simple drawing problem on orthographic projection and Sciagraphy for the same.

## **Unit VI: Architectural Documentation**

On site analysis of major activity spaces, through scale and measured drawings. Preparation of maps, plans, elevations, sections, views using different media of presentation such as sketching, drafting, collage, photos etc. Documentation of progressive work on site, preparation of report of detailed documentation for a historical monument.

*Note: Unit VI: Seminar on Shelter Forms is purely for internal evaluation and not for external evaluation.*

### **Reference Books:**

1. Francis D.K. Ching, Architectural Graphics, 5<sup>th</sup> Edition, ISBN 978-0-470-39911-8 ( pbk )
2. Dr. N. Kumara Swamy and A. Kameswara Rao, Building and Drawing, 2019, 9<sup>th</sup> Revised and Enlarged Edition.
3. N.D. Bhatt and VM Panchal, Engineering Drawing: Plane and Solid Geometry, 42<sup>nd</sup> Edition, 2000.
4. P. S. Gill, Engineering Drawing (Geometrical Drawing), 11<sup>th</sup> edition, charottar publications. ISBN 81-85749-62-0
5. Robert W. Gill, Rendering with Pen and Ink, Revised and Enlarged Edition, ISBN 978-81-767-097-8
6. Albert O.Halse, edited by Spencer L. George and Helen A. Halse, Architectural Rendering , International Edition 1989, ISBN-0-07-100498.

### **COURSE OUT COMES:**

At the end of this course, the student will be able to:

1. *Represent* three-dimensional objects and spaces as pictorial views and two dimensional drawings
2. *Communicate* technical understanding of simple built-spaces such as floor plans, sections and elevations.
3. Graphically *represent* visualized design ideas and proposals.
4. *Prepare* reports on architectural information of buildings and spaces.

## AR22B2.4C: STRUCTURAL MECHANICS

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 3                | 0     | 3     | 3       | 50       | 50       | 100   | W             |

### Objectives of the Course:

- To enrich the knowledge of students in understanding force systems, statics, and equilibrium
- To define and explain Mechanical and geometric properties of material used for structural elements.
- To understand the joints in structural elements and framing and the critical design parameters involved in design of joints.
- To introduce truss formation, its configuration in two and three dimensions and analysis of truss as a structural element.

### Course Contents:

#### Unit – I

**Forces** - Static forces and Equilibrium in a plane. System of forces, resultant and equilibrium. Parallelogram law, Triangle law, polygon law, Lami's Theorem. Resultant of coplanar, concurrent force system. Couple, characteristics of couple. Varignon's Theorem.  
Lateral forces – behavior of members under lateral loads

#### Unit – II

**Material Characterization** – Mechanical properties of elastic materials like Strength, Stiffness, Ductility, Toughness, brittleness, Quasi elastic and plasticity etc., Definition of Stress and Strain. Types of stresses and strains. Stress-strain curve for ductile Material, Hooke's law, Modulus of Elasticity, Compatibility conditions- Bars of Varying Section and Bars of Composite Section.

Relation between the three Elastic Constants - Poisson's Ratio, Shear modulus, Bulk Modulus.

Torsion - definition –as part of structural behavior, shear stresses under torsion

#### Unit – III

**Cross sectional Properties** – Area and lines of symmetry, Definition, formulae and calculation of Centroid for some standard shapes like L,T,C,I, hollow Sections etc., Moment of inertia - formulae and Derivation for calculation of Moment of Inertia to Rectangle, circle, L,T ,C, I Sections etc., Introduction to shear center.

**Stress Behavior in the cross sections** of members subjected to Axial, eccentric and lateral loads– Direct and Bending Stresses.

#### **Unit IV: Mechanics of Joints (Bolted, Riveted and Welded)**

**Bolted and Riveted Joints:** Introduction, Advantages and disadvantages, Sizes and Types of Bolts and Rivets - Lap and Butt joints, Study of failure of bolted and Riveted joints,

Forces in joints, Strength of a joint, Efficiency of a joint. Unwin's formula, Chain riveting and Diamond Riveting. Reference to the IS Code clauses. Design of Bolted joints under axial load.

**Welded joints:** Introduction, Advantages and disadvantages, types of welds, strength of fillet weld and Butt weld. Design of the welded joint to plates and unsymmetrical sections for axial loading.

#### **Unit V: Two Dimensional Trusses**

- Types of trusses, Statically Determinate and Indeterminate Trusses, Loads on trusses, 2-D truss analysis (Cantilever & Simply supported) using the method of joints.

Three Dimensional Trusses, Grids - Definitions and behavior, code provisions.

#### **Reference Books**

1. Khurmi. R.S. Strength of Materials, S. Chand and Co. Ltd., New Delhi, 1999.
2. Ramamrutham. S. Strength of Materials, 7th ed. Dhanpat Rai Pub. Co. Ltd., Delhi, 2004.
3. Timoshenko. S. and Young, D.H. Strength of Materials, McGraw-Hill International Editions.

#### **Course Outcomes**

At the end of the semester, student should be able to

1. Describe the force systems and equilibrium.
2. Classify the Engineering materials and demonstrate the material properties that helps them to distinguish their applications.
3. Explain the sectional properties for a structural member.
4. Discuss the different types of joints in a structure and design few basic joints types.
5. Discuss the types of 2-D trusses being used and examine the force system in basic truss systems.

## AR22B2.5C: SITE SURVEYING

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 1                | 2     | 3     | 3       | 50       | 0        | 50    |               |

### Objectives of the Course:

- A. To learn measurement on a site.
- B. To identify the levels on a site. To read a contour map.
- C. To analyse and plan a building on a site.
- D. To mark a plan on to the site.
- E. To extract the measurements from images.

### UNIT I: SURVEY METHODS AND EQUIPMENT

Importance of Surveying and Levelling in Architecture. Terminology, definitions and Classification of Surveying. Understanding the Instruments and accessories for each type of Surveying. Chain Surveying, Compass surveying, Plane Table surveying; Levelling instruments, Dumpy level, Theodolite, Electronic Distomat, Total Station Survey, and Satellite Imagery using GPS. Process of installation of Equipment on site, Temporary and permanent adjustments of equipment.

### UNIT II: SURVEY AND SITE PLAN PREPARATION

Difference between plot, site, land etc. Reconnaissance survey of the site to know the location, shape, and various topographical factors, natural and manmade things; Preparation of notes inclusive of preliminary hand sketches make quick notes; Importance of site Analyse site to establish appropriate location for the equipment on site and to decide the survey method;

Process of taking site measurements using each of the equipment, precautions in the process of measurements, possible errors and probable corrections. Importance of taking notes along with readings in the Field Measurement Book. Preparation of site plan, deciding the scale of site plan, marking the readings and measurements on the drawing sheet, representing the data on the site plans, computing area of site using different methods.

### UNIT III: LEVELING

Importance of Levelling in Site measurement. Identification of Bench Mark, Datum line and Reduced Levels (RLs). Instruments used for Levelling, deciding the location of installing the equipment for levelling, process of taking readings of levelling staff and marking them on Field Measurement Book. Applying the Calculations to readings in field book, deciding the scale of site plan, plotting the readings on drawing sheet, preparing contour maps with the requisite site data. Understanding and evaluating the existing topographic maps and contour maps for architectural design.



#### **UNIT IV: METHOD OF MARKING ON THE SITE:**

Clearing, cleaning levelling the site, understanding the site: orientation, outline and shape; establishing the boundaries and site dimensions, setting up the reference line and benchmark on the site, creating a right angle corner with respect reference line, marking the building block as per the drawing and given setbacks by marking parallel lines to the reference line, confirm right angle at all the corners of the block using 3,4,5. Check the diagonals to confirm to the right angles. Mark the wall centreline parallel to the first two reference lines as per the measurements given in the drawing, fix the centrelines properly,

For building with non-regular shapes, corners of the building to be established by intersection of arcs as per the drawing.

#### **UNIT V: EXTRACTING MEASUREMENTS FROM IMAGES**

Updating with the latest technological advances in surveying methods, using Graphical Interface methods, image lapping methods and virtual measurement methods in taking measurements from the Digital Images; Using GPS to read the satellite images and extract linear and angular measurements to the possible correctness; Image measurements and their refinement. Introduction to Coordinate Systems and Image Measurements, simple scales for Photographic measurements, Measuring Photo Coordinates with simple scales, Trilaterative method of photo coordinate measurement.

#### **Reference Books:**

1. Surveying and Levelling by Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni , Pune Vidyarthi Griha Prakashan.
2. Surveying and Levelling by Subramanian, Oxford University Press.
3. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain , Laxmi Publications.
4. Textbook of Surveying by C. Venkatramaiah , University Press.
5. Surveying, Vol. I & II by S. K. Duggal, TataMc-Graw Hill.

#### **Course outcomes:**

At the end of the semester, student should be able to

1. *Learn* to measure a site.
2. *Measure* the levels on a site and read a contour map.
3. *Analyse* and locate a building on a site.
4. *Mark* a plan on to the site.
5. *Extract* the measurements from images.



## AR22B2.6A: MODEL MAKING WORKSHOP

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 1                | 2     | 3     | 3       | 50       | 0        | 50    |               |

### Objectives of the Course:

- A. Review various tools and techniques and incorporate them in visual communication and model making.
- B. Prepare models to present the architectural design concepts.
- C. Learn photography of architectural models.

### UNIT I: INTRODUCTION TO MODEL MAKING

Understanding of various tools and machines and their methods in model making; safely guidelines in using sharp instruments and machines; exploring different materials used in physical model making: paper, wood, metal and Fiber, abstract models, realistic models, block models, planar models, solid models.

### UNIT II: 3D FORMS (SURFACE AND SOLIDS)

Site models, mockup models, design process models, study models, final models. Making of geometric models using paper, techniques of paper folding to create shapes into forms: Cube, Cuboid, Pyramid, Prism, Octahedron, Tetrahedron, Dodecahedron, 3d Compositions.

### UNIT III: CONTOURS AND LANDSCAPE ELEMENTS

Introduction to levels and contours, reading and translating into form with the help of paper/cardboard. Road, Pathways, Trees, Scrubs, Pavilion, Pergolas, Outdoor furniture, landscape lighting, railing, gate, compound wall, Vehicles, Swimming pool, Deck.

### UNIT IV: 3D ARCHITECTURAL MODELS

Understanding the presentation technique for built forms; Block Models; Exterior build form model: Villa, Hospital; Interiors model: Living, Bed Room, Kitchen, Toilet, Staircase; High Rise buildings, Stadiums, decorative lighting on models.

## **UNIT V: DIGITAL MODELS AND RAPID PROTOTYPING**

Process of Digital model making from file to finished product in digital fabrication, CNC, Jet cutting, 3D Printing and Laser Cutting, preparation of digital models for printing, giving input to machine using appropriate software's; materials used in digital printing: thermoplastic material, liquids, and powder grains being fused. Introduction to presentation skills in photography

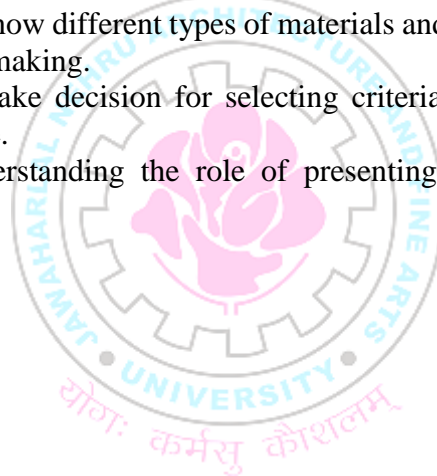
### **Reference Books:**

1. Paul Jackson. Folding techniques for designers, Laurence king; Mac Win Pa Edition 2011.
2. Catherine Woram. Paper Scissor Glue, Ryland Peters & Small Ltd 2011
3. Eugene Felder & Emmett Elvin. The complete book of drawing techniques, Kandour 2005

### **Course Outcomes:**

At the end of the semester, student should be able to

1. Students will get to know different types of materials and manufacturing techniques for Architectural model making.
2. Gain knowledge to take decision for selecting criteria of material according to the model has to be made.
3. Students get to understanding the role of presenting design concepts using three dimensional models.



## GN22B2.2A: ENVIRONMENTAL STUDIES

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 0                | 2     | 2     | 0       | 50       | 50       | 100   | J             |

### Objectives of the Course:

- A. Creating awareness among students about Environment and ecosystem.
- B. Inculcating the importance of bio-diversity and its conservation in students.
- C. Imparting knowledge to students about natural resources and how they need to be consumed.
- D. Sensitizing students to the issues involved in creating sustainable environment and framing the policies and practices in achieving it. Prepare models to present the architectural design concepts.
- E. Establishing the need of co-existence between the human community and the environment.

### UNIT I: THE ENVIRONMENT AND ECOSYSTEM

Environment and Environmental Studies: Definition, concepts, components and importance.

- 1.1 Ecosystem: Structure and function of ecosystem.
- 1.2 Food chain, food web and ecological pyramids.
- 1.3 Bio geo chemical cycles in ecosystems (Carbon, Nitrogen and Phosphorous cycles)
- 1.4 Ecosystem: Structure and function of ecosystem.
- 1.5 Food chain, food web and ecological pyramids.
- 1.6 Bio geo chemical cycles in ecosystems (Carbon, Nitrogen and Phosphorous cycles)
- 1.7 Ecosystem: Structure and function of ecosystem.
- 1.8 Food chain, food web and ecological pyramids.
- 1.9 Ecological succession: Definition, types, concept and process (Hydrosere, Xerosere)
- 1.10 Bio geo chemical cycles in ecosystems (Carbon, Nitrogen and Phosphorous cycles)

### UNIT II: BIODIVERSITY AND ITS CONSERVATIONS

- 2.1 Definition, concept, levels and values of biodiversity.
- 2.2 Biodiversity of India, India as a mega diversity nation, hotspots of biodiversity.
- 2.3 Threats of biodiversity (habitat loss, poaching of wildlife and man wildlife conflicts).
- 2.4 Conservation of biodiversity: In-situ conservation: ex-situ conservation.
- 2.5 Eco-tourism - concept of protected area network with special reference to wild life reserves in the region.

### **UNIT III: NATURAL RESOURCES AND THEIR CONSERVATION**

- 3.1 Forest Resources: Uses and over-exploitation of forests and consequences of deforestation.
- 3.2 Water Resources: Use and consequences of over-utilization - concept of rain water harvesting and watershed management - water conflicts.
- 3.3 Food Resources: Sources of food - impact of modern agriculture on environment (Fertilizer-pesticide problem, water logging and salinity) - organic farming.
- 3.4 Energy Resources: Renewable and non-renewable energy sources - growing energy needs and alternate energy sources.
- 3.5 Land Resources: Global land use patterns, soil erosion, and desertification and wasteland reclamation - The Save Soil movement.

### **UNIT IV: ENVIRONMENTAL POLICIES AND PRACTICES**

- 4.1 Climate changes - global warming - ozone layer depletion - acid rain and their impacts on human communities and agriculture.
- 4.2 Environment Laws: Environmental Pollution.  
**Definition, Cause, effects and control measures of:**  
(a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards  
  
Role of an individual in pollution control & pollution case studies.  
Wildlife Protection Act; Forest Conservation Act; Water (Prevention and control of Pollution) Act; Air (Prevention & Control of Pollution) Act; Environment Protection Act; Biodiversity Act.
- 4.3 International agreements: Montreal Protocol; Kyoto Protocol and Climate Negotiations; Convention on Biological Diversity (CBD).
- 4.4 Protected area network - tribal populations and rights - human wildlife conflicts in Indian context.

### **UNIT V: HUMAN COMMUNITIES AND THE ENVIRONMENT**

- 5.1 Human population growth: Impacts on Environment, Human Health and Welfare.
- 5.2 From unsustainable to sustainable development - Urban problems related to Energy - Water conservation, rainwater harvesting, and watershed management - resettlement and rehabilitation of people & case studies.
- 5.3 Environmental Disaster: Natural disasters - floods, earthquake, cyclones, tsunamis and landslides; Man-made disasters: Bhopal and Chernobyl disasters - Disaster Management.
- 5.4 Environmental movements: Bishnois Chipko, Silent Valley, Big Dam Movements.
- 5.5 Environmental ethics: Role of gender and cultures in environmental conservation issues and possible solutions.
- 5.6 Environmental education and public awareness - Consumerism and waste products - Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.

### Reference Books:

1. Environmental Studies: From Crisis to Cure by R. Rajagopalan (Oxford University Press).
2. Essentials of Ecology and Environmental Science by S.V.S. Rana (Prentice Hall India Learning Private Limited, New Delhi).
3. Introduction to Environment Management, M.M. Sulphery & M.M. Safeer (Prentice Hall India Learning Private Limited, New Delhi) (2015).
4. Environmental Law by Surender Kumar Sharma (Wisdom Press, New Delhi) (2015).
5. Ecology and Environment by P.D. Sharma (Rastogi Publications) (2018).
6. Environmental Science by S.C. Santra (New Central Book Agency, Kolkata) (2016).
7. Text Book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission (Orient Blackswan Pvt. Ltd., New Delhi).
8. Sustainable Development Goals and Indian Cities – Inclusion, Diversity and Citizen Rights (Part I), edited by Ashok Kumar & D.S Meshram (Routledge India, New Delhi).

### Course Outcomes:

At the end of the semester, student should be able to:

1. Define the basic concepts of the environment & eco-systems and their concerns and issues.
2. Apply their knowledge for efficiently conserving natural resources and achieving sustainable development.
3. Analyze the importance of biodiversity and its conservation.
4. Synthesize the policies and practices formulated by the Government and other agencies and propose alternative solutions and strategies.
5. Evaluate the relationship existing between human communities and their surrounding environment.

# **Bachelor of Architecture**

## **Second Year Syllabus, R22**

(As Approved as by Board of Studies, Architecture on 12-09-2023)



## Course Structure for B.Arch.

(Under the OBE and CBCS, Effective from the Academic Year 2022-2023)  
THIRD SEMESTER

| S.No | Course Code | Course Title                            | CoA group | Periods/Hours per week |       |       | Credits | Marks |      |       | End Exam |
|------|-------------|---|-----------|------------------------|-------|-------|---------|-------|------|-------|----------|
|      |             |   |           | L/T/S                  | P/F/O | Total |         | Int.  | Ext. | Total | W/J/S/P  |
| 1    | AR22B3.1C   | Architectural Design – II               | PC        | 9                      |       | 9     | 9       | 100   | 100  | 200   | J        |
| 2    | AR22B3.2C   | Materials and Building Construction III | BS        | 5                      |       | 5     | 5       | 50    | 50   | 100   | S        |
| 3    | AR22B3.3C   | Perspective and Rendering               | PC        |                        | 4     | 4     | 4       | 50    |      | 50    |          |
| 4    | AR22B3.4C   | History of Architecture – I             | PC        | 3                      |       | 3     | 3       | 50    | 50   | 100   | W        |
| 5    | AR22B3.5C   | Structural Analysis - I                 | BS        | 3                      |       | 3     | 3       | 50    | 50   | 100   | W        |
| 6    | GN22B3.1A   | Universal Human Values                  | SEC       | 3                      |       | 3     | 3       | 50    | 50   | 100   | J        |
| 7    | AR22B3.6C   | Climatology for Built Environment       | BS        | 2                      | 1     | 3     | 3       | 50    | 50   | 100   | W        |
|      |             |   |           | 25                     | 5     | 30    | 30      | 400   | 350  | 750   |          |

**Note:** L/T/S = Lecture/ Tutorial / Studio; P/F/O = Practical / Fieldwork / Others; End Exam W/J/S/P = Written (3 hours) / Jury/ Studio (5 hours) / Practical

## AR22B3.1C ARCHITECTURAL DESIGN – II

| Periods Per Week |       |       | Credits | Marks    |          |       | End Exam |
|------------------|-------|-------|---------|----------|----------|-------|----------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P  |
| 9                | 0     | 9     | 9       | 100      | 100      | 200   | J        |

### Objectives of the Course:

- A. To introduce the students to the pre-design phase and provide effective tools and methods in dealing with them.
- B. Emphasize the role of conceptual and creative thinking in the ideation phase using elements of visual language
- C. Develop a critical understanding of context specific approach in design.

### Unit I: Design Process

Understanding design as a cyclic process, iterative process for refinement, different stages involved in design: Pre-design studies, conceptual design, design development, evaluation and validation; design as analysis, synthesis and evaluation; design as Problem solving and decision making;

### Unit II: Case Study

Case-study method of research, enumeration of standards, selecting appropriate case, observations, documentation, analysis, inferences leading to design,

Study of form: built-form, structure, style, elements and meaning

Function: building type, served and servant spaces, circulation system, zoning, diagrammatic representation of figure-ground, circulation, orientation and sun path, lighting, air flow

Structure: structural system, materiality, construction and services

### Unit III: Understanding the context

Site and the environs: geographical, cultural and historical concerns; temporal, socio-economic aspects, climate and ecological aspects

Site analysis: understand the physical and environmental context of the site, including topography, climate, vegetation, and views, building orientation, site layout, landscaping and sustainability;



Cultural and historical research: understand the cultural and historical context of the site and its surrounding area. Understanding local traditions, culture, and architectural styles, historical events and landmarks

#### **Unit IV: Problem Seeking**

Critical appraisal of real-world situations, enumerating standards, listing of activities, spaces for activities, relevant spaces pertinent to building typology, quantity and quality of spaces; relationship between spaces: adjacencies, bubble diagrams;

Identifying the problem, understanding the problem, and define the design problem clearly; to prepare the design the program.

#### **Unit V: Concept Formulation**

Constraints or opportunities presented by the context of the site and typology of the building, abstract and graphical representation of ideas leading to the solution, Concept as a theme or central idea driving the design, metaphors in concept formation.

#### **Guidelines for learning:**

Dealing with the complexity of multiple spaces and their inter-relationships is the focus in this semester. Students need to sensitize themselves to the user requirements, design process, understanding the context and problem solving. Students are advised to more pursue more alternatives and do many iterations and refinements to their design in order to gain experience in solving real life problems.

#### **Assignments to be formulated:**

At least one major design exercise and one minor design in this semester.

In the major design exercise, emphasis to be given to the process and methods of design. Efforts have to be made to build-on what students have learnt in the previous semesters and integrate the learning in the present semester to ensure a systematic learning experience to the students. Students are to be encouraged in pursuing more alternatives. Students are to be encouraged to use physical model as a tool to visualize and validate their design.

The minor problems can be a Design Charrette or a time problem.

Type of Design Problems: Kindergarten, Balwadi, Primary Health Center, Architect's office, departmental store, Police Station, Post office, Café, Food Courts, Food Plaza, Plug and Play facility, Day Care, Small Bank, Doctor's clinic, Beauty Saloon etc.

**Integration:** The design portfolio shall consist of construction details of the spaces designed and the details of the building structural components in RCC. The students are expected make the staircase details as part of the portfolio. The built-up area has to be indicated; the specifications of the materials to be written, construction techniques, structural systems used

and the elements of built forms to become part of portfolio. Approximate estimate based on built-up area to be worked out.

**Reference:**

1. Karl Aspelund, The Design Process, 3<sup>rd</sup> Edition, Fairchild books, 2015.
2. William M.Pena, Steven A.Parshall, Problem Seeking: An Architectural Programming Primer, 5<sup>th</sup> Edition, John Wiley & Sons; 2012.
3. James Tait, The Architecture Concept Book, 1<sup>st</sup> Edition, Thames and Hudson, 2013.
4. Geoffrey Makstutis, Design Process In Architecture, Laurence King Publishing, 2018.
5. Joy W. Siegel, Thinking by Making: Architecture Design process Documented and Demystified, Blurb, 2023.
6. Gaston Bachelard, The Poetic of Space, Penguin Classics, 2014.

**E-resources:**

|   |  |
|---|--|
| <a href="https://www.re-thinkingthefuture.com/2021/01/12/a2830-8-concepts-trending-among-architecture-students/">https://www.re-thinkingthefuture.com/2021/01/12/a2830-8-concepts-trending-among-architecture-students/</a>               | Architecture Concepts :8 Concepts trending among Architecture Students |
| <a href="https://www.firstinarchitecture.co.uk/architecture-design-process/">https://www.firstinarchitecture.co.uk/architecture-design-process/</a>   | Architecture Design Process  |
| <a href="https://www.gov.wales/sites/default/files/publications/2018-09/site-context-analysis-guide.pdf">https://www.gov.wales/sites/default/files/publications/2018-09/site-context-analysis-guide.pdf</a>                               | Site and Context Analysis  |
| <a href="https://www.re-thinkingthefuture.com/rtf-fresh-perspectives/a1730-a-checklist-for-architectural-case-studies/">https://www.re-thinkingthefuture.com/rtf-fresh-perspectives/a1730-a-checklist-for-architectural-case-studies/</a> | A checklist for architectural case studies                             |
| <a href="https://archexamacademy.com/download/Programming-Planning-Practice/PPP_ProblemSeekingPena.pdf">https://archexamacademy.com/download/Programming-Planning-Practice/PPP_ProblemSeekingPena.pdf</a>                                 | Problem Seeking  |
| <a href="https://www.firstinarchitecture.co.uk/how-to-develop-architectural-concepts/">https://www.firstinarchitecture.co.uk/how-to-develop-architectural-concepts/</a>   | how to develop architectural concepts                                  |

**COURSE OUTCOMES:**

Upon successful completion of the course the students will be able to:

| COURSE OUTCOME | DESCRIPTION   |
|----------------|---|
| CO1            | Develop an effective design process model that familiarizes the students to the iterative nature of design.   |
| CO2            | Formulate methods of Case-study as an important phase in the design cycle and equip the students with necessary tools, procedural knowledge and skills        |
| CO3            | Investigate the Problem-Seeking methodology as a primer to gain in depth understanding of the design problem before an effective solution could be conceived. |
| CO4            | Create articulated design by adopting meaningful design rationale and engage in conceptual thinking to generate creative design concepts.                     |
| CO5            | Generate design solutions for diverse contextual settings such as user, site, built space, etc.   |

**COURSE OUTCOMES PROGRAM OUTCOMES MAPPING:**

| CO/PO | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 | PO-9 | PO-10 | PO-11 | PO-12 | PSO 1 | PSO 2 |
|-------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO 1  | 2    | 3    | -    | 2    | 2    | 2    | 2    | 2    | 1    | 2     | -     | 3     | 1     | 1     |
| CO 2  | 2    | 2    | 2    | 2    | 3    | 2    | 2    | 2    | 3    | 3     | 1     | 2     | 2     | 3     |
| CO 3  | 2    | 2    | 2    | -    | 2    | 2    | 2    | 1    | 1    | 2     | 1     | 2     | 3     | 2     |
| CO 4  | 3    | 2    | 3    | 2    | 3    | 2    | 3    | -    | 1    | 3     | 2     | 2     | 2     | 3     |

1 - Low Correlation    2 - Medium Correlation    3 - High Correlation



## AR22B3.2C MATERIALS AND BUILDING CONSTRUCTION – III

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 5                | 0     | 5     | 5       | 50       | 50       | 100   | S             |

### Objectives of the Course:

- A. Imparting comprehensive knowledge to the students on the building materials while highlighting the current innovations and trends.
- B. Preparing the students for a systematic study of building materials in the scope of ingredients, manufacturing process, properties, uses, installation and market price and application in real life problems.
- C. To explore materials like Glass and Floorings materials and the methods and techniques for constructing RCC components in building projects with comprehensive understanding of the underlying theory.
- D. To combine theoretical and practical instruction and equip the students to apply the knowledge to real-world situations, enabling them to make informed decisions when designing and constructing with RCC.
- E. Imparting how to represent building construction methods in the form of drawings, instructions and check the quality of work on site

### UNIT I: Glass and Glass Products:

Composition and manufacturing of float glass, types of glass: clear glass, tinted glass, wired glass, laminated glass; Properties of glass and use of glass in buildings; Special glasses: tempered glass, structural glass, glass blocks, glass-crete, and fiber glass.

### UNIT II: Floorings:

Essential requirements of a flooring material, criteria for selection of flooring material, natural and artificial materials for flooring; Properties of natural flooring materials: Kadapa stone, Kotah stone, Tandur stone, marble, flag stone, sandstone, rubber, wooden; Properties of artificial flooring materials: cement concrete, brick, terrazzo, vitrified tiles, ceramic tiles, Linoleum, PVC and PVA floorings, granolithic;

### UNIT III: Introduction to R.C.C.:

Understanding the properties and characteristics of RCC, Advantages and disadvantages of RCC: Cast-in-situ and pre-cast constructional methods in RCC. Constructional methods in RCC: ingredients, mixing, pouring, machinery and tools used in RCC; Structural components

of typical R.C.C. framed structure. Observing junctions of RCC beams and columns use of Ready Mix Concrete.

#### **UNIT IV: R.C.C. Building components:**

Foundations: Isolated footing viz. rectangular and trapezoidal footings, combined footings, shoe foundations, raft foundation and pile foundation. Step by step procedure for laying foundation and detailed construction process, Soil bearing capacity, criteria for deciding the type of foundation,

RCC columns – different shapes, different combinations and loading conditions, placing column footers, maintaining the plumb and orthogonality over the height of column and number of stories

RCC beams: Single and doubly reinforced beams, T and L beams, continuous beams, lintels and brackets, cover blocks, spacer bars, layers of Reinforcement : RCC slabs: One way and two way slabs, Reinforcement placing in cantilever slabs , chairs for Reinforcement. R.C.C Balconies, Chajjas.

#### **UNIT V: Staircases:**

Principles of staircase construction and its elements; Terms defined: Tread, riser, stringer, nosing, flight, landing, head room, handrail, balusters, newel post etc., types of stairs i.e., straight, doglegged, open-well, geometrical, circular, spiral, bifurcated, wooden stairs, stone stairs, metal stairs and elementary knowledge of R.C.C. stairs. Details of various staircases in wood, stone, steel and RCC; Thumb rules and safety provisions for staircases;

**(For Internal assessment only)**

#### **UNIT VI: Traditional Construction Methods**

Exploration and documentation of the following traditional elements from field with an emphasis to understand the methods:

Brick: Columns, brackets, corbelling, arches, domes, jalties and compound walls;

Stone: Columns, brackets, corbelling, arches, chajjas, and roofs;

#### **Reference:**

1. Bindra and Arora. Building Construction: Planning Techniques and Methods of Construction, 19th ed. DhanpatRai Pub., New Delhi. (2000)
2. Barry, The Construction of Buildings, Vol- 2, 5th Edition. New Delhi: East West Press. (1999)
3. McKay, W.B. Building, Construction Metric Vol. 1 – IV, 4th ed. Orient Longman, Mumbai. (2005)
4. Foster, J. Stroud. Mitchell, Building Construction: Elementary and Advanced, 17th ed. B.T. Batsford Ltd, London. (1963)
5. Ramamrutham,S. Reinforced Concrete Design, DhanpatRai Publishing company. (2013)
6. Willibald Mannes, Techniques Of Staircase Construction,1st ed. London&Newyork: Van Nostrand Reinhold Company. (1979)
7. SushilKumar,T.B. of Building Construction, 19th ed. Standard Pub. Distributors, Delhi. , (2003)

8. Dr. Gurucharan Singh, Building Construction and Materials, 16th Edition. New Delhi: Standard Book House. (2017)
9. Duggal, S. Building Materials, 5th Edition. Delhi: New Age International Publications PVT. (2019)
10. Dr. BC. Punmia, E.A. Building Construction, 11th Edition. Laxmi Publications..(2016)  
Rangwala, S.C Building Construction, 22nd ed. Charotar Pub. House, Anand. .(2004)

### E-resources:

|   |  |
|---|--|
| <a href="https://in.saint-gobain-glass.com/glass-manufacturing-process">https://in.saint-gobain-glass.com/glass-manufacturing-process</a>   | Manufacturing process of Glass, Types of Glass by Saint gobain.                  |
| <a href="https://johnkollyns.com/application-of-glass-in-building-and-construction/">https://johnkollyns.com/application-of-glass-in-building-and-construction/</a>   | Applications of Glass in buildings.  |
| <a href="https://theconstructor.org/building/types-of-flooring-materials-uses-building/16992/">https://theconstructor.org/building/types-of-flooring-materials-uses-building/16992/</a>   | Types of Floorings , applications of flooring materials,                         |
| <a href="https://www.civilprojectsonline.com/building-construction/introduction-to-design-of-rcc-structures/">https://www.civilprojectsonline.com/building-construction/introduction-to-design-of-rcc-structures/</a>   | Introduction to R.C.C. , Components of R.C.C., examples of R.C.C. structures     |
| <a href="https://www.linkedin.com/pulse/components-rcc-frame-structure-fourmarketing?trk=organization-update-content_share-article">https://www.linkedin.com/pulse/components-rcc-frame-structure-fourmarketing?trk=organization-update-content_share-article</a>   | Structural components of typical R.C.C. framed structure                         |
| <a href="https://www.ultratechcement.com/home-building-explained-single/the-right-way-to-install-rcc-footings-for-a-strong-home">https://www.ultratechcement.com/home-building-explained-single/the-right-way-to-install-rcc-footings-for-a-strong-home</a>   | Right way to install R.C.C footings. Step by step process of laying foundations. |
| <a href="https://tribby3d.com/blog/one-way-slab-and-two-way-slab/#:~:text=In%20a%20one%2Dway%20slab,it%20occurs%20in%20both%20directions.">https://tribby3d.com/blog/one-way-slab-and-two-way-slab/#:~:text=In%20a%20one%2Dway%20slab,it%20occurs%20in%20both%20directions.</a>   | R.C.C One way Slab and Two way Slab  |
| <a href="https://www.keuka-studios.com/types-of-stairs-2/">https://www.keuka-studios.com/types-of-stairs-2/</a>   | Types of Staircases, advantages and disadvantages                                |
| <a href="https://bmtpc.org/DataFiles/CMS/file/PDF_Files/61_PAC_Urbaanic_Final.pdf">https://bmtpc.org/DataFiles/CMS/file/PDF_Files/61_PAC_Urbaanic_Final.pdf</a>   | Precast concrete technology  |
| <a href="https://theconstructor.org/concrete/self-compacting-concrete-properties-tests/7683/">https://theconstructor.org/concrete/self-compacting-concrete-properties-tests/7683/</a>   | Self-compacting concrete, properties, applications                               |
| <a href="https://www.concrete.org/topicsinconcrete/topicdetail/High%20Performance%20Concrete?search=High%20Performance%20Concrete">https://www.concrete.org/topicsinconcrete/topicdetail/High%20Performance%20Concrete?search=High%20Performance%20Concrete</a>   | High performance concrete, applications and uses.                                |
| <a href="https://www.nbmccw.com/product-technology/construction-chemicals-waterproofing/concrete-admixtures/sustainable-concrete-an-inevitable-need-for-present-future.html">https://www.nbmccw.com/product-technology/construction-chemicals-waterproofing/concrete-admixtures/sustainable-concrete-an-inevitable-need-for-present-future.html</a> | Sustainable construction techniques in R.C.C. construction                       |
| <a href="https://moremargie.com/article/bricks-of-kerala">https://moremargie.com/article/bricks-of-kerala</a>   | Laurie Baker — Brick Genius  |
| <a href="https://nayeemasif.files.wordpress.com/2014/04/poetry-in-brick.pdf">https://nayeemasif.files.wordpress.com/2014/04/poetry-in-brick.pdf</a>   | Poetry in brick: the infamous architecture of Laurie Baker                       |

**COURSE OUTCOMES:**

Upon successful completion of the course the students will be able to:

| <b>COURSE OUTCOME</b> | <b>DESCRIPTION</b>   |
|-----------------------|--|
| <b>CO1</b>            | Demonstrate knowledge on glass, types of glass, natural and artificial flooring materials and R.C.C components.  |
| <b>CO2</b>            | Implement the knowledge of R.C.C construction in architectural design and appraise building materials in the scope of ingredients, properties, manufacturing process, uses, installation and market price with real life applications. |
| <b>CO3</b>            | Learn systematic methods of construction of buildings using R.C.C.   |
| <b>CO4</b>            | Prepare construction drawings as studio exercises along with the theoretical inputs on R.C.C.  |
| <b>CO5</b>            | Conduct site visits, case studies market surveys for flooring materials, Glass types, and documentation of R.C.C building components.  |

**COURSE OUTCOMES PROGRAM OUTCOMES MAPPING:**

| <b>CO/<br/>PO</b> | <b>PO-<br/>1</b> | <b>PO-<br/>2</b> | <b>PO-<br/>3</b> | <b>PO-<br/>4</b> | <b>PO-<br/>5</b> | <b>PO-<br/>6</b> | <b>PO-<br/>7</b> | <b>PO-<br/>8</b> | <b>PO-<br/>9</b> | <b>PO-<br/>10</b> | <b>PO-<br/>11</b> | <b>PO-<br/>12</b> | <b>PSO<br/>1</b> | <b>PSO<br/>2</b> |
|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|------------------|------------------|
| <b>1</b>          | 3                | 2                | 1                | -                | 1                | 2                | -                | -                | 2                | 3                 | -                 | 2                 | 2                | 1                |
| <b>2</b>          | 3                | 3                | -                | 1                | -                | 2                | 1                | -                | 2                | 3                 | 2                 | 1                 | 2                | 1                |
| <b>3</b>          | 3                | 2                | 1                | 3                | -                | 3                | -                | -                | -                | 1                 | -                 | 2                 | 3                | -                |
| <b>4</b>          | 3                | 2                | 2                | 2                | -                | 1                | -                | -                | -                | 3                 | -                 | -                 | -                | 3                |
| <b>5</b>          | 3                | 3                | -                | -                | -                | -                | 2                | 2                | -                | 3                 | 3                 | -                 | 1                | 2                |

1 - Low Correlation 2 - Medium Correlation 3 - High Correlation



## AR23B3.3C PERSPECTIVE AND RENDERING

| Periods Per Week |       |       | Credits | Marks    |          |       | End Exam |
|------------------|-------|-------|---------|----------|----------|-------|----------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P  |
| 0                | 4     | 4     | 4       | 50       | 0        | 50    | -        |

### Objectives of the Course:

- A. To impart the skills of composition, rendering and documentation for the presentation of the design ideas in real-life situation.
- B. To impart the skills in understanding of Perspective as a tool to visualize design in real-life environment
- C. To encourage the students to explore different rendering techniques that help them to visualize the different aspects of design.
- D. To train students in organizing and presenting the drawings in appropriate format for portfolios and Digital Presentations of their work.

### UNIT I: 3D Perception in Architecture

Three dimensional perception of simple forms, understanding views of the objects, components and characteristics of complex objects with respect to human eye in a visual environment.

### UNIT II: Perspective Views

Representation of 3D Objects on flat surface; preparation of perspective views of buildings from plans and elevations. One point and Two Point Perspectives of Buildings and Interiors. Understanding perspective components like Horizon Level, Stationary Point Vanishing Point and Picture Plane; constructing One point and Two Point Perspectives views in detail. Introduction to 3 Point Perspective

### UNIT III: Rendering

Study of the surfaces, textures and colours of buildings in different light conditions and materials; Developing Shades and Shadows of building on vertical and horizontal planes and in perspective; Application of manual and digital techniques of rendering in perspective with various media;



## UNIT IV: Sciagraphy

Constructing Shadows on vertical and horizontal surfaces of a building near to reality. Representation of Shadows of different elements like Trees, Shrubs, Human Figures and other elements in the drawing.

## UNIT V: Graphics and Composition

Illustration Techniques, Page making, Portfolio Design and formats, Brochure preparation. Digital Techniques in rendering and graphics.

### Reference:

1. Robert Gill, "Rendering with Pen and Ink", The Thames & Hudson Manuals, 1984.
2. Bellings, Lance Brown, " Perspective, Space and Design".
3. Holmes, John M, " Sciagraphy ", Sir Isaac Pitman & Sons, 1952
4. Dick Powell, "Design Rendering Techniques- A Guide to Drawing and Presenting Design Ideas ", 1986.
5. Sara Eisenman, Building Design Portfolios: Innovative Concepts for Presenting Your Work (Design Field Guide) , 2008.

### E-resources:

|   |   |
|---|---|
| <a href="https://doi.org/10.3390/su13116223">https://doi.org/10.3390/su13116223</a>   | The Drawing and Perception of Architectural Spaces through Immersive Virtual Reality, Sustainability 2021   |
| <a href="https://ieeexplore.ieee.org/abstract/document/9615339">https://ieeexplore.ieee.org/abstract/document/9615339</a>   | The Digital Perception of Architectural Space, <i>Hugo C. Gomez</i>   |
| <a href="https://ieeexplore.ieee.org/author/37717691400">https://ieeexplore.ieee.org/author/37717691400</a>   | Using Architectural Perspectives ,<br><i>Eoin Woods</i>   |
| <a href="https://www.journals.uchicago.edu/doi/abs/10.2307/750956?journalCode=jwci">https://www.journals.uchicago.edu/doi/abs/10.2307/750956?journalCode=jwci</a>                               | The Perspective of Shadows: The History of the Theory of Shadow Projection, <i>Thomas Da Costa Kaufmann</i> |
| <a href="https://books.google.co.in/books?id=hoTOJJdyG3EC&amp;sitesec=buy&amp;source=gbs_vpt_read">https://books.google.co.in/books?id=hoTOJJdyG3EC&amp;sitesec=buy&amp;source=gbs_vpt_read</a> | Design Drawing Techniques: For Architects, Graphic Designers & Artists,<br><i>Tom Porter, Sue Goodman</i>   |

## COURSE OUTCOMES:

Upon successful completion of the course the students will be able to:

| COURSE OUTCOME | DESCRIPTION  |
|----------------|--|
| CO1            | Perceive the Objects in Three Dimensional Environment and able to create 2 D drawings of the same.   |
| CO2            | Develop a perspective drawing understanding the scale and visual geometry of the buildings representing ideas of Design.                                     |
| CO3            | Render a perspective understanding different light conditions and environment that enhances the value of drawings close to reality.                          |
| CO4            | Construct shadows on Building Facades as well as objects associated in the Landscape like Trees, Human Figures considering the day light at different times. |
| CO5            | Compose architectural design work in the form of Portfolio using Illustration and Digital techniques for a professional presentation.                        |

### Program Articulation Matrix

| Course Code  | CORRELATION WITH PROGRAM OUTCOMES |     |     |     |     |     |     |     |     |       |       |       | CORRELATION WITH PROGRAM SPECIFIC OUTCOMES |       |       |       |
|--------------|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|--|-------|-------|-------|
|              | PO 1                              | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1 0 | PO1 1 | PO1 2 | POS 1                                      | POS 2 | POS 3 | POS 4 |
| AR17B 3.2C.1 | 3                                 |     |     |     |     | 3   |     |     | 2   |       |       | 3     |  |       |       |       |
| AR17B 3.2C.2 | 3                                 |     |     |     |     |     |     |     | 2   |       |       | 1     |  |       |       |       |
| AR17B 3.2C.3 | 2                                 |     |     |     |     |     |     |     | 3   | 2     |       | 3     |  |       |       |       |
| AR17B 3.2C.4 | 2                                 |     |     |     |     |     |     |     |     |       |       | 2     |  |       |       |       |
| AR17B 3.2C.5 | 3                                 | 2   |     |     | 1   | 3   |     |     | 3   | 3     |       | 3     |  |       |       |       |

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

## AR 22B3.4C HISTORY OF ARCHITECTURE - I

| Periods Per Week |       |       | Credits | Marks    |          |       | End Exam |
|------------------|-------|-------|---------|----------|----------|-------|----------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P  |
| 3                | 0     | 3     | 3       | 50       | 50       | 100   | W        |

### Objectives of the Course:

- To expose the students to a wide spectrum of architectural styles ranging from pre-historic to pre-modern times.
- To elucidate the evolution of architecture in relation to time with special emphasis on social, religious and environmental factors.
- To make the students understand the developments in the construction technology in different periods.

### Unit I: Ancient Civilizations

Architectural developments of the ancient civilizations, Mesopotamia: Ziggurats and other built-forms; in Indus valley: people and culture, development of town-form, built-form, community living, building typologies, brick masonry and sanitation system;

### Unit II: Architecture of Egypt

Elements of nature in architecture of Egypt, Study of Pyramids and construction process, Temples, Mastabas, residences; study of architectural elements, hypostyle halls, obelisk, hieroglyphs

### Unit III: Architecture of Greek period

Architecture in the Classic Greek periods: different orders, optical correction and appreciation of perfection in architecture; Study of Greek buildings like: temples, agora, house-forms; construction of elements like arches and columns;

### Unit IV: Architecture of Roman Period

Architecture in Roman period: grand scale, application of Greek orders, addition of new orders, construction of pointed arches and vaults, use of puzzolana concrete, study of different typologies of public buildings and residential buildings; development of roads and aqueducts.

### Unit V: Architecture of Medieval Period

Architectural developments: churches and Basilicas; development of plan-form of churches in the Early Christian; developments of domes in Byzantine; Churches of Romanesque; churches of Gothic period in Europe and rest of the world excluding Asia; introduction of newer architectural elements in churches of Gothic period

**Reference:**

1. Fletcher, Sir Banister. A History of Architecture, 19th ed. CBS Pub., Delhi, 1992.
2. Yarwood, Doreen. A Chronology of Western Architecture. B.T. Batsford Ltd., London, 1987.
3. Schulz, Christian Norberg. Meaning in Western Architecture, 2nd ed. Rizzoli Intl. Pub., New York, 1981.
4. Copplstone, Trewin and Others. World Architecture: An Illustrated History, 11th ed. Hamlyn, London, 1979.
5. Bindoo. D.D, History of Architecture, Milind P Lakshana, Hyderabad – 2006.
6. Wittkaner R Architectural Principles in the Age of Humanism, Chichester :Academy Editions 1998.

**E-resources:**

|   |   |
|---|---|
| <a href="https://www.worldhistory.org/Indus_Valley_Civilization/">https://www.worldhistory.org/Indus_Valley_Civilization/</a>   | Indus Valley Civilization                                       |
| <a href="https://www.khanacademy.org/humanities/world-history/world-history-beginnings/ancient-india/a/the-indus-river-valley-civilizations">https://www.khanacademy.org/humanities/world-history/world-history-beginnings/ancient-india/a/the-indus-river-valley-civilizations</a> | Indus River Valley civilizations                                |
| <a href="https://en.unesco.org/silkroad/sites/default/files/knowledge-bank-article/vol_I%20silk%20road_the%20indus%20civilization%20BIS.pdf">https://en.unesco.org/silkroad/sites/default/files/knowledge-bank-article/vol_I%20silk%20road_the%20indus%20civilization%20BIS.pdf</a> | THE INDUS CIVILIZATION1   |
| <a href="https://www.history.com/topics/ancient-egypt/ancient-egypt">https://www.history.com/topics/ancient-egypt/ancient-egypt</a>   | Ancient Egypt   |
| <a href="https://www.historymuseum.ca/cmce/exhibitions/civil/egypt/egcivile.html">https://www.historymuseum.ca/cmce/exhibitions/civil/egypt/egcivile.html</a>   | egyptian civilization   |
| <a href="https://www.history.com/topics/ancient-middle-east/mesopotamia">https://www.history.com/topics/ancient-middle-east/mesopotamia</a>   | Mesopotamia   |
| <a href="https://education.nationalgeographic.org/resource/resource-library-mesopotamia/">https://education.nationalgeographic.org/resource/resource-library-mesopotamia/</a>   | MESOPOTAMIA   |
| <a href="https://www.worldhistory.org/Greek_Architecture/">https://www.worldhistory.org/Greek_Architecture/</a>   | Greek Architecture  |
| <a href="https://artincontext.org/greek-architecture/">https://artincontext.org/greek-architecture/</a>   | Greek Architecture – An Exploration of Ancient Greek Structures |
| <a href="https://www.worldhistory.org/Roman_Architecture/">https://www.worldhistory.org/Roman_Architecture/</a>   | Roman Architecture  |
| <a href="http://www.classichistory.net/archives/early-christian-architecture">http://www.classichistory.net/archives/early-christian-architecture</a>   | Early Christian Architecture                                    |
| <a href="https://www.worldhistory.org/Byzantine_Architecture/">https://www.worldhistory.org/Byzantine_Architecture/</a>   | Byzantine Architecture  |
| <a href="https://engineering.tiu.edu.iq/architecture/wp-">https://engineering.tiu.edu.iq/architecture/wp-</a>   | Romanesque Architecture   |

|   |  |
|---|--|
| <a href="content/uploads/2019/11/4-Romanesque-Architecture.pdf">content/uploads/2019/11/4-Romanesque-Architecture.pdf</a>   | History of Architecture  |
| <a href="https://www.worldhistory.org/article/1649/gothic-cathedrals-architecture--divine-light/">https://www.worldhistory.org/article/1649/gothic-cathedrals-architecture--divine-light/</a>   | Gothic Cathedrals: Architecture & Divine Light   |
| <a href="https://www.worldhistory.org/Renaissance_Architecture/">https://www.worldhistory.org/Renaissance_Architecture/</a>   | Renaissance Architecture   |
| <a href="https://www.youtube.com/watch?v=uUumTRgCCx8&amp;t=37s">https://www.youtube.com/watch?v=uUumTRgCCx8&amp;t=37s</a>   | Baroque & Rococo Architecture  |
| <a href="https://cavitt.eurekausd.org/documents/Parents/PTC/Art%20Docent%20Presentations/8th%20Grade/Revised_Oct2015_Neoclassical_Architecture_Presentation.pdf">https://cavitt.eurekausd.org/documents/Parents/PTC/Art%20Docent%20Presentations/8th%20Grade/Revised_Oct2015_Neoclassical_Architecture_Presentation.pdf</a> | Neoclassical Architecture  |
| <a href="https://victorianweb.org/art/architecture/stevenson/renaissance.html">https://victorianweb.org/art/architecture/stevenson/renaissance.html</a>   | The Renaissance in England   |
| <a href="https://victorianweb.org/art/architecture/indian/index.html">https://victorianweb.org/art/architecture/indian/index.html</a>   | Moorish, Saracenic, Northern Indian, and Islamic, Architectural Styles in Great Britain, the Empire, and Other Countries |

### COURSE OUTCOMES

After the completion of this course, students will be able to

|     |   |
|-----|---|
| CO1 | Identify the common characteristics of a particular architectural style   |
| CO2 | Describe the development of built form in response to socio religious, aesthetic, and environmental factors of architecture from prehistoric to modern times. |
| CO3 | Illustrate various building types, construction methods, architectural characteristics of prehistoric, classical, medieval and pre modern periods.            |
| CO4 | Recognize the architectural elements used in different time periods.  |

### CO/PO Mapping

| CO  | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 | PO-9 | PO-10 | PO-11 | PO-12 |
|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| CO1 | 1    | -    | -    | 2    | 3    | 3    | 2    | -    | 1    | 2     | -     | 2     |
| CO2 | 3    | 2    | 1    | 1    | 2    | -    | 2    | 3    | 3    | 2     | -     | 2     |
| CO3 | 3    | 2    | 1    | 3    | 3    | 3    | 2    | 1    | 1    | 3     | 1     | 2     |
| CO4 | 1    | 2    | -    | 2    | 2    | 1    | 1    | 2    | 1    | 3     | -     | 2     |

## AR22B3.5C: STRUCTURAL ANALYSIS -I

| Periods per week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 1                | 2     | 3     | 3       | 50       | 50       | 100   | W             |

### Objectives of the Course:

- A. To understand the shear force and bending moments in determinate beams.
- B. Classify the shear and bending stress behaviour for beams.
- C. Enrich shear force and bending moment to fixed beams and propped cantilevers.
- D. To develop the magnitude of deflections for simply supported and cantilever beams for point load and uniformly distributed load.
- E. To develop the skills to analyse the reactions, horizontal thrust and bending moment for 3 hinged arches.
- F. Understand the structural behaviour of domes and vaults, chimneys and retaining walls.

### UNIT I: Flexure, Analysis of Flexural Members

Flexure, analysis of flexural members - Types of Beams, types of supports, types of loads. Calculation of reactions. Definition of shear force & Bending Moment, Relation between loadings, SF & BM. Plotting SFD, BMD for Cantilever, simply supported (S.S), and over hanging. Definition of Point of contra flexure, its location.

### UNIT II: Flexure Members - Bending and Shear

Cross sectional Behaviour of flexural members.  
Bending Stresses: Introduction to Theory of simple bending, pure bending, Assumptions, derivation of flexure formula, section modulus, calculation of bending stress distribution in the Cross section of member. Numerical solutions.  
Shear stresses Introduction to shear stress in beams, shear stress formula, shear stress distribution for standard shapes like Rectangle, Circle, I,T Section, etc., Numerical solutions.  
Torsion in beams – Behaviour of members subjected to Torsion

### UNIT III: Fixed Beams and Propped Cantilevers

Fixed beams - Introduction to behavior of fixed beams, Advantages and disadvantages of fixed beams over simply supported beams, SFD & BMD for fixed beams with combination of point loads & UDL (No derivations)  
Propped Cantilevers - Introduction to behavior of Propped Cantilevers, Reaction of propped Cantilevers with UDLs and point loads. Drawing SFD and BMD. Slope and Deflection at end and the intermediate positions.

### UNIT IV: Deflection

**Deflection** – Understanding the behavior of deflection in beams under various loads and various support conditions.  
Slope and deflection of cantilever beams and simply supported beams for various loads using Double integration method, moment area method and Macaulay's method

## UNIT V: Arches, Chimneys and Retaining Walls

Arches: Types of Arches (2, 3 hinged) and behavior of arches under various loads. Funicular shapes for loads. Different geometry of arches. Determination of support reactions, horizontal shear, bending moment, horizontal thrust and radial shear. Mainly for three-hinged parabolic and segmental arches with supports at same and different levels.

Structural behavior of Vaults and Domes along with the Force flow showing the way the statics operate.

Structural behavior of Chimneys and Retaining Walls to lateral loads.

### Reference:

1. **Khurmi. R.S.** Strength of Materials, S. Chand and Co.Ltd., New Delhi, 1999.
2. **S S Bhavikatti** Mechanics of Structures, Vikas Publishing House, New Delhi, January 2021
3. **H. J. Shah, S. B. Junnarkar**, Mechanics of Structures Vol. II 32<sup>nd</sup> ed., Charotar Publishing house, 2016
4. **Gambhir M.L.** Fundamentals of Structural Mechanics and Analysis, Prentice Hall India Learning Private Limited, January 2014
5. **Ramamrutham. S.** Theory of Structure 11th ed., Dhanpat Rai Publishing Company Ltd. January 2020.
6. **Timoshenko. S. and Young, D.H.** Theory of Structures, McGraw-Hill, International Editions

### E-resources:

|   |  |
|---|--|
| <a href="https://www.studocu.com/en-us/document/university-of-memphis/reinforced-concrete-design/chapter-5-flexural-analysis-and-design-of-beams/1060825">https://www.studocu.com/en-us/document/university-of-memphis/reinforced-concrete-design/chapter-5-flexural-analysis-and-design-of-beams/1060825</a> | Flexural Analysis and Design of Beams.                             |
| <a href="https://www.bu.edu/moss/mechanics-of-materials-bending-shear-stress/">https://www.bu.edu/moss/mechanics-of-materials-bending-shear-stress/</a>   | Bending shear stress mechanics of members                          |
| <a href="https://www.engineeringtoolbox.com/beams-fixed-both-ends-support-loads-deflection-d_809.html">https://www.engineeringtoolbox.com/beams-fixed-both-ends-support-loads-deflection-d_809.html</a>   | Analysis of fixed beams for various loads and end conditions       |
| <a href="https://www.sciencedirect.com/topics/engineering/proppe-d-cantilever">https://www.sciencedirect.com/topics/engineering/proppe-d-cantilever</a>   | Propped cantilever practical applications                          |
| <a href="https://skyciv.com/docs/tutorials/beam-tutorials/what-is-deflection/">https://skyciv.com/docs/tutorials/beam-tutorials/what-is-deflection/</a>   | Deflection in beams in various types.                              |
| <a href="https://www.structuralbasics.com/arch-structure-bending-moment">https://www.structuralbasics.com/arch-structure-bending-moment</a>   | Arch structure: Bending moment, normal and Shear force calculation |

### COURSE OUTCOMES:

Upon the successful completion of the course, the student will be able to

| COURSE OUTCOME | DESCRIPTION  |
|----------------|--|
| CO1            | Assess the shear force and bending moments in determinate beams.   |
| CO2            | Analyze shear and bending stress behavior for beams  |
| CO3            | Evaluate shear force and bending moment to fixed beams and propped cantilevers.  |
| CO4            | Compute the magnitude of deflections for simply supported and cantilever beams for point load and UDL.   |
| CO5            | Analyze 3 hinged arches to perform bending moment calculations. Understand structural behavior of domes, vaults, chimneys and retaining walls. |



**COURSE OUTCOMES PROGRAM OUTCOMES MAPPING:**

| <b>AR17B<br/>3.5C</b> | <b>PO-<br/>1</b> | <b>PO-<br/>2</b> | <b>PO-<br/>3</b> | <b>PO-<br/>4</b> | <b>PO-<br/>5</b> | <b>PO-<br/>6</b> | <b>PO-<br/>7</b> | <b>PO-<br/>8</b> | <b>PO-<br/>9</b> | <b>PO-<br/>10</b> | <b>PO-<br/>11</b> | <b>PO-<br/>12</b> | <b>PSO<br/>1</b> | <b>PSO<br/>2</b> |
|-----------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|------------------|------------------|
| <b>CO-1</b>           | 3                | 2                | 2                | -                | 2                | 2                | -                | 1                | -                | -                 | -                 | -                 | 2                | -                |
| <b>CO-2</b>           | 3                | 2                | 2                | -                | 2                | 3                | 1                | -                | 2                | -                 | -                 | 2                 | 2                | 2                |
| <b>CO-3</b>           | 3                | 2                | 2                | 2                | 2                | 3                | -                | 1                | 2                | 2                 | 2                 | 2                 | 2                | 3                |
| <b>CO-4</b>           | 3                | 2                | 2                | 2                | 2                | 2                | -                | 1                | 2                | 2                 | -                 | 2                 | 2                | 2                |
| <b>CO-5</b>           | 3                | 2                | 2                | -                | -                | 2                | 2                | -                | -                | -                 | -                 | 2                 | 2                | 2                |





## GN22B3.1A: UNIVERSAL HUMAN VALUES

| Periods per week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 1                | 2     | 3     | 3       | 50       | 50       | 100   | J             |

### Unit I

#### Introduction to Value Education (6 lectures and 3 tutorials for practice sessions)

Lecture1: Understanding Value Education

Lecture2: Self-exploration as the Process for Value Education

Tutorial 1: Practice Session PS 1 Sharing about One-self

Lecture3: Continuous Happiness and Prosperity– the Basic Human Aspirations

Lecture 4: Right Understanding, Relationship, and Physicality

Tutorial 2: Practice Session PS 2 Exploring Human Consciousness

Lecture5: Happiness and Prosperity– Current Scenario

Lecture6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS 3 Exploring Natural Acceptance

### UNIT II

#### Harmony in the Human Being (6 lectures and 3 tutorials for practice sessions)

Lecture 7: Understanding Human being as the Co-existence of the Self and the Body

Lecture 8: Distinguishing between the Needs of the Self and the Body

Tutorial 4: Practice Session PS 4 Exploring the difference of Needs of Self and Body

Lecture9: The Body as an Instrument of the Self

Lecture10: Understanding Harmony in the Self

Tutorial 5: Practice Session PS 5 Exploring Sources of Imagination in the Self

Lecture11: Harmony of the Self with the Body

Lecture12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS 6 Exploring Harmony of Self with the Body

### UNIT III

#### Harmony in the Family and Society (6 lectures and 3 tutorials practice sessions)

Lecture13: Harmony in the Family –the Basic Unit of Human Interaction

Lecture14: Values in Human-to-Human Relationship

Lecture 15: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS 7 Exploring the Feeling of Trust

Lecture16: 'Respect'–as the Right Evaluation

Tutorial 8: Practice Session PS 8 Exploring the Feeling of Respect  
Lecture17: Understanding Harmony in the Society  
Lecture18: Vision for the Universal Human Order  
Tutorial 9: Practice Session PS9 Exploring Systems to fulfill Human Goal

#### **UNIT IV**

##### **Harmony in the Nature/Existence (4 lectures and 2 tutorials practice sessions)**

Lecture19: Understanding Harmony in the Nature  
Lecture 20: Interconnectedness, self-regulation, and Mutual Fulfillment among the Four Orders of Nature  
Tutorial 10: Practice Session PS 10 Exploring the Four Orders of Nature  
Lecture21: Realizing Existence as Co-existence at All Levels  
Lecture22: The Holistic Perception of Harmony in Existence  
Tutorial11: Practice Session PS 11 Exploring Co-existence in Existence

#### **UNIT V**

##### **Implications of the Holistic Understanding – a Look at Professional Ethics** (6lectures and 3 tutorials for practice session)

Lecture23: Natural Acceptance of Human Values  
Lecture24: Definitiveness of (Ethical)Human Conduct  
Tutorial 12: Practice Session PS 12Exploring Ethical Human Conduct  
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order  
Lecture26: Competence in Professional Ethics  
Tutorial 13: Practice Session PS 13 Exploring Humanistic Models in Education  
Lecture 27: Holistic Technologies, Production Systems and Management Models -Typical Case Studies  
Lecture28: Strategies for Transition towards Value-based Life and Profession

## AR22B3.7C CLIMATOLOGY FOR BUILT ENVIRONMENT

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam |
|------------------|-------|-------|---------|----------|----------|-------|----------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P  |
| 2                | 1     | 3     | 3       | 50       | 50       | 100   | W        |

### Objectives of the course:

- A. Understand systems that affect global climate and how the country has been divided into climatic zones.
- B. Understand factors that affect thermal gain in a built envelope and what indoor conditions are ideal for indoor human comfort also in the context of external climate.
- C. Sensitize the students to micro climate at site level and what elements may be used to modify micro climate for human comfort
- D. Train the students to modify building volumes and use proven passive design strategies to ensure thermal comfort
- E. Sensitize students to best practices in the area of climate sensitive design

### Unit I: Macro Climate:

Climate change, Global climatic factors: global wind currents and ocean currents , movement of earth around the sun, shape of the earth, angle of tilt, earth rotation and revolution ; Elements of climate: Solar radiation, temperature, humidity, wind velocity, precipitation; climatic zones in India: hot and dry, warm-humid, composite and temperate,cold; measurement of climatic data, instruments and measurement of climatological data, climatic data required for design of buildings and interpretation of graphical data.

### Unit II: Thermal Comfort

Importance of thermal comfort in buildings: thermal comfort factors: body's heat production and regulatory mechanisms, heat loss in various environments body heat balance deep body temperature; thermal comfort indices CET (corrected effective temperature), interpretation of psychometric charts, bioclimatic chart, human comfort ranges and levels. Basic principles of heat flow through buildings: conduction, convection, radiation, thermal properties of building materials steady state calculations and introduction to periodic heat flow.

### Unit III: Analysis of Climate

Analysis of microclimate from macro climate, site and the environs, factors effecting the micro climate at the site, instruments and methods used to carry out measurements of climate data: temperature, humidity, wind, precipitation, driving rain, sky conditions, solar radiation, vegetation, graphical representations of data,

Use of tools like mahoney's tables; climate consultant for analysing the requirements of buildings in relation to climate.

#### **Unit IV: Passive Solar Design Technologies**

Understanding Solar charts, orientation-siting of building with respect to sun and design of shading devices; passive cooling devices: humidity control, use of evaporative cooling, physiological cooling, convective cooling, ground cooling-earth air tunnel.

courtyard houses , night time cooling, reflective surfaces and radiant barriers, thermal mass, cavity walls, cool roof and green roof, stack effect ,wind catchers, Trombe walls and sun room,.

#### **Unit V: Ventilation and micro climate control through Landscape**

Ventilation: interpretation of wind-rose diagrams, Beaufort wind force scale, predicting air movement around site, airflow through buildings, natural ventilation: windward and leeward sides, position and size of openings, cross ventilation, borrowed ventilation, forced ventilation, window floor ratio, sick building syndrome.orientation and positioning of windows.

Plantation for: shading, wind buffer, dust control, minimizing the reflected ground factor in radiation, cooling through evapo-transpiration, use of water: evaporative cooling, misters.

#### **Unit VI: Design and Best Practices (for internal evaluation)**

Design process: Forward analysis, plan development, elements design stages, Design strategies for each climate (ref. Koenigsberger); effect of orientation , design of shading devices , heat flow calculations, Case study and climatic analysis of a local model building. Class discussions on national and International best practices as per climate and typology of building.

#### **Reference:**

1. Markus, T.A. and Morris. E.N., Buildings, Climate and Energy. Pitman Pub. Ltd., London, 1980.
2. Narashimhan ,An Introduction To Building Physics ,CBRI, 1974
3. Otto H Koenigsberger, O. H., Ingersoll, T. G., Mayhew, Manual Of Tropical Housing And Building – Part I – Climatic Design, Orient Longman Private Limited, 1975
4. Fred Pearce, Climate and Man, 1989
5. RamachandraGuha, Environmentalism: A Global History, 1999
6. Sustainable Buildings - Design Manual: Vol 2,TERI
7. Energy-efficient buildings in India, The Energy and Resources Institute (TERI), 2001
8. MiliMajumdar and MinniSastry, Green Homes and Workplaces, TERI
9. Building wise, CSE, 2021
10. Energy conscious Architecture, Ministry of non-conventional energy resources, GOI, Jan 2005.

## E-resources:

|   |   |
|---|---|
| <a href="https://www.teriin.org/">https://www.teriin.org/</a>   | <b>TERI</b> (The Energy and Resources Institute): This website provides information on sustainable development in India, including research on building energy efficiency and renewable energy. |
| <a href="https://www.cseindia.org/">https://www.cseindia.org/</a>   | <b>Centre for Science and Environment (CSE):</b> This website provides information on sustainable development in India, including research on building energy efficiency and renewable energy.  |
| <a href="https://thearchspace.com/5-different-climate-zones-in-india-and-their-important-characteristics/">https://thearchspace.com/5-different-climate-zones-in-india-and-their-important-characteristics/</a> | 5 different climatic zones in India.  |
| <a href="https://youtu.be/6D4ow2Wu1VA">https://youtu.be/6D4ow2Wu1VA</a>   | Heat Flow through buildings NPTEL (IIT Roorkee).  |
| <a href="https://archive.org/download/nationalbuilding02/in.gov.nbc.2016.vol2.digital.pdf">https://archive.org/download/nationalbuilding02/in.gov.nbc.2016.vol2.digital.pdf</a>                                 | NBC national building codes Part.8.   |

## COURSE OUTCOMES

After successfully completing the course the student will able to:

|             |  |
|-------------|--|
| AR22B3.7C.1 | Apply knowledge of macro level climatic data to the site level   |
| AR22B3.7C.2 | Understand and analyse thermal comfort factors effecting the human body.                                     |
| AR22B3.7C.3 | Evaluate potential of site for comfortable micro climatic conditions   |
| AR22B3.7C.4 | Develop climate sensitive design strategies  |
| AR22B3.7C.5 | Create small scale structures which can achieve comfortable indoor thermal conditions through passive design |

## CO-PO mapping

| CO\PO       | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 | PO-9 | PO-10 | PO-11 | PO-12 | PS-01 | PS-02 |
|-------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| AR22B3.7C.1 | 1    | 2    | -    | 1    | 2    | -    | -    | -    | 2    | -     | -     | 1     |       |       |
| AR22B3.7C.2 | 2    | 3    | -    | 1    | 2    | 1    | -    | -    | -    | -     | -     | -     |       |       |
| AR22B3.7C.3 | 3    | 1    | 3    | 3    | -    | -    | 1    | 1    | -    | -     | 2     | -     |       |       |
| AR22B3.7C.4 | 3    | 2    | 3    | 3    | -    |      | 1    | 1    | -    | -     | -     | 1     |       |       |
| AR22B3.7C.5 | 2    | 1    | 1    | 2    | 2    | 1    | -    | -    | -    | -     | -     | -     |       |       |

## Course Structure for B.Arch.

(Under the OBE and CBCS, Effective from the Academic Year 2022-2023)  
FOURTH SEMESTER

| S.No. | Course Code | Course Title                            | CoA group | Periods/Hours per week |       |       | Credits | Marks |      |       | End Exam |
|-------|-------------|---|-----------|------------------------|-------|-------|---------|-------|------|-------|----------|
|       |             |   |           | L/T /S                 | P/F/O | Total |         | Int.  | Ext. | Total |          |
| 1     | AR22B4.1C   | Architectural Design – III              | PC        | 9                      |       | 9     | 9       | 100   | 100  | 200   | J        |
| 2     | AR22B4.2C   | Materials and Building Construction -IV | BS        | 4                      |       | 4     | 4       | 50    | 50   | 100   | S        |
| 3     | AR22B4.3C   | Landscape Architecture                  | PC        | 4                      |       | 4     | 4       | 50    | 50   | 100   | W        |
| 4     | AR22B4.4C   | History of Architecture – II            | PC        | 3                      |       | 3     | 3       | 50    | 50   | 100   | W        |
| 5     | AR22B4.5C   | Structural Design (RCC)                 | BS        | 3                      |       | 3     | 3       | 50    | 50   | 100   | W        |
| 6     | AR22B4.6C   | Water, Sanitation and Hygiene           | BS        | 4                      |       | 4     | 4       | 50    | 50   | 100   | W        |
| 7     | AR22B4.7C   | Computer Aided Design - I               | SEC       |                        | 3     | 3     | 3       | 50    |      | 50    |          |
|       |             |   |           | 27                     | 3     | 30    | 30      | 400   | 350  | 750   |          |

Note: L/T/S = Lecture/ Tutorial / Studio; P/F/O = Practical / Fieldwork / Others; End Exam W/J/S/P = Written (3 hours) / Jury/ Studio (5 hours) / Practical

## AR22B4.1C ARCHITECTURAL DESIGN- III

| Periods Per Week |       |       | Credits | Marks    |          |       | End Exam |
|------------------|-------|-------|---------|----------|----------|-------|----------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P  |
| 9                | 0     | 9     | 9       | 100      | 100      | 200   | J        |

### Objectives of the Course:

- A. Develop a critical understanding of various conditions that effect design outcomes such as Socio-economic conditions, statutory laws and norms.
- B. Sensitize the students on the role climate plays in building design and material selection criteria that provides thermal comfort.
- C. Perceive the building as a cohesive model of several systems and components that perform specific functions in an integrated manner.

### Unit I: Socio-economic Factors

Understanding of Socio-economic factors that exist in society and their impact on the design of built environment. Understanding of communities, their requirements and cultural aspects that needs to be considered in design of public, semi-public and private areas of residences. Introduction to the economic levels effect the construction of built-forms. Importance of universal design such as, the accessibility and inclusivity of buildings, including the design of entrances, accessibility features, and the provision of public spaces.

### Unit II: How Buildings Work

The outdoor environment, the human environment, the concept of shelter;

building function, providing water, recycling wastes, providing for thermal comfort, thermal properties of building components, controlling the radiation of heat, controlling air temperature and humidity, controlling air movement;

Keeping water out, seeing and illumination, hearing and being heard, providing concentrated energy;

Fitting buildings to people, providing structural support, providing for building movement,

Controlling fire, getting a building built, keeping a building alive and growing, building components and building function;

### Unit III: Standards – NBC - Bye laws and codes

Collection of different standards pertinent to building typology; Understanding the application of spatial standards pertaining to the built-form given out different by authorities; Minimum standards provided by NBC for particular building typology and spatial requirement; Local building byelaws and its consideration to the particular context of design.



#### **Unit IV: Structural Systems**

Introduction to the role of structural systems in design; range of spans and limitations of each structural system; exploration of different types of forms that can be achieved adapting different structural systems;

#### **Unit V: Climate and Environment**

Understanding of local macro-climatic factors, interpreting the local macro-climatic data for given site to understand the micro-climate; understanding application of climate responsive design; understanding and application of sustainable design goals: conservation of natural resources, usage of renewable energy resources, active and passive design solutions, using orientation of buildings, concepts of building façade to minimize heat-gain, balancing of indoor and outdoor spaces.

#### **Guidelines for learning: Guidelines for learning:**

Building is a complex set of systems performing in coordination with each other. Architecture is socially and environmentally responsible engagement. Therefore students need to sensitize themselves to the requirements of climate responsive design, environmentally responsive design and socially responsive design and integrate them into the design process and problem solving. Students are advised pursue alternative ways and to do many iterations and refinements to their design in order to gain experience in solving real-life problems.

#### **Assignments to be formulated:**

At least one major design exercise and one minor design in this semester.

In the major design exercise, emphasis to be given to the process and methods of design. Efforts have to be made to build-on what students have learnt in the previous semesters and integrate the learning in the present semester to ensure a systematic learning experience to the students. Students to be encouraged to use physical model as a tool to visualize and validate their design.

The minor problems can be a Design Charrette or a time problem.

Type of Design Problems: Small Residence, Guest-house, students hostel, Multi-family Housing: block of flats, cluster housing, row housing; holiday resorts, Clubs, Small Mixed-Use buildings, Etc.

**Integration:** The design portfolio shall consist of construction details of the spaces designed. And the details of the building structural components. The students are expected make the structural details of steel elements as part of the portfolio. The portfolio shall consist diagrammatic representation of climatic data and design. The built-up area has to be indicated; the specifications of the materials to be written, construction techniques, structural systems used in the elements of built forms and approximate estimate based on carpet area.



## Reference:

1. Alexander, C., Ishikawa, S., & Silverstein, M. (1977). A pattern language: towns, buildings, construction. New York, Oxford University Press.
2. Edward Allen, How Buildings Work: The Natural Order of Architecture, 3<sup>rd</sup> Edition, Oxford University Press, 2005
3. William H. Whyte, The Social Life of Small Urban Spaces, 8<sup>th</sup> edition, Project for public Spaces, Inc. 2021
4. Joseph De Chiara And John Hancock Callendar, Time-Saver Standards for Building Types, 4<sup>th</sup> Edition, McGraw Hill Education, 2017
5. Telangana Government orders for land development.
6. Ernst Neufert, Peter Neufert, Neufert Architects' Data, 5<sup>th</sup> Edition, Wiley Blackwell, 2019
7. National Building Code Of India 2016 Volume 1, Bureau Of Indian Standards, 2016
8. National Building Code Of India 2016 Volume 2, Bureau Of Indian Standards, 2016
9. MarjaSarvimaki, Case Study Strategies for Architects and Designers Integrative Data Research Methods, 1<sup>st</sup> Edition, Routledge, 2017

## E-resources:

|   |  |
|---|--|
| <a href="https://lsrsa.edu.in/blog/the-building-design-responsive-to-climate/">https://lsrsa.edu.in/blog/the-building-design-responsive-to-climate/</a>   | THE BUILDING DESIGN RESPONSIVE TO CLIMATE  |
| <a href="https://www.re-thinkingthefuture.com/2020/08/19/a1539-examples-of-climate-responsive-architecture-in-indian-cities/">https://www.re-thinkingthefuture.com/2020/08/19/a1539-examples-of-climate-responsive-architecture-in-indian-cities/</a> | Examples of Climate responsive architecture in Indian cities   |
| <a href="Http://www.pif.zut.edu.pl/images/pdf/pif%2039/DOI%2010_21005_pif_2019_39_B-02_Kravchenko.pdf">Http://www.pif.zut.edu.pl/images/pdf/pif%2039/DOI%2010_21005_pif_2019_39_B-02_Kravchenko.pdf</a>   | Impact of socioeconomic factor on architectural formation of buildings for non-formal education in Ukraine |
| <a href="Https://www.explainthatstuff.com/howbuildingswork.html">Https://www.explainthatstuff.com/howbuildingswork.html</a>   | How buildings work   |
| <a href="Https://www.architecturaldigest.com/story/buildings-redefined-architecture-past-5-years">Https://www.architecturaldigest.com/story/buildings-redefined-architecture-past-5-years</a>   | These 13 buildings redefined architecture in the past 5 years  |

**COURSE OUTCOMES:**

Upon successful completion of the course the students will be able to:

| <b>COURSE OUTCOME</b> | <b>DESCRIPTION</b>   |
|-----------------------|--|
| <b>CO1</b>            | Formulate various conditioning factors that play important role in architecture design such Scio-economic aspects, cultural and historic aspects, climate responsive solutions, etc. |
| <b>CO2</b>            | Develop an understanding of the function of a typical building in terms of an integrated system of components such as structure, plumbing, electrical, sanitary provisions.          |
| <b>CO3</b>            | Investigate various statutory norms, NBC local bye laws and other codes relevant to buildings and adopt salient guidelines for specific building topologies.                         |
| <b>CO4</b>            | Generate a methodology for structural basis in architectural design for while discussing the different structural components and their roles in the building.                        |
| <b>CO5</b>            | Categorize various building materials employed in modern-day buildings and develop appropriate selection criteria for using them.  |

**COURSE OUTCOMES PROGRAM OUTCOMES MAPPING:**

| <b>CO/<br/>PO</b> | <b>PO<br/>-1</b> | <b>PO<br/>-2</b> | <b>PO<br/>-3</b> | <b>PO<br/>-4</b> | <b>PO-<br/>5</b> | <b>PO-<br/>6</b> | <b>PO-<br/>7</b> | <b>PO-<br/>8</b> | <b>PO-<br/>9</b> | <b>PO-<br/>10</b> | <b>PO-<br/>11</b> | <b>PO-<br/>12</b> | <b>PS-<br/>01</b> | <b>PS-<br/>02</b> |
|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>CO 1</b>       | 2                | 1                | 1                | 2                | 1                | 2                | 3                | 2                | 1                | 3                 | 2                 | 3                 | 2                 | 2                 |
| <b>CO 2</b>       | 3                | 2                | 1                | 1                | 2                | 1                | 1                | -                | -                | 2                 | -                 | 1                 | 3                 | 2                 |
| <b>CO 3</b>       | 2                | 2                | 3                | 1                | 2                | 3                | 1                | 1                | 3                | 1                 | 2                 | 3                 | 2                 | 2                 |
| <b>CO 4</b>       | 2                | 3                | 1                | 2                | 2                | 2                | 2                | 1                | 2                | 3                 | 2                 | 3                 | 1                 | 3                 |
| <b>CO 5</b>       | 3                | 2                | 1                | 2                | 1                | 2                | 3                | 3                | 1                | 2                 | 1                 | 2                 | 3                 | 1                 |

1 - Low Correlation    2 - Medium Correlation    3 - High Correlation

## AR22B4.2C MATERIALS AND BUILDING CONSTRUCTION – IV

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 5                | 0     | 5     | 5       | 50       | 50       | 100   | S             |

### Objectives of the Course:

- A. Imparting comprehensive knowledge to the students on the basic building materials while highlighting the current innovations and trends.
- B. Preparing the students for a systematic study of building materials in the scope of ingredients, properties, manufacturing process, uses, installation and market price and application in real life problems.
- C. Throughout the course, students will explore materials like Metals, Paints and varnishes and methods and techniques for utilizing Steel in building projects, gaining a comprehensive understanding of the underlying theory behind these approaches.
- D. By combining theoretical and practical instruction, students will be well-equipped to apply their knowledge to real-world situations, enabling them to make informed decisions when designing and constructing buildings that incorporate Steel.
- E. Imparting how to represent building construction in the form of drawings, instructions and check the quality of work.

### UNIT I: Metals

**Ferrous Metals:** Manufacturing, processes and casting. Characteristics and uses of different types of metals like iron and steel. Corrosion of iron and their prevention, metallic protective coatings.

**Non Ferrous Metals:** Basic idea of important ores, properties and uses of aluminum, zinc, copper, tin and lead.

### UNIT II: Paints and Varnishes

**Paints:** Constituents of paints, functions, selection of paints and storage of paints. Types of paints oil based, water based, cement based paint and emulsion. Non VOC's, Acrylic paints. Surface finishing of different types of paints and their applications.

**Varnishes:** Characteristics and uses of varnishes, types of varnishes oil and spirit

### **UNIT III: Introduction to Steel**

**Introduction:** General principles and terms defined, standard sections like I-section, C-section, T-section, H-section, equal and unequal angles, rivets and welding

**Steel Work Connections:** Bolts, rivets, types of riveting and types of welding methods.

### **UNIT IV: Steel Members and Roof Trusses**

**Steel Members:** Columns and stanchions, column bases, beam and girders, column and beam connection, plate girder, lattice or warren girder.

**Roof Trusses:** Steel Trusses, types of truss for various spans, tubular steel roof truss, monitor roof, north light roof truss and steel lattices.

### **UNIT V: Miscellaneous**

Lantern light, dome light, structural steel practice and drawings as per IS Code. Portal frame, Geodesic principles, cable net and tensile structures.

#### **Reference:**

1. Bindra and Arora. Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub., New Delhi, 2000.
2. Foster, J. Stroud. Mitchell Building Construction: Elementary and Advanced, 17th ed. B.T. Batsford Ltd, London, 1963.
3. McKay, W.B. Building Construction Metric Vol. 1 – IV, 4th ed. Orient Longman, Mumbai, 2005.
4. Sushil Kumar. T.B. of Building Construction, 19th ed. Standard Pub. Distributors, Delhi, 2003.
5. Sushil Kumar. T.B. of Building Construction, 19th ed. Standard Pub, Delhi, 2003
6. Dr. BC. Punmia, E. A. (2016). Building Construction, 11th Edition. Laxmi Publications
7. Rangwala, S.C. Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004
8. Barry. The Construction of Buildings, Vol- 4, 5th Edition. New Delhi: East West Press, 1999.

**E-resources:**

|   |   |
|---|---|
| <a href="https://www.melfab.com.au/the-six-steps-of-modern-steel-manufacturing/">https://www.melfab.com.au/the-six-steps-of-modern-steel-manufacturing/</a>   | The Six Steps of Modern Steel Manufacturing   MELFAB Engineering      |
| <a href="https://tigertmt.com/blog/effects-of-corrosion-on-buildings.php">https://tigertmt.com/blog/effects-of-corrosion-on-buildings.php</a>   | Effects of Corrosion on Buildings                                     |
| <a href="https://eoncoat.com/corrosion-prevention-methods/">https://eoncoat.com/corrosion-prevention-methods/</a>   | 5 Different Types of Corrosion Prevention Methods                     |
| <a href="https://www.bbc.co.uk/bitesize/guides/z74bcj6/revision/3">https://www.bbc.co.uk/bitesize/guides/z74bcj6/revision/3</a>   | Material Categories And Properties                                    |
| <a href="https://theconstructor.org/building/paints-and-varnishes-for-buildings/4621/">https://theconstructor.org/building/paints-and-varnishes-for-buildings/4621/</a>   | Paints And Varnishes For Buildings - The Constructor                  |
| <a href="https://essential.construction/academy/tutorials/the-ultimate-guide-to-the-design-and-construction-of-structural-steel/">https://essential.construction/academy/tutorials/the-ultimate-guide-to-the-design-and-construction-of-structural-steel/</a> | The Ultimate Guide To The Design and Construction of Structural Steel |
| <a href="https://theconstructor.org/structural-engg/steel-frame-structure-building-construction/24906/">https://theconstructor.org/structural-engg/steel-frame-structure-building-construction/24906/</a>   | What is Steel Frame Structure Building Construction?                  |
| <a href="https://havitsteelstructure.com/type-steel-building-structures/">https://havitsteelstructure.com/type-steel-building-structures/</a>   | The Type of Steel Building Structures                                 |
| <a href="https://www.pretoriusstructures.co.za/lattice-steel-structures/">https://www.pretoriusstructures.co.za/lattice-steel-structures/</a>   | Lattice Type Steel Structures   |
| <a href="https://www.civilprojectsonline.com/building-construction/lantern-light-architectural-element-of-roof-lighting/">https://www.civilprojectsonline.com/building-construction/lantern-light-architectural-element-of-roof-lighting/</a>                 | Lantern Light steel frame roof lighting.                              |
| <a href="https://www.lfspaceframe.com/application/the-light-steel-dome-space-frame-multifunctional-activity-hall-project/">https://www.lfspaceframe.com/application/the-light-steel-dome-space-frame-multifunctional-activity-hall-project/</a>               | Dome light  |
| <a href="https://ia800407.us.archive.org/6/items/gov.in.is.800.2007/is.800.2007.pdf">https://ia800407.us.archive.org/6/items/gov.in.is.800.2007/is.800.2007.pdf</a>   | IS code 800 (2007)  |
| <a href="https://www.designingbuildings.co.uk/wiki/Tensile_structures">https://www.designingbuildings.co.uk/wiki/Tensile_structures</a>   | Tensile structures  |
| <a href="https://www.designingbuildings.co.uk/wiki/Geodesic_dome">https://www.designingbuildings.co.uk/wiki/Geodesic_dome</a>   | Geodesic dome   |

## COURSE OUTCOMES:

Upon successful completion of the course the students will be able to:

| COURSE OUTCOME | DESCRIPTION   |
|----------------|---|
| CO1            | Demonstrate knowledge on Building Materials like Metals, Paints and Varnishes and its applications in building construction   |
| CO2            | Implement the knowledge of the principles, theories, and applications of Steel in building construction.  |
| CO3            | Develop the ability to select appropriate steel sections for different elements, steel work construction methods and techniques based on the specific needs and requirements of a building project. |
| CO4            | Prepare construction drawings as studio exercises along with the theoretical inputs on steel.   |
| CO5            | Conduct market surveys for Metals, Paints and Varnishes and documentation of steel structures.  |

## COURSE OUTCOMES PROGRAM OUTCOMES MAPPING:

| CO/<br>PO | PO<br>-1 | PO<br>-2 | PO<br>-3 | PO<br>-4 | PO<br>-5 | PO<br>-6 | PO<br>-7 | PO<br>-8 | PO<br>-9 | PO<br>-10 | PO<br>-11 | PO<br>-12 | PS-<br>01 | PS-<br>02 |
|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| 1         | 3        | 3        | -        | -        | -        | 3        | 1        | -        | -        | 2         | -         | 2         | 2         | 1         |
| 2         | 3        | 3        | -        | 1        | -        | 3        | 1        | -        | 2        | 2         | -         | 2         | 2         | 1         |
| 3         | 3        | 1        | 2        | 1        | -        | 2        | 3        | -        | 1        | 2         | -         | 2         | 3         | 2         |
| 4         | 3        | 2        | 2        | 2        | -        | 1        | -        | -        | -        | 3         | -         | 1         | -         | 3         |
| 5         | 3        | 3        | -        | -        | -        | -        | 2        | 2        | -        | 3         | 3         | 1         | 1         | 2         |

1 - Low Correlation    2 - Medium Correlation    3 - High Correlation

## AR22B4.3C LANDSCAPE ARCHITECTURE

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 2/0/3            | 0     | 5     | 5       | 50       | 50       | 100   | W             |

### Objectives of the course:

- A. To introduce the students to the discipline, Landscape Architecture and its relevance in built environment.
- B. Articulate an understanding on the interactions between human and environmental process for creation of aesthetic, functional and environmentally tuned designs.
- C. To develop an understanding on site features, site planning Principles and the process of site development.
- D. To develop skills to integrate buildings with open spaces and design sustainable built environments.
- E. To train students to design comprehensive Landscape proposals and detail landscape elements for small scale projects.

### Course Contents:

#### UNIT I: Evolution and Development of Landscape Architecture

Introduction to landscape Architecture and Role of Landscape design in built environment.

A brief review of garden design in history in various regions Persian, Spanish, Italian, French, Moghul, English, Japanese Garden styles. Changing perception of man's relationship with nature in various phases of history and its influence on environment.

Evolution of concepts in landscape design after the industrial revolution leading to new theories in integrating built spaces to open spaces. Increasing awareness of ecological variables in landscape design. Artistic sensibility in Landscape Architecture.

Multi-disciplinary approach in design of built environment- integrating ecology, Bio-diversity and sustainability. Introduction to concepts of green architecture and micro climate planning.

Contemporary concepts and concerns in design of open spaces in Architecture and City Planning. Basic knowledge of professional work in contemporary Landscape Architecture.

## **UNIT II: Site Analysis and Site Planning:**

Site survey and appraisal – understanding different site characteristics –topography, vegetation, hydrology, Access, Surroundings etc. documentation of site characteristics and establishing relationship with design / Architecture Programme requirements.

Study of landform its technical expression through grading plan, section, profiles layout plans and earthwork computations. Development of site integrating the built and open spaces by mutual exploitation of forms and use of grading principles.

Principles of soil mechanics. Understanding surface drainage, sewage disposal, and water systems their application in site development for small scale projects.

Philosophical and design issues related to site development. Identifying functional requirements of site, spatial and contextual relationships of built and outdoor space and circulation, site and its relationship to surroundings. Importance of climate and social factors in development of site.

Principles of site Planning and land use. Understanding different Landscape situations - siting of buildings, inter connection of areas, nodes, circulation and zoning, in Residential, Institutional planning and other land use typologies. Examples of contemporary Landscape Architecture Projects in India and abroad.

## **UNIT III: Plants and Design:**

Introduction to study of plants in relation to landscape design and architecture.

Study of Plant material – Botanical Nomenclature anatomy and physiology of plant growth study of trees, shrubs, ground cover, indoor plants in Indian context.

Design with plants – Basic principles of designs. Plant selection criteria –The physical attribute of plants and relation to design. Appearance, functional and visual effects of plants in landscape design and built environment. Selection and management of plant material in relation to built environment.

Planting principles – Bed preparation, mounding, and application of fertilizers, roll preparation, pruning and maintenance.

## **UNIT IV: Elements in Landscape Design:**

Introduction to Elements in Landscape design Natural and Manmade elements.

Hard landscapes: Design concepts related to use of sculpture, outdoor lighting, built /architectural elements, and street furniture and grouping them into meaningful compositions for various purposes. Design of vehicular and pedestrian ways.

Soft landscapes: Use of landform, water and vegetation as landscape elements. Design of soft landscapes features lawns, shrubs, hedges, trees in relation to buildings and other landscape elements. Introduction to design of vertical gardens, terrace gardens and green facades.



## UNIT V: Landscape Construction Details and Services

Materials and techniques of landscape construction with emphasis on appropriateness for intended use – Circulation (roads, parking, and paths), level changes (walls, steps), outdoor lighting, boundary walls, trellis, fences, decks, pools. etc.

Landscape construction details- paving, curbs, retaining wall, fountain, decks, terrace and vertical gardens etc.

Bed preparation, mounding, and application of fertilizers, roll preparation, pruning and maintenance.

Introduction to irrigation systems – sprinkler trickle irrigation, drip irrigation and laying irrigation networks.

### Assignments /Tests

1. History and development of Landscape Architecture.
2. Studio exercises on preparing Site inventory, Site analysis, grading.
3. Studio exercise emphasizing relationship between built form and outdoor areas.
4. Studio exercises in site zoning and site planning
5. Simple exercises in using plants and landscape elements
6. Documentation of designed landscapes such as residential, institutional, and recreational spaces.
7. Comprehensive Landscape Design proposal for small scale buildings
8. Write a report on the design process or narratives on site studies.

### Reference:

1. **Blake, Alan.** Landscape Construction and Detailing. B.T. Batsford Ltd., London, 1996.
2. **Colvin, Brenda.** Land and Landscape.
3. **Hacheat, Brian.** Planting Design.
4. **Harris, C.W. and Dines, T. Nicholas.** T.S.S for Landscape Architecture. McGraw Hill, New York, 2014.
5. **Laurie, Michael.** An Introduction to Landscape, 2nd ed. Prentice Hall, New Jersey, 1986.
6. **Lynch, Kevin.** Site Planning. MIT Press, Massachusetts, 1962.
7. **John I.Mutloch.** Introduction to Landscape Design, 2nded. John Wiley & Sons, Inc, New York, 2001.
8. **J.O. Symonds,** Architecture-A manual of site planning and design
9. **Santapau. H.** Common Trees. National Book Trust, New Delhi, 1981.

### E-resources:

|   |  |
|---|--|
| <a href="https://www.academia.edu/34842204/introduction_to_landscape_architecture">https://www.academia.edu/34842204/introduction_to_landscape_architecture</a>   | Introduction to Landscape Architecture               |
| <a href="https://doarch411sp16.files.wordpress.com/2016/01/site_planning_and_design_handbook_second_edition.pdf">https://doarch411sp16.files.wordpress.com/2016/01/site_planning_and_design_handbook_second_edition.pdf</a> | Site Planning and Design Handbook, Second Edition    |
| <a href="https://www.academia.edu/31755549/Site_Planning_and_Design_Handbook">https://www.academia.edu/31755549/Site_Planning_and_Design_Handbook</a>   | Site Planning and Design Handbook, Thomas H. Russ    |
| <a href="https://www.calloways.com/landscape-design-texas/landscape-design-elements/">https://www.calloways.com/landscape-design-texas/landscape-design-elements/</a>   | 10 Elements for Landscape Design, Calloway's Nursery |
| <a href="https://worldlandscapearchitect.com/what-is-landscape-architecture/?v=3a1ed7090bfa">https://worldlandscapearchitect.com/what-is-landscape-architecture/?v=3a1ed7090bfa</a>   | What is landscape architecture?                      |
| <a href="https://archi-monarch.com/ancient-to-modern-landscape/">https://archi-monarch.com/ancient-to-modern-landscape/</a>   | Ancient to Modern Landscape                          |

### COURSE OUTCOMES:

With the successful completion of the course students will have capability to:

| COURSE OUTCOME | DESCRIPTION  |
|----------------|--|
| CO1            | <b>Understand</b> the history and development of landscape architecture and its role in built environment.   |
| CO 2           | <b>Conduct</b> survey, <b>prepare</b> site inventory, <b>analyze</b> site, and <b>draw</b> inferences/ <b>identify</b> challenges for design and development |
| CO 3           | <b>Assimilate</b> and <b>apply</b> site planning principles to <b>develop</b> site for various land uses.  |
| CO 4           | <b>Identify</b> plants and <b>design</b> with plants for functional, environmental, and visual effects.  |
| CO 5           | <b>Skill</b> to design and <b>detail</b> various landscape elements and <b>specify</b> appropriate materials and construction techniques to be used.         |
| CO 6           | <b>Research, document, discuss</b> and <b>narrate</b> designed landscapes /works of landscape architects   |
| CO 7           | <b>Ability</b> to <b>design</b> and <b>plan</b> landscape for small scale projects.  |

These course outcomes ensure that students will acquire functional environmental and aesthetic sensitivity towards design of sustainable landscapes in built environment and develop practical and ethical skills that are relevant to their professional practice as architects.

## AR22B4.4C HISTORY OF ARCHITECTURE – II

| Periods Per Week |       |       | Credits | Marks    |          |       | End Exam |
|------------------|-------|-------|---------|----------|----------|-------|----------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P  |
| 3                | 0     | 3     | 3       | 50       | 50       | 100   | W        |

### Objectives of the Course:

- To expose the students to a wide spectrum of architectural styles ranging from ancient to pre independence period in India.
- To explain the students the evolution of architecture in relation to time with special emphasis to social, religious and environmental factors.
- To make the students understand the developments in the construction technology adopted during different time periods.

### Course Contents:

#### Unit I: Vedic and Buddhist Architecture.

Development of Vedic Architecture; Development of built forms, ornamentation and architectural characteristics of Buddhist Architecture in India and rest of Asia.

#### Unit II: Early Temple Architecture.

Evolution of Hindu temple form, construction techniques in examples of early rock cut examples; architectural style developed by Early Chalukyans in temples.

#### Unit III: Nagara, Dravidian and Pandayan styles.

Development of Hindu Architecture: Temples constructed in Nagara style in Orissa, Kahjuraho, Gujarat, Bengal and Deccan; Developments of Dravidian style in temples constructed during Pallava, Chola, Pandya periods.

#### Unit IV: Continuation of Temple Architecture in South India and Jain Architecture.

Development of Hindu Architecture under the reign of later Chalukyans, Architecture of Vijayanagara- Rayas, Nayakars, Development of built forms and ornamentation used in Jain Architecture.

#### Unit V: Indo-Islamic Architecture.

Islamic Architecture in India: Early Saracenic School in India: Imperial school at Delhi. Development of Islamic Architecture in India; Understanding Provincial styles of Gujarat, Deccan and Bengal regions; Different built forms constructed in Moghul Architecture in India.

### Reference:

- Brown, Percy. Indian Architecture: Buddhist and Hindu Periods. D.B. Taraporevala Sons and Co., Mumbai, 2003.
- Brown, Percy. Indian Architecture: Islamic Periods. D.B. Taraporevala Sons and Co., Mumbai, 2003.
- Grover, Satish. The Architecture of India. Vikas Pub. House Pvt. Ltd., Ghaziabad, 1980.
- Rowl, Benjamin. Art and Architecture of India.

5. Tadgell, Christopher. The History of Architecture in India: from the Dawn of Civilization to the End of the Raj. Om Book Service, New Delhi, 1990.

**E-resources:**

|   |   |
|---|---|
| Buddhism in India, Ceylon, China and Japan, a reading guide by Clarence H. Hamilton                             | <a href="https://ignca.gov.in/Asi_data/7273.pdf">https://ignca.gov.in/Asi_data/7273.pdf</a>   |
| Encyclopedia of Indian Temple Architecture: Volume II, Part 1 – Text<br>By American Institute of Indian Studies | <a href="https://archive.org/details/encyclopedia-of-indian-temple-architecture-ii-pt.1-text/page/n7/mode/2up">https://archive.org/details/encyclopedia-of-indian-temple-architecture-ii-pt.1-text/page/n7/mode/2up</a> |
| Indian Architecture (Buddhist and Hindu Periods) by Percy Brown   | <a href="https://ignca.gov.in/Asi_data/18060.pdf">https://ignca.gov.in/Asi_data/18060.pdf</a>   |
| Indo-Islamic Architecture<br>By Desai, Ziyauddin A., 1925-2002  | <a href="https://archive.org/details/indoislamicarchi00desa">https://archive.org/details/indoislamicarchi00desa</a>   |
| Temple Architecture and Sculpture   | <a href="https://ncert.nic.in/textbook/pdf/kefa106.pdf">https://ncert.nic.in/textbook/pdf/kefa106.pdf</a>   |

**COURSE OUTCOMES:**

After the completion of this course, students will be able to

| COURSE OUTCOME | DESCRIPTION   |
|----------------|---|
| CO1            | Illustrate the development of Buddhist architecture in India and Asia.                        |
| CO 2           | Understand the development of Hindu temple Architecture in different parts of India.          |
| CO 3           | Review the development of Jain Architecture in Indian Sub-Continent.                          |
| CO 4           | Identify the characteristic features of Islamic architecture in different provinces of India. |
| CO 5           | Describe the construction techniques used in building Temples and Mosques etc in India.       |

**CO-PO Mapping for History of Architecture - II**

| CO         | PO -1 | PO -2 | PO -3 | PO- 4 | PO- 5 | PO- 6 | PO- 7 | PO- 8 | PO- 9 | PO- 10 | PO- 11 | PO- 12 |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| AR-4.4 -01 | 2     | 2     | -     | 2     | 1     | -     | 1     | 2     | 1     | -      | -      | 3      |
| AR-4.4-02  | 2     | 2     | -     | 2     | 1     | -     | 1     | 2     | 1     | -      | -      | 3      |
| AR-4.4-03  | 2     | 2     | -     | 2     | 1     | -     | 1     | 2     | 1     | -      | -      | 3      |
| AR-4.4-04  | 2     | 2     | -     | 1     | 3     | 3     | 1     | 2     | 1     | 1      | 1      | 3      |
| AR-4.4-05  | 2     | 2     | -     | 2     | 1     | -     | 1     | 2     | 1     | -      | -      | 3      |

## AR22B4.5C: DESIGN OF STRUCTURES (RCC)

| Periods per week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 1                | 2     | 3     | 3       | 50       | 50       | 100   | W             |

### Objectives of the Course:

- A. To understand the clauses and provisions in IS Codes for RCC design.
- B. Classify the design methodologies in RCC design.
- C. Enrich the knowledge of students in understanding the RCC elements.
- D. To develop the structural design skills in RCC elements.
- E. Imparting information on latest technologies in Concrete Designs.

### UNIT I: Introduction to RCC Design and its Code

Introduction to Design Philosophies: Working stress and limit state method; (Limit State of Collapse and Serviceability). Introduction to different structural elements in RCC. General conditions, loads and load combinations, design concepts of different structural elements for flexure, shear, torsion and deflection as per IS- 456 2000.

### UNIT II: Design of Flexure Members - Beams

Beams –Analysis and Design of single and doubly reinforced beams using limit state methods for flexure, shear, torsion and deflection. Introduction to T beam and L beams. Design of a Lintel and Cantilever beam.

### UNIT III: Design of Flexure Members - Slabs and Staircases

Slabs: Introduction, Design of One way, two way and cantilever slabs for flexure and deflection.

Staircases: Types of staircases in RCC and their behaviour. Design of a dog-legged stair case.

### UNIT IV: Compression Members - Columns and Footings

Columns: Analysis and Design of axially loaded RCC columns. Design of columns subjected to uniaxial and biaxial bending. Design of Column for buckling and torsion.

Footings: Design of Isolated footings (Square and Rectangle) for columns by LSM.

### UNIT V: Pre- Stressed Concrete

Introduction to pre-stressed concrete, Codal provisions of IS code, Materials and equipment used in pre-stressed concrete, Methods of Pre-stressing, Pre tensioning and Post tensioning techniques. Practical applications in current projects.

Introduction to flat slab design concepts and waffle slabs.

## Reference:

1. A.K.Jain. Reinforced Concrete: Limit State Design, 5th ed. New Chand and Bros., Roorkee, 1999.
2. Ramamrutham. S. and Narayan, R. Design of RCC Structures, 12th ed. Dhanpat Rai Pub. Co. Pvt. Ltd., Delhi, 1998.
3. Krishna Raju. N and PraneshNR., Reinforced Concrete Design: Principles And Practice., 1<sup>st</sup> ed., New Age International Pvt Ltd Publishers, 2018.
4. Punmia BC, Ashok Kumar Jain, Arun Kumar Jain, Limit State Design of Reinforced Concrete, Revised ed., Laxmi Publications, 2016.

## E-resources:

|   |  |
|---|--|
| <a href="https://www.ultratechcement.com/home-building-explained-single/the-right-way-to-install-rcc-footings-for-a-strong-home">https://www.ultratechcement.com/home-building-explained-single/the-right-way-to-install-rcc-footings-for-a-strong-home</a>                     | Right way to install R.C.C footings. Step by step process of laying foundations. |
| <a href="https://www.cademya.edu/12715036/IS_456_2000">https://www.cademya.edu/12715036/IS_456_2000</a>   | Indian Standard PLAIN AND REINFORCED CONCRETE CODE OF PRACTICE Fourth Revision   |
| <a href="https://www.civilprojectsonline.com/building-construction/introduction-to-design-of-rcc-structures/">https://www.civilprojectsonline.com/building-construction/introduction-to-design-of-rcc-structures/</a>   | Introduction to R.C.C. , Components of R.C.C., examples of R.C.C. structures     |
| <a href="https://www.linkedin.com/pulse/components-rcc-frame-structure-fourmarketing?trk=organization-update-content_share-article">https://www.linkedin.com/pulse/components-rcc-frame-structure-fourmarketing?trk=organization-update-content_share-article</a>               | Structural components of typical R.C.C. framed structure                         |
| <a href="https://tribby3d.com/blog/one-way-slab-and-two-way-slab/#:~:text=In%20a%20one%2Dway%20slab,it%20occurs%20in%20both%20directions.">https://tribby3d.com/blog/one-way-slab-and-two-way-slab/#:~:text=In%20a%20one%2Dway%20slab,it%20occurs%20in%20both%20directions.</a> | R.C.C One way Slab and Two way Slab  |
| <a href="https://www.keuka-studios.com/types-of-stairs-2/">https://www.keuka-studios.com/types-of-stairs-2/</a>   | Types of Staircases, advantages and disadvantages                                |
| <a href="https://bmtpc.org/DataFiles/CMS/file/PDF_Files/61_PAC_Urbaanic_Final.pdf">https://bmtpc.org/DataFiles/CMS/file/PDF_Files/61_PAC_Urbaanic_Final.pdf</a>   | Precast concrete technology  |

## COURSE OUTCOMES

Upon the successful completion of the course, the student will be able to

| COURSE OUTCOME | DESCRIPTION   |
|----------------|---|
| CO1            | <i>Understand</i> IS code provisions to evaluate design concepts of RCC.                                |
| CO2            | <i>Perform</i> the design calculations for flexure members, beams and slabs.                            |
| CO3            | <i>Evaluate</i> the behavior and design capacity of compression members.                                |
| CO4            | <i>Assess</i> the strength and design of Cantilever beams and slabs, lintels, sunshades and staircases. |
| CO5            | <i>Discuss</i> the conceptual understanding of pre stressing methods.                                   |

**COURSE OUTCOMES PROGRAM OUTCOMES MAPPING:**

| AR17B4<br>.3C | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 | PO-9 | PO-10 | PO-11 | PO-12 | PSO 1 | PSO 2 |
|---------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| <b>CO-1</b>   | 3    | 2    | 2    | -    | 2    | 2    | 2    | -    | 1    | -     | -     | -     | 2     | -     |
| <b>CO-2</b>   | 3    | 2    | 2    | -    | 1    | 2    | -    | 1    | 2    | 1     | -     | 2     | 2     | 2     |
| <b>CO-3</b>   | 3    | 2    | 2    | 2    | 1    | 3    | -    | 1    | 2    | 2     | 2     | 2     | 2     | 3     |
| <b>CO-4</b>   | 3    | 2    | 2    | 1    | 1    | 2    | -    | -    | 2    | 2     | -     | 2     | 2     | 2     |
| <b>CO-5</b>   | 2    | 2    | 1    | -    | -    | 2    | 2    | -    | -    | -     | -     | 3     | 1     | 2     |





## AR22B4.6C WATER SUPPLY, SANITATION AND HYGIENE

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam Type |
|------------------|-------|-------|---------|----------|----------|-------|---------------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P       |
| 3                | 0     | 3     | 3       | 50       | 50       | 100   | W             |

### Objectives of the course

The objective of the subject is to enable students to understand and apply:

- A. To enrich the knowledge of students in understanding the need and importance of building services at building and urban level with standard bye laws as per BIS.
- B. Water distribution systems and its requirements at different scales such as building, site, neighborhood, etc.
- C. To equip the fundamentals to design plumbing systems for different sizes of buildings.
- D. Calculations and disposal of rainwater and solid waste disposal.
- E. Formulating sustainable solutions for real world problems.

### UNIT I: Water Supply

**Sources** of water supply – Surface and Underground, standards of purity-pH levels and treatment of water- Conventional water **treatment** – sedimentation, coagulation, filtration and disinfection, Impurities, and treatment; Hardness of water – softening, qualities of potable water. Domestic water **distribution** system- Continuous, intermittent, service **connections**, water meters, capacity of **storage tanks** - overhead tank, sump and pumping plants required, **calculation** of water consumption. **Demand** of water for domestic, commercial, industrial, and public utility purposes as per **BIS standards**. Domestic water piping systems. Hot and cold-water distribution within the building: **Layout** of water supply lines in a domestic house. Types of fittings to Kitchen and bathrooms, etc. Water supply to high rise buildings: **problems** encountered, and **systems** adopted. Energy Efficient Pumping Systems as per Eco-Niwas Samhita 2021 **recommendations**. New **trends** in water supply and plumbing to domestic and commercial level (**Green building Concepts** on water supply and plumbing)

### UNIT II: Plumbing and Sanitary Appliances

Building service **connections**- Domestic and Commercial - Hot and Cold-water **distribution systems** and **design** in small and multi storied buildings, **Types** of Valves (gate, flap, ball, flush valves etc.) & station, Pipe supports, hangers, fixing, plumbing for small houses direct and indirect water supply systems for individual and multistorey buildings, Fire hydrants, solar heating systems. Preparation of plumbing **drawings**, **symbols** commonly used in these



drawings. **Drainage** – floor traps, drains, P, Q, S-trap, bottle traps, Single stack, two stack, cross venting, fixture venting, **Materials** for construction.

**Sanitary appliances** – Kitchen and toilets, etc., Basic requirements of Drainage and Sanitation, **Selection**, and **Installation** of Sanitary Appliances from Hot and Cold-Water system- Pipe **Sizes**, **Materials** and **type** of fixtures, Sanitary pipe work – PVC, GI, CI, HDPE, etc. within the premises and multi storied building. **Quantity Estimate** for Sanitary Fixtures.

### **UNIT III: Sanitation and Storm Water System**

Basic **principles** of sanitation and disposal of various kinds of waste matter from building. Brief **description** of **various types** systems of sewage disposal systems - surface drainage combined and separate system of drainage, Individual disposal systems- cess pool, Septic tank etc., Public Drainage system, **Materials**, details of **Construction** etc., Refuse disposal: - Refuse bins, refuse chutes etc, **plumbing systems** (one pipe, two pipe etc), Anti siphonage and vent pipes, single stack and double stack system House drainage system, Drainage of sub-soil water. Manholes, Sub drains, culverts, ditches, and gutters, drop inlets and catch basins, roads and pavements, storm water overflow/regulators. **On-site processing** and disposal **methods**. Aerobic and Anaerobic decomposition, purifying capacity of water bodies. Sewage **treatment**- Biochemical Oxygen Demand.

**Sources** and **uses** of storm water, Roof drainage – Pitched roofs, flat roofs, Surface Water drainage, storm water drains. Rainwater harvesting **techniques**, Swales, ditches etc, **methods** of recharging ground water, **construction** details and techniques for **storage** of rain water for building and site use.

### **UNIT IV: Solid Waste Disposal**

**Types** of solid waste, **quantity** of waste generated, **collection** and **segregation** of municipal solid waste. Recycling **techniques** for solid waste. **Properties** of Solid Wastes: Physical and chemical composition of municipal solid wastes, waste generation rates. **Management** of Solid Wastes in India: Prevalent SWM **practices and deficiencies**: **Storage** of waste at source, segregation of wastes, primary collection of waste, transportation of waste, disposal of wastes. **Disposal** of Wastes: Sanitary landfilling, Composting, Incineration, Pyrolysis – **advantages** and **limitations**.

### **UNIT V: Hygiene**

**Importance** of Health- Individual and Building, set of **practices** performed for the preservation of health and well-being. World Health Organization (WHO) **guidelines**. Hygiene Cleanliness, Waterborne, Water-related, Water based, Epidemic **diseases**, Conservancy to water carriage system. Understanding the **Sustainable techniques** related to sanitation without compromising the hygiene at Individual and building level. Incorporating the aspects of hygiene for bathrooms, kitchens, and other areas where people engage in activities that require hygiene and clean conditions.

There are also emerging areas of focus in architecture related to hygiene, such as designing buildings and spaces that can better resist the spread of diseases, such as those that have become more relevant in the context of the COVID-19 pandemic, etc.

#### **ASSIGNMENTS TO BE FORMULATED:**

1. Assigning work to learn about the BIS related to the topics.
2. Case Study- Understanding the Water Supply from Residential Level to Neighborhood level.
3. Market survey for pipes, fittings and fixtures, traps etc
4. Online Study on Water Supply, Sanitation and Hygiene – report submission.
5. Inculcate working drawings and report on Water supply and Sanitation with all fixtures in Kitchen, Bath, and Utility for a small Residence and multi storied i.e., Plan and Section, Terrace plan with Rainwater down take pipes, Sump and OHT. Report Writing - Understanding the present technologies and facilities.
6. Individual and group presentation on micro and macro (Environment) Problems and solutions associated with the health and well-being of the society.

#### **Reference:**

1. National Building Code (NBC) – 2005, 2016.
2. Wise, A.F.E. and Swaffield, J.A., “Water Sanitary Services for Buildings”, Longman Scientific and Technical, Harlow, 1995.
3. Greeno, Roger, “Building Services Technology and Design”, Longman Scientific and Technical, Harlow, 1997.
4. Chatterjee, A.K., “Water Supply and Sanitary Engineering”, Khanna Publishers, New Delhi, 1986.
5. Punmia, B. C., Jain, A. K. and Jain, A. K. (1995). Water Supply Engineering. New Delhi: Laxmi Publications.
6. Punmia, B. C., Jain, A. K. and Jain, A.K. (1998). Waste Water Engineering. New Delhi: Laxmi Publications
7. Rangwala, S. C. (2005). Water Supply and Sanitary Engineering. Charoter Publishing.
8. Birdie, G. S., and Birdie, J. S., Water Supply and Sanitary Engineering, DhanpatRai and Sons, New Delhi, 2007.
9. Garg, S. K., Environmental Engineering, Vol. II, Khanna Publications, New Delhi, 2009.
10. Duggal, K. N., Elements of Environmental Engineering, S Chand and Co. Ltd., New Delhi, 2008
11. Hussain, S.K. T.B. of Water supply and Sanitary Engineering, 3rd ed. Oxford and IBH Pub. Ltd., New Delhi, 1994

### E-resources:

|   |   |
|---|---|
| <a href="https://www.pas.org.in/Portal/document/ResourcesFiles/pdfs/Module_1%20Basics%20of%20water%20supply%20system.pdf">https://www.pas.org.in/Portal/document/ResourcesFiles/pdfs/Module_1%20Basics%20of%20water%20supply%20system.pdf</a>   | Basics Of Water Supply System Training Module for Local Water and Sanitation Management |
| <a href="https://ncert.nic.in/textbook/pdf/iepg105.pdf">https://ncert.nic.in/textbook/pdf/iepg105.pdf</a>   | Pipe Fittings, Joints, and Valves   |
| <a href="https://law.resource.org/pub/in/bis/S03/is.sp.35.1987.pdf">https://law.resource.org/pub/in/bis/S03/is.sp.35.1987.pdf</a>   | Handbook On Water Supply and Drainage (With Special Emphasis on Plumbing)               |
| <a href="https://iricen.gov.in/iricen/books_jquery/Plumbing%20And%20Pipe%20Line%20Work.pdf">https://iricen.gov.in/iricen/books_jquery/Plumbing%20And%20Pipe%20Line%20Work.pdf</a>   | Rets-Practical Guide Book Series- Plumbing and Pipeline Work                            |
| <a href="https://www.philadelphia.edu.jo/academics/nbadarneh/uploads/CH%202%20part2.pdf">https://www.philadelphia.edu.jo/academics/nbadarneh/uploads/CH%202%20part2.pdf</a>   | Sanitary Systems Design Part 2 Prepared By: Eng. Nadia Badarneh                         |
| <a href="https://ec.europa.eu/echo/files/evaluation/watsan2005/annex_files/WEDC/es/ES07CD.pdf">https://ec.europa.eu/echo/files/evaluation/watsan2005/annex_files/WEDC/es/ES07CD.pdf</a>   | Chapter 7-Solid Waste Management  |
| <a href="http://www.mmmut.ac.in/News_content/21020tpnews_10312020.pdf">http://www.mmmut.ac.in/News_content/21020tpnews_10312020.pdf</a>   | Madan Mohan Malaviya Univ. Of Technology, Gorakhpur Solid Waste Management              |
| <a href="https://www.eawag.ch/fileadmin/Domain1/Abteilung/en/sandec/E-Learning/Moocs/Solid_Waste/W2/Solid_waste_management_UNEP_2005.pdf">https://www.eawag.ch/fileadmin/Domain1/Abteilung/en/sandec/E-Learning/Moocs/Solid_Waste/W2/Solid_waste_management_UNEP_2005.pdf</a>                           | Solid Waste Management  |
| <a href="https://ec.europa.eu/programmes/erasmus-plus/project-result-content/908fceb3-6d8d-43a0-bc76-d780aeb1a13b/Hygiene-Sanitation-Handbook_ENG.pdf">https://ec.europa.eu/programmes/erasmus-plus/project-result-content/908fceb3-6d8d-43a0-bc76-d780aeb1a13b/Hygiene-Sanitation-Handbook_ENG.pdf</a> | Hygiene And Sanitation Handbook 2018  |
| <a href="https://apps.who.int/iris/bitstream/handle/10665/330100/WHO-CED-PHE-WSH-19.149-eng.pdf">https://apps.who.int/iris/bitstream/handle/10665/330100/WHO-CED-PHE-WSH-19.149-eng.pdf</a>   | Water, Sanitation, Hygiene and Health A Primer for Health Professionals                 |
| <a href="https://www.jica.go.jp/project/solomon/002/materials/ku57pq00003um0e9-att/Water_Sanitation_and_Hygiene.pdf">https://www.jica.go.jp/project/solomon/002/materials/ku57pq00003um0e9-att/Water_Sanitation_and_Hygiene.pdf</a>   | Healthy Village Facilitator's Guide-Water Supply, Sanitation and Hygiene (Wash)         |

### COURSE OUTCOMES:

On successful completion of the course, student should have capability to

| COURSE OUTCOME | DESCRIPTION  |
|----------------|--|
| CO1            | <b>Identify</b> the importance of water supply, sanitation and hygiene in architecture and design.   |
| CO 2           | <b>Evaluate</b> different water supply and plumbing technologies, systems and interventions for buildings and communities  |
| CO 3           | <b>Apply</b> site planning and design principles for building water supply, sanitation and plumbing facilities and infrastructure in relation to water resources, sanitation, and hygiene requirements               |
| CO 4           | <b>Design</b> integrated solutions that promote health, safety, wellbeing at building and site level.  |
| CO 5           | <b>Apply</b> critical thinking, problem-solving, and project management skills to develop water supply, sanitation, and hygiene projects that align with local and global standards, regulations, and best practices |

These course outcomes ensure that students will not only acquire technical knowledge in

|  | PO<br>-1 | PO<br>-2 | PO<br>-3 | PO<br>-4 | PO<br>-5 | PO<br>-6 | PO<br>-7 | PO<br>-8 | PO<br>-9 | PO<br>-10 | PO<br>-11 | PO<br>-12 |                       |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------------------|
| CO<br>1  | 2        | -        | 1        | -        | 1        | -        | 2        | 1        | 1        | -         | -         | 1         | 1,3,5,7,8,9,12        |
| CO<br>2  | 3        | -        | -        | 2        | 1        | 3        | 1        | -        | 2        | 3         | -         | 2         | 1,4,5,6,7,9,10,<br>12 |
| CO<br>3  | 2        | -        | -        | -        | 3        | 3        | 2        | 2        | 2        | 1         | 2         | -         | 1,5,6,7,8,9,10,<br>11 |
| CO<br>4  | -        | 2        | 3        | 2        | -        | 2        | -        | 3        | 2        | -         | -         | -         | 2,3,4,6,8,9           |
| CO<br>5  | 1        | 3        | 2        | -        | 1        | 2        | -        | -        | 3        | -         | 3         | 1         | 1,2,3,5,6,9,11,<br>12 |
| 1- Low Correlation      2-Medium Correlation      3-High Correlation |          |          |          |          |          |          |          |          |          |           |           |           |                       |

water supply, sanitation and hygiene but also develop practical, creative, and ethical skills that are relevant to their professional practice as architects.



## AR22B4.7C COMPUTER AIDED DESIGN-I

| Periods Per Week |       |       | CREDITS | Marks    |          |       | End Exam |
|------------------|-------|-------|---------|----------|----------|-------|----------|
| L/T/S            | P/F/O | Total |         | Internal | External | Total | W/J/S/P  |
|                  | 3     | 3     | 3       | 50       |          | 50    |          |

### Objectives of the Course:

- A. To orient the student to create two and three-dimensional objects in virtual space
- B. Train students to use CAD to produce more work/ quicker time
- C. Train students to convert their virtual drawings to high quality prints
- D. Sensitize students to create 2D documents which can be used for further development in 3D softwares

### Course Contents:

#### Unit I : Manual and CAD Techniques

History; Advantages of CAD over manual drafting, integrating CAD with manual methods like sketching and model making.

Introduction to the Interface of Auto CAD, other alternative CAD softwares

#### Unit II : CAD Interface

Starting Auto CAD: Introduction to the menu, starting drawings from scratch,

Creating and using templates starting drawings with setup wizards. Saving and closing a file.

Using co-ordinate system: The UCS, Working with Cartesian and polar co-ordinate systems, using displays with key shortcuts.

#### Unit III: Drafting

Drawing tools, modification tools, layers (CTB/STB), line weights, keyboard shortcuts

Creating and modifying blocks

Model space vs paper space

#### Unit IV: Documenting and Printing

Using database information for objects, calculating distance and angle, areas etc.

Annotate: Dimensioning the objects in linear, angular fashions along with quick time dimensioning etc.

Presentation- Colour, texture, Hatch, templates and layout

Plotting Setup: sheet size, ctb, object line weights, export file type, Scale, print setup.

## Unit V: Geo-mapping And Rastering

Practicing the geometric shapes, geo-mapping by using google earth images to scale, extracting contour information from google maps, reading and understanding them.

Digitisation by documentation of existing site plans by tracing in autocad , importing images/pdf/different file types in to cad.

### Reference:

1. **Teyapoovan, T.** Engineering Drawing with Auto CAD 2000. Vikas Pub. House Pvt. Ltd., New Delhi, 2000.
2. **Parker, Daniel and Rice, Habert.** Inside Auto CAD Daniel. 1987.
3. **Georgeomura,** Auto CAD Release 2000.
4. **AutoCAD 2010** Textbook-AutoCAD 2010: A Problem-Solving Approach- Customizing AutoCAD 2010
5. **Beginning AutoCAD 2007-** By Bob McFarlane, Robert McFarlane

### E-reference:

- <https://help.autodesk.com/view/ACD/2022/ENU/?guid=GUID-2AA12FC5-FBB2-4ABE-9024-90D41FEB1AC3>.
- [https://images.autodesk.com/adsk/files/autocad\\_aca\\_user\\_guide\\_english.pdf](https://images.autodesk.com/adsk/files/autocad_aca_user_guide_english.pdf)

### COURSE OUTCOMES:

After successfully completing the course the student will able to:

|     |  |
|-----|--|
| CO1 | Apply CAD as a tool to create better presentations                                   |
| CO2 | analyse Satellite imagery to extract site related information into the CAD interface |
| CO3 | Understand interoperability of various digital formats                               |
| CO4 | Create required project drawings on CAD  |
| CO5 | Create technical drawings and plans for architectural and engineering projects.      |

### CO-PO mapping

| CO\PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|-------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| CO1   | -    | -    | 1    | -    | -    | 2    | -    | -    | -    | 3     | -     | -     |
| CO2   | 1    | 2    | -    | -    | 3    | -    | -    | -    | -    | -     | 1     | 1     |
| CO3   | -    | -    | 1    | -    | -    | -    | -    | -    | -    | -     | 3     | -     |
| CO4   | 3    | -    | -    | -    | -    | 1    | -    | -    | -    | 3     | -     | 1     |

**Course Structure for B. Arch**  
(Under the CBCS, Effective from the Academic Year 2017-2018)  
**Semester - I**

| S. No. | Course Code | Course Title                         | Pre Req | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/S/P | Remarks |
|--------|-------------|--------------------------------------|---------|------------------|-----|-------|-------|---------|-------|------|-------|---------------------|---------|
|        |             |                                      |         | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                     |         |
| 1      | AR17B1.1C   | Basic Design                         | Nil     | 1                | 8   | -     | 9     | 9       | 200   | 200  | 400   | S                   | Open    |
| 2      | AR17B1.2C   | Architectural Drawing and Graphics-I | Nil     | 1                | 3   | -     | 4     | 4       | 50    | 50   | 100   | S                   | Open    |
| 3      | AR17B1.3C   | Building Construction - I            | Nil     | 1                | 3   | -     | 4     | 4       | 50    | 50   | 100   | S                   | -       |
| 4      | AR17B1.4C   | Building Materials – I               | Nil     | 2                | -   | -     | 2     | 2       | 50    | 50   | 100   | W                   | -       |
| 5      | AR17B1.5C   | Structural Mechanics – I             | Nil     | 2                | -   | 1     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 6      | AR17B1.6C   | Introduction to Art and Architecture | Nil     | 2                | -   | -     | 2     | 2       | 50    | 50   | 100   | W                   | Open    |
| 7      | AR17B1.7C   | Workshop - Carpentry & Model making  | Nil     | -                | -   | 4     | 4     | 4       | 50    | -    | 50    | -                   | -       |
| 8      | GN17B1.2A   | Environmental Studies                | Nil     | 2                | -   | -     | 2     | 2       | 50    | 50   | 100   | W                   | -       |
|        |             | Total                                |         | 11               | 14  | 5     | 30    | 30      | 550   | 500  | 1050  |                     |         |

### Semester - II

| S. No. | Course Code | Course Title                            | Pre Req     | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/S/P | Remarks |
|--------|-------------|---|-------------|------------------|-----|-------|-------|---------|-------|------|-------|---------------------|---------|
|        |             |   |             | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                     |         |
| 1      | AR17 B2.1C  | Architectural Design – I                | AR17 B1.1C  | 1                | 8   | _     | 9     | 9       | 200   | 200  | 400   | S                   | -       |
| 2      | AR17 B2.2C  | Architectural Drawing and Graphics - II | AR17 B1. 2C | 1                | 3   | _     | 4     | 4       | 50    | 50   | 100   | S                   | Open    |
| 3      | AR17 B2.3C  | Building Construction – II              | AR17 B1. 3C | 1                | 3   | _     | 4     | 4       | 50    | 50   | 100   | S                   | -       |
| 4      | AR17 B2.4C  | Building Materials – II                 | AR17 B1. 4C | 2                | _   | _     | 2     | 2       | 50    | 50   | 100   | W                   | -       |
| 5      | AR17 B2.5C  | Structural Mechanics – I                | AR17 B1. 5C | 2                | _   | 1     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 6      | AR17 B2.6C  | History of Architecture -I              | Nil         | 3                | _   | _     | 3     | 3       | 50    | 50   | 100   | W                   | Open    |
| 7      | AR17 B2.7C  | Surveying and Leveling                  | Nil         | 2                | _   | 1     | 3     | 3       | 50    | 50   | 100   | W                   | Open    |
| 8      | GN17 B2.1A  | Communication Skills                    | Nil         | 1                | _   | 1     | 2     | 2       | 50    | 50   | 100   | W                   | Open    |
|        |             | Total                                   |             | 13               | 14  | 3     | 30    | 30      | 550   | 550  | 1100  |                     |         |



### Semester - III

| S. No. | Course Code | Course Title                             | Pre Req    | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/S/P | Remarks |
|--------|-------------|--|------------|------------------|-----|-------|-------|---------|-------|------|-------|---------------------|---------|
|        |             |  |            | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                     |         |
| 1      | AR17 B3.1C  | Architectural Design – II                | AR17 B2.1C | 1                | 8   | –     | 9     | 9       | 200   | 200  | 400   | J                   | -       |
| 2      | AR17 B3.2C  | Architectural Drawing and Graphics - III | AR17 B2.2C | –                | 3   | –     | 3     | 3       | 50    | 50   | 100   | S                   | Open    |
| 3      | AR17 B3.3C  | Building Construction – III              | AR17 B2.3C | 1                | 3   | –     | 4     | 4       | 50    | 50   | 100   | S                   | -       |
| 4      | AR17 B3.4C  | Structural Mechanics – III               | AR17 B2.5C | 2                | –   | 1     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 5      | AR17 B3.5C  | History of Architecture - II             | Nil        | 3                | –   | –     | 3     | 3       | 50    | 50   | 100   | W                   | Open    |
| 6      | AR17 B3.6C  | Building Services - I                    | Nil        | 3                | –   | –     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 7      | AR17 B3.7C  | Climatology                              | Nil        | 2                | –   | 1     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 8      | GN17 B2.2A  | Value Education                          | Nil        | 2                | –   | –     | 2     | 2       | 50    | 0    | 50    | -                   | -       |
|        |             | Total                                    |            | 14               | 14  | 2     | 30    | 30      | 550   | 500  | 1050  |                     |         |

**Semester - IV**

| S. No. | Course Code | Course Title                       | Pre Req    | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/S/P | Remarks |
|--------|-------------|------------------------------------|------------|------------------|-----|-------|-------|---------|-------|------|-------|---------------------|---------|
|        |             |                                    |            | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                     |         |
| 1      | AR17 B4.1C  | Architectural Design – III         | AR17 B3.1C | 1                | 8   | _     | 9     | 9       | 200   | 200  | 400   | J                   | -       |
| 2      | AR17 B4.2C  | Building Construction - IV         | AR17 B3.3C | 1                | 3   | _     | 4     | 4       | 50    | 50   | 100   | S                   | -       |
| 3      | AR17 B4.3C  | Design of Structures - I           | AR17 B3.4C | 2                |     | 1     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 4      | AR17 B4.4C  | History of Architecture - III      | AR17 B3.5C | 3                | _   | _     | 3     | 3       | 50    | 50   | 100   | W                   | Open    |
| 5      | AR17 B4.5C  | Building Services - II             | Nil        | 3                | _   | _     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 6      | AR17 B4.6C  | Landscape Design and Site Planning | Nil        | 2                | _   | 1     | 3     | 3       | 50    | 50   | 100   | W                   | Open    |
| 7      | AR17 B4.7C  | Computer Applications - I          | Nil        | _                | _   | 3     | 3     | 3       | 50    | 50   | 100   | P                   | -       |
| 8      | GN17 B4.1A  | Cultural and Political Studies     | Nil        | 2                | _   | _     | 2     | 2       | 50    | 0    | 50    | _                   | Open    |
|        |             | Total                              |            | 14               | 11  | 5     | 30    | 30      | 550   | 500  | 1050  |                     |         |

**Semester - V**

| S. No. | Course Code | Course Title                                    | Pre Req    | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/S/P | Remarks |
|--------|-------------|---|------------|------------------|-----|-------|-------|---------|-------|------|-------|---------------------|---------|
|        |             |   |            | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                     |         |
| 1      | AR17 B5.1C  | Architectural Design – IV                       | AR17 B4.1C | 1                | 8   | _     | 9     | 9       | 200   | 200  | 400   | J                   | -       |
| 2      | AR17 B5.2C  | Building Construction - V                       | AR17 B4.2C | 1                | 3   | _     | 4     | 4       | 50    | 50   | 100   | S                   | -       |
| 3      | AR17 B5.3C  | Design of Structures - II                       | AR17 B4.3C | 2                | _   | 1     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 4      | AR17 B5.4C  | History of Architecture - IV                    | AR17 B4.4C | 3                | _   | _     | 3     | 3       | 50    | 50   | 100   | W                   | Open    |
| 5      | AR17 B5.5C  | Computer Applications -II                       | AR17 B4.7C | _                | _   | 4     | 4     | 4       | 50    | 50   | 100   | P                   | -       |
| 6      | AR17 B5.6C  | Building Estimating, Costing and Specifications | Nil        | 2                | _   | 2     | 4     | 4       | 50    | 50   | 100   | W                   | -       |
| 7      | AR17 B5.xE  | ELECTIVE - I                                    | Nil        | 1                | 2   | _     | 3     | 3       | 50    | 0    | 50    | _                   | Open    |
|        | AR17 B5.1E  | Workshop - Vernacular Architecture              |            |                  |     |       |       |         |       |      |       |                     |         |
|        | AR17 B5.2E  | Workshop - Universal Design                     |            |                  |     |       |       |         |       |      |       |                     |         |
|        |             | Total   |            | 10               | 13  | 7     | 30    | 30      | 500   | 450  | 950   |                     |         |

**Semester - VI**

| S. No. | Course Code | Course Title  | Pre Req                   | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/S/P | Remarks |
|--------|-------------|---|---------------------------|------------------|-----|-------|-------|---------|-------|------|-------|---------------------|---------|
|        |             |   |                           | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                     |         |
| 1      | AR17 B6.1C  | Architectural Design – V                              | AR17 B5.1C                | 1                | 8   | _     | 9     | 9       | 200   | 200  | 400   | J                   | -       |
| 2      | AR17 B6.2C  | Working Drawing and Details                           | AR17 B3.2C&<br>AR17 B4.2C | 1                | 3   | _     | 4     | 4       | 50    | 50   | 100   | J                   | -       |
| 3      | AR17 B6.3C  | Architectural Acoustics                               | Nil                       | 3                | _   | _     | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 4      | AR17 B6.4C  | Building Economics and Sociology                      | Nil                       | 4                | _   | _     | 4     | 4       | 50    | 50   | 100   | W                   | -       |
| 5      | AR17 B6.5C  | Human Settlements & Town Planning                     | Nil                       | 4                | _   | _     | 4     | 4       | 50    | 50   | 100   | W                   | Open    |
| 6      | AR17 B6.6C  | Environment Responsive Design                         | AR17 B3.7C                | 3                |     |       | 3     | 3       | 50    | 50   | 100   | W                   | -       |
| 7      | AR17 B6.xE  | ELECTIVE - II   |                           |                  |     |       |       |         |       |      |       |                     |         |
|        | AR17 B6.1E  | Theory of Design and Architecture                     | AR17 B5.4C                | 3                | _   | _     | 3     | 3       | 50    | 50   | 100   | W                   | Open    |
|        | AR17 B6.2E  | Advanced Construction Technology & Structural Systems | AR17 B5.2C                |                  |     |       |       |         |       |      |       |                     |         |
|        |             | Total   |                           | 19               | 11  | 0     | 30    | 30      | 500   | 500  | 1000  |                     |         |

**Semester - VII**

| S. No. | Course Code       | Course Title                      | Pre Req    | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/S/P | Remarks |
|--------|-------------------|-----------------------------------|------------|------------------|-----|-------|-------|---------|-------|------|-------|---------------------|---------|
|        |                   |                                   |            | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                     |         |
| 1      | AR17 B7.1C        | Architectural Design –VI          | AR17 B6.1C | 1                | 9   | _     | 10    | 10      | 200   | 200  | 400   | J                   | -       |
| 2      | AR17 B7.2C        | Advanced Services                 | AR17 B4.5C | 3                | 2   | _     | 5     | 5       | 50    | 50   | 100   | W                   | -       |
| 3      | AR17 B7.3C        | Energy Conservation Building Code | AR17 B6.6C | 3                | -   | 2     | 5     | 5       | 50    | 50   | 100   | P                   | -       |
| 4      | AR17 B7.xE        | ELECTIVE -3                       | Nil        | 4                | -   | -     | 4     | 4       | 50    | 50   | 100   | W                   | -       |
|        | AR17 B7.1E        | Urban Design                      |            |                  |     |       |       |         |       |      |       |                     |         |
|        | AR17 B7.2E        | Housing                           |            |                  |     |       |       |         |       |      |       |                     |         |
|        | AR17 B7.3E        | Building Construction Management  |            |                  |     |       |       |         |       |      |       |                     |         |
|        | AR17 B7.4E        | Interior Design                   |            |                  |     |       |       |         |       |      |       |                     |         |
|        | AR17 B7.5E        | Landscape Architecture            |            |                  |     |       |       |         |       |      |       |                     |         |
| 5      | Open Elective - 1 |                                   |            |                  |     | *     | *     |         |       |      |       |                     | Open    |
| 6      | GN17 B7.1A        | Personality Development           |            | 2                |     | 1     | 3     | 3       | 50    | -    | 50    | -                   | -       |
|        |                   | Total                             |            | 13               | 11  | 3     | 30    | 30      | 400   | 350  | 750   |                     |         |

**Semester - VIII**

| S. No. | Course Code      | Course Title                                     | Pre Req    | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam<br>W/J/P | Remarks |
|--------|------------------|--|------------|------------------|-----|-------|-------|---------|-------|------|-------|-------------------|---------|
|        |                  |  |            | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total |                   |         |
| 1      | AR17 B8.1C       | Design Studio                                    | AR17 B7.1C | 1                | 10  | -     | 11    | 11      | 200   | 200  | 400   | J                 | -       |
|        | AR17 B8.1.1C     | Architectural Design - VII (Design Studio)       |            |                  |     |       |       |         |       |      |       |                   |         |
|        | AR17 B8.1.2C     | Building Construction Management (Design Studio) |            |                  |     |       |       |         |       |      |       |                   |         |
|        | AR17 B8.1.3C     | Landscape Architecture (Design Studio)           |            |                  |     |       |       |         |       |      |       |                   |         |
|        | AR17 B8.1.4C     | Interior Design (Design Studio)                  |            |                  |     |       |       |         |       |      |       |                   |         |
| 2      | AR17 B8.2C       | Pre-Thesis Seminar                               | AR17 B7.1C |                  | 2   | 2     | 4     | 4       | 100   | 0    | 100   | -                 |         |
| 3      | AR17 B8.xE       | ELECTIVE - 4                                     |            | 2                | 2   | -     | 4     | 4       | 50    | 50   | 100   | W                 | -       |
|        | AR17 B8.1E       | Architectural Illumination                       | AR17 B4.5C |                  |     |       |       |         |       |      |       |                   |         |
| 4      | AR17 B8.2E       | Architectural Journalism                         | GN17 B2.1A | 2                | 2   | -     | 4     | 4       | 50    | 50   | 100   | J                 | -       |
|        | AR17 B8.xE       | ELECTIVE - 5                                     |            |                  |     |       |       |         |       |      |       |                   |         |
|        | AR17 B8.3E       | Structures Project                               | AR17 B5.3C |                  |     |       |       |         |       |      |       |                   |         |
| 5      | AR17 B8.4E       | Workshop - Tall Buildings                        | AR17 B7.2C | 2                | 2   | -     | 4     | 4       | 50    | 50   | 100   | W                 |         |
|        | AR17 B8.xE       | ELECTIVE - 6                                     |            |                  |     |       |       |         |       |      |       |                   |         |
|        | AR17 B8.5E       | Furniture and Product Design                     | AR17 B7.4E |                  |     |       |       |         |       |      |       |                   |         |
|        | AR17 B8.6E       | Architectural Documentation                      | Nil        |                  |     |       |       |         |       |      |       |                   |         |
| 6      | AR17 B8.7E       | Building Information Modeling                    | AR17 B5.5C |                  |     |       | *     | *       |       |      |       |                   |         |
|        | Open Elective -2 |  |            |                  |     |       | *     | *       |       |      |       |                   |         |
| Total  |                  |  |            | 7                | 18  | 2     | 30    | 30      | 450   | 350  | 800   |                   |         |

Note: \* indicates credits for Open Electives. It is assumed as 3 credits for the purpose of the Course Structure and will depend upon the Course opted.

**Semester - IX**

| S. No. | Course Code | Course Title       | Pre Req    | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam | Remarks |
|--------|-------------|--------------------|------------|------------------|-----|-------|-------|---------|-------|------|-------|----------|---------|
|        |             |                    |            | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total | W/J/S/P  |         |
| 1      | AR17 B9.1C  | Practical Training | AR17 B7.1C | -                | -   | 30    | 30    | 30      | 150   | 150  | 300   | J        | -       |
|        |             |                    |            |                  |     | 30    | 30    | 30      | 150   | 150  | 300   |          |         |

**Semester - X**

| S. No. | Course Code | Course Title                           | Pre Req    | Periods per Week |     |       |       | Credits | Marks |      |       | End Exam | Remarks |
|--------|-------------|--|------------|------------------|-----|-------|-------|---------|-------|------|-------|----------|---------|
|        |             |  |            | L                | S/F | P/T/O | Total |         | Int.  | Ext. | Total | W/J/S/P  |         |
| 1      | AR17 B10.1C | Design Thesis                          | AR17 B8.1C | 2                | 21  | -     | 23    | 23      | 300   | 300  | 600   | J        | -       |
| 2      | AR17 B10.2C | Professional Practice & Building Codes | Nil        | 4                | -   | -     | 4     | 4       | 50    | 50   | 100   | W        | -       |
| 3      | AR17 B10.xE | ELECTIVE - 7                           |            | 3                |     |       | 3     | 3       | 50    | 50   | 100   |          | -       |
|        | AR17 B10.1E | Disaster Resistant Architecture        | Nil        |                  |     |       |       |         |       |      |       | W        | -       |
|        | AR17 B10.2E | Intelligent Buildings                  | AR17 B5.5C |                  |     |       |       |         |       |      |       | W        | -       |
|        |             | Total                                  |            | 9                | 21  | 0     | 30    | 30      | 400   | 400  | 800   |          |         |
|        |             |  |            |                  |     |       | 300   | 300     | 4600  | 4250 | 8850  |          |         |

**LIST OF PROFESSIONAL ELECTIVES  
BACHELOR OF ARCHITECTURE A.Y -2017-18**

| <b>FIFTH SEMESTER</b>   |   |           |   |   |   |   |   |     |    |     |   |      |   |
|-------------------------|---|-----------|---|---|---|---|---|-----|----|-----|---|------|---|
| AR17B5.xE               | <b>ELECTIVE - 1</b>                                   | Nil       | 1 | 2 | - | 3 | 3 | 50  | 0  | 50  | - | Open |   |
| AR17B5.1E               | Workshop - Vernacular                                 |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B5.2E               | Workshop - Universal Design                           |           |   |   |   |   |   |     |    |     |   |      |   |
| <b>SIXTH SEMESTER</b>   |   |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B6.xE               | <b>ELECTIVE - 2</b>                                   |           | 3 | - | - | 3 | 3 | 50  | 50 | 100 | W | Open |   |
| AR17B6.1E               | Theory of Design and Architecture                     | AR17B5.4C |   |   |   |   |   |     |    |     |   |      |   |
| AR17B6.2E               | Advanced Construction Technology & Structural Systems | AR17B5.2C |   |   |   |   |   |     |    |     |   |      |   |
| <b>SEVENTH SEMESTER</b> |   |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B7.xE               | <b>ELECTIVE - 3</b>                                   | Nil       | 4 | - | - | 4 | 4 | 50  | 50 | 100 | W |      |   |
| AR17B7.1E               | Urban Design  |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B7.2E               | Housing   |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B7.3E               | Building Construction                                 |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B7.4E               | Interior Design                                       |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B7.5E               | Landscape Architecture                                |           |   |   |   |   |   |     |    |     |   |      |   |
| <b>EIGHTH SEMESTER</b>  |   |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B8.xE               | <b>ELECTIVE - 4</b>                                   |           | 2 | 2 | - | 4 | 4 | 50  | 50 | 100 | W |      |   |
| AR17B8.1E               | Architectural Illumination                            | AR17B4.5C |   |   |   |   |   |     |    |     |   |      |   |
| AR17B8.2E               | Architectural Journalism                              | GN17B2.1A |   |   |   |   |   |     |    |     |   |      |   |
| AR17B8.xE               | <b>ELECTIVE - 5</b>                                   |           | 2 | 2 | - | 4 | 4 | 50  | 50 | 100 |   |      |   |
| AR17B8.3E               | Structures Project                                    | AR17B5.3C |   |   |   |   |   |     |    |     | J |      |   |
| AR17B8.4E               | Workshop - Tall Buildings                             | AR17B7.2C |   |   |   |   |   |     |    |     | W |      |   |
| AR17B8.xE               | <b>ELECTIVE - 6</b>                                   |           | 2 | 2 | - | 4 | 4 | 50  | 50 | 100 | J |      |   |
| AR17B8.5E               | Furniture and Product Design                          | AR17B7.4E |   |   |   |   |   | 100 | -  | 100 | J |      |   |
| AR17B8.6E               | Architectural Documentation                           | Nil       |   |   |   |   |   |     |    |     |   |      |   |
| AR17B8.7E               | Building Information Modeling                         | AR17B5.5C |   |   |   |   |   | 50  | 50 | 100 | P |      |   |
| <b>TENTH SEMESTER</b>   |   |           |   |   |   |   |   |     |    |     |   |      |   |
| AR17B10.xE              | <b>ELECTIVE - 7</b>                                   |           | 3 | - | - | 3 | 3 | 50  | 50 | 100 |   |      | - |
| AR17B10.1E              | Disaster Resistant Architecture                       | Nil       |   |   |   |   |   |     |    |     | W |      |   |
| AR17B10.2E              | Intelligent Buildings                                 | AR17B5.5C |   |   |   |   |   |     |    |     | W |      |   |



## SEMESTER - I

### AR17B1.1C BASIC DESIGN

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*L/s: 9/Wk Int: 200 End Exam: 200 Total: 400 End Exam: 5hrs Cr: 9*

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#### Course Overview:

Basic Design provides the framework for understanding design by sensitizing students to the conceptual, visual and perceptual issues involved in the design process, through exercises in simple two dimensional and three dimensional compositions.

#### Objectives of the Course:

- To understand the elements and principles of Basic Design as the building blocks of creative design through exercises to develop expression and creative thinking.
- Introduction to design - problem-solving, elements of design, principles of design, 2-D designs in different mediums, colours and textures for articulation of abstract ideas.
- Learning in the subject to be strengthened by conducting at least two workshops (preferably conducted by fine arts faculty), one of which should focus on visual art.

#### Expected Skills / Knowledge Transferred:

The Course prepares ground for the students to gain an understanding into the fundamental issues in design and develop the skill to create solutions for simple elements of building.

#### Course Contents:

##### Unit – I

Introduction to design – importance of design; Study and appreciation of design examples from forms in nature and analysis with respect to their colour, form, texture and structure.

Exercises involving these natural forms and various approaches to art such as – Representation, Abstraction, and Non-Representational/ Non-Objective compositions.

Analysis of Simple Objects: Critical analysis of simple man-made objects and environments to understand the underlying concepts in their design. Studies to understand function - Aesthetic Relationship, and Anthropometrics.

## **Unit – II**

Elements of design: point, line, shape, form, space, texture, value, colour and material; Introduction to the principles of composition: unity, balance, symmetry, asymmetry, proportion, scale and proportion, hierarchy, rhythm, contrast, harmony, focus, movement, direction, gradation, repetition, etc; Application of the principles of composition in two dimensional compositions;

## **Unit - III**

Compositions in two dimensions: shapes and patterns; use of grids in creating repetitive patterns; Principles of composition-using grids, symmetrical / asymmetrical, rule of thirds, center of interest etc.

Form generation through addition & subtraction, Anomaly, Positive & Negative spaces, Solid and Voids.

Developing compositions in two dimensional designs like- logos, cover page, collage, mural, floor patterns, grills, railings, gates etc.

## **Unit - IV**

Concepts of geometry –different three dimensional forms, primitive forms and understanding the behavior when combined- Transformations to three dimensional forms; Explorative exercises in three dimensional compositions.

Making three dimensional sculptures involving the basic platonic solids and abstract sculptures using various techniques/ materials. (Ex: POP, wire/ matchstick, soap, clay etc.)

## **Unit - V**

Colour theory, color wheel, primary, secondary, tertiary colors, color schemes, color value and intensity, colour coding systems and psychological factors governing the choice of colour schemes in architecture. Theoretical inputs to be followed by exercises to develop the ability to translate abstract principles into two and three dimensional compositions.

## **UNIT VI**

Design of non-enclosed object. eg. park seat, push-cart, built-in furniture etc. Developing compositions in of semi-enclosed spaces- entrances, gateways, portal, compound walls etc.

## **Unit - VII**

Study of ornament in architectural design: documentation and comparison of different types of ornamentation in historical and contemporary buildings, to understand their design features as studied in the previous units.

**Reference books:**

**Wucius, Wong.** Principles of two Dimensional Design. Van Nostrand Reinhold 1972.

**Maier Manfred** Basic Principles of Design, Vol.1, 2, 3 & 4, Van Nostrand Reinhold, NY. (1977)

**Ching, Francis D.K. Architecture:** Form, Space, and Order, 2nd ed. Van Nostrand Reinhold, New York, 1996.

**Hanks, A. David.** Decorative Designs of Frank Lloyd Wright, Dover Publications, Inc. New York, 1999.

**Hepler, E. Donald, Wallach, I. Paul.** Architecture Drafting and Design, 3rd ed. McGraw-Hill Book Company, New York, 1977.

**Itten, Johannes. Design and Form:** The basic course at the Bauhaus, Thames and Hudson Ltd., London 1997.

**Krier, Rob.** Architectural Composition, Academy Editions, London, 1988.

**Meiss, Pierre Von.** Elements of Architecture: From form to place, E and FN Spon, London, 1992.

**Pipes, Alan.** Drawing for 3-Dimensional Design. Thames and Hudson Ltd., London 1990.

**Shibikawa, Ikuyoshi and Takahashi, Yumi.** Designers Guide to Colour.

**Smithies, K.W.** Principles of Design in Architecture. Chapman and Hall, 1983.

**AR17B1.2C      ARCHITECTURAL DRAWING AND GRAPHICS – I**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 4*

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**Course Overview:**

The course introduces the fundamental techniques of architectural drawing and develops the appropriate skills for visualization and representation.

**Objectives of the Course:**

To introduce architectural drawing techniques and to facilitate effective visual communication.

**Expected Skills / Knowledge Transferred:** Freehand, scale drawing, conventional architectural representations in drawings and graphics.

## **Course Contents:**

### **Unit – I**

Introduction: Fundamentals of drawing and its practice, introduction to drawing equipment, familiarization, use and handling. Drawing sheet sizes, layouts and composition. Simple exercises in drafting, line types, line weights; dimensioning, use of scale

### **Unit – II**

Typography –anatomy of Type, Styles, Roman and Gothic style lettering; freehand lettering, title panels and legends.

### **Unit – III**

**Geometrical Construction:** Constructing simple and complex geometrical shapes involving various drafting techniques; regular shapes using T-squares, set-squares; straight lines, triangles, quadrilaterals, circles, tangents, regular polygons, polygons inscribed in circle.

Description of Plane Curve: Ellipse, Parabola, Hyperbola and Ovals.

### **Unit – IV**

Architectural Symbols: Representation of building elements, openings, materials, furniture and accessories; human postures; vegetation; vehicles; terminology and abbreviations used in architectural representation.

### **Unit – V**

**Measuring and Drawing to Scale:** Scales and construction of scales, scaled drawings of simple objects, dimensions; scaled drawings of furniture, rooms, doors and windows etc., in plan, elevation and section. Reduction and enlargement of drawings.

### **Unit – VI**

**Free Hand Drawings:** Line strokes, light and shade techniques of simple, natural and 3D geometric forms. Study of proportions and scale; structure and axes of objects; Indoor and Outdoor sketching of built and natural forms: Still life, furniture, etc.

**Note:** This is a studio subject and students should be made to prepare drawings as studio exercises along with the theoretical inputs. The studio work should be supplemented with appropriate site visits.

### **Reference books:**

**Moris, I.H.** Geometrical Drawing for Art Students.

**Thoms, E. French.** Graphic Science and Design, New York: MC Graw Hill.

**Nichols, T.B. and Keep, Norman.** Geometry of Construction, 3rd ed. Cleaver – Hume Press Ltd., London, 1959.

**Bhatt, N.D. and Panchal V.M.** Engineering Drawing: Plane and Solid Geometry, 42nd ed. Charotar Pub., Anand, 2000.

**Gill, P.S.** T.B. of Geometrical Drawing, 3rd ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986.

**Shah, M.G., Kale, C.M. and Patki, S.Y. Building Drawing:** with an integrated approach to built environment, 7th ed. Tata McGraw Hill Pub., Delhi, 2000.

**Bies, D. John. Architectural Drafting:** Structure and Environment. Bobbs – Merrill Educational Pub., Indianapolis.

**Nelson, A. John. H.B.** of Architectural and Civil Drafting, Van Nostrand Reinhold, New York, 1983.

## **AR17B1.3C BUILDING CONSTRUCTION- I**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 5hrs Cr: 4*

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### **Course Overview:**

The course introduces to the methods and techniques of construction of basic elements of a simple building.

### **Objectives of the Course:**

To understand the elementary and simple construction methods, explaining basic principles and considerations in the construction of one roomed rectilinear building with verandah.

### **Expected Skills / Knowledge Transferred:**

To understand the techniques of construction of a simple load bearing structure with simple material like brick, stone etc.

### **Course Contents:**

#### **Unit I**

**Basic building components:** Cross section of a small building to understand foundation, plinth beam flooring, sill, lintel, roof beam and slabs parapet & weathering course

**Walls:** Details of walls section across the opening (door & window) Roofs: simple configurations and details of various forms of roofs (flat, slope pyramidal & dome)

## Unit – II

**Brickwork:** Various types of bonds, stopped ends, junctions, piers, jambs, footings, foundations, corbelling, damp proof course, window sills, thresholds, copings, mortar joints and pointing.

## Unit – III

**Stone masonry:** stone walls, rubble work, ashlar work, masonry joints, window sills, plinth, cornices, surface finishes.

## Unit – IV

**Composite masonry:** Brick backed ashlar, rubble backed ashlar, concrete backed masonry, ashlar faced concrete walls, marble faced masonry; tile faced concrete, hollow block masonry.

**Cladding:** Cladding of various materials-marble, granite, slate, tiles, metal etc.

## Unit – V

**Lintels:** Lintels of wood, stone, brick.

**Arches:** arches; terms defined; various forms of arches like segmental, semi-circular, elliptical, three-centered, flat and relieving arch, etc.

## Unit – VI

**Building Foundations:** Definition, safe bearing capacity of soils; brick and stone foundations, simple, steeped, combined and cantilevered footing, RCC footing.

**Basement:** Damp proofing, different types of damp proof materials, their compositions and application, Constructional details of walls, floors, foundations etc. with respect to their damp proofing and natural ventilation.

## Unit – VII

**Construction techniques of the past:** Ground and upper floors: solid floor, brick flooring, floor finishing and floor coverings, Basement floor. Wooden ground and upper floors: Terms defined, bridging joists, binding joists, binders, beams and girders, solid and herring bone strutting, floor boards, ceiling joists, trimming floors to accommodate fire place. Details of fire place.

**Flat roofs: Madras terrace, Jack arch, elementary knowledge about R.C.C roof and floor slabs.**

**This unit to be taught with the objective of giving a historical perspective. A broad orientation may be given without preparation of drawing plates.**

To give the learning in this subject a more practical orientation seminars by industry or trade related organizations or field/site visits should be organized. At least two exercises to be done in the construction yard. A weight age of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.

**Reference books:**

**Barry, R.** The Construction of Buildings Vol. 2, 5th ed. East-West Press. New Delhi, 1999.

**Bindra, S P. and Arora, S P. Building Construction:** Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub. New Delhi, 2000.

**Hailey and Hancork, D.W.** Brick Work and Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R. Mitchell's** Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.

**Sushil Kumar. T.B.** of Building Construction, 19th ed. Standard Pub, Delhi, 2003.

**AR17B1.4C BUILDING MATERIALS – I**

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*L/s: 2/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3hrs Cr: 2*

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**Course Overview:**

The course provides information on the properties, use, installation and costs of basic building materials.

**Objectives of the Course:**

To impart knowledge on the various building materials,

To highlight the current trends and innovations in the usage of building materials.

**Expected Skills / Knowledge Transferred:**

Knowledge required for specifying appropriate materials for various spaces in buildings.

## **Course Contents:**

### **Unit –I**

Brick as a building material: Types, properties, uses and manufacturing methods. Brick: Composition of earths, standard, market and ISI. size properties, as per ISI brick manufacturing processes, requirements and tests for good bricks. Fire clay bricks - varieties; sand lime bricks; paving bricks; Terra-cotta-its varieties: ordinary, glazed, porous, polished and fine; sun dried brick, Special types of bricks, uses and properties Different uses of brick in construction.

**Building Tiles:** Roof, floor and wall tiles.

### **Unit –II**

Stones: Classification of stones: granite, laterite, quartzite, marble and slates properties and uses; stone units - khandki, rubble, black stones, stone metal, flag stones. method of quarrying of building stones, types of stone dressings defects in stone, stones used in construction, uses in construction, aggregates. tool used, Preservation of stone work.

### **Unit –III**

**Sand :** Pit, river sea sand, gravel, bulk age of sand, impurities in sand their removal, tests for silt and organic contents different grades of sand with respect to size and their application. I.S.I. standards, use in mortar and concrete.

### **Unit –IV**

**Cement:** Ingredients and properties of cement, Types of cement, Grades of cement, Initial and final setting time, Test of cements, ISI Standards, Pozzolana material and its properties.

### **Unit –V**

**Mortars:** Types, proportioning, mixing and grinding, mortar, cement mortar, lime mortar, methods of preparing, handling and uses of mortars, Surkhi-mortar, light weight mortars i.e. cinder, sawdust and fibrous plaster, gypsum plaster, Plaster of Paris and application.

**Concrete:** Concrete and its constituents, aggregate: coarse and fine, properties of concrete, strength, durability, etc. Effect of age on strength.

**Grading:** importance, fineness modulus, combined aggregate, water cement ratio. Mixing and Curing.

### **Unit –VI**

**Timber:** Building timber types and its properties, sawing of timber, shrinkage and distortion, wastage, methods of sawing. Drying and seasoning, moisture contents,



purpose of seasoning, natural and artificial. Defects in timber. Use and application of timber in construction.

**Processed woods:** Plywood and Synthetic boards properties and application. Use of alternative materials as substitute to wood. ISI standards

## Unit –VII

**Ferrous Metals** - Pig iron, cast iron, wrought iron, steel, manufacturing processes and casting. Characteristics form and uses of cast iron, wrought iron and steel. Alloys steel, stainless steel, steel-treatment, steel tempering, annealing, normalizing, and case hardening, their objectives and effect on alloy steels. Galvanizing, oxidation and casting of metallic products, corrosion of iron and their prevention. Metallic protective coatings.

**Non ferrous Metals:** Basic idea of important ores, properties and uses of Aluminum, Zinc, Copper, Tin and Lead

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.*

*Students should be exposed to Lab tests in the context of the listed materials.*

### Reference Books:

**Hailey & Hancork, D.W.** Brick Work & Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R.** Mitchell's Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.

**Sushil Kumar. T.B.** of Building Construction, 19th ed. Standard Pub, Delhi, 2003.

## AR17B1.5C      STRUCTURAL MECHANICS – I

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L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr: 3

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### Course Overview:

Gives an in-depth understanding of the concepts associated with different Elements of Structures.

## **Objectives of the Course:**

To provide knowledge of different forces, force systems, Beams types sectional Properties behavior of different members due to applied forces.

Expected Skills / Knowledge Transferred: Basic principles of mechanics and behavior of elements of structures.

## **Course Contents:**

### **Unit – I**

**Introduction:** Forces, system of forces, resultant, equilibrant Parallelogram law, Triangle law, Lamis Theorem, polygon law, resultant of coplanar, concurrent force system, couple, characteristics of couple, moment, Equilibrium, Varignon's Theorem.

### **Unit – II**

Analysis of trusses, types of stresses, Loads on trusses, 2-D truss analysis using method of joint (Cantilever & Simply Supported)

### **Unit – III**

Stress, Strain, type of stresses, stress-strain curve for ductile Material, Hooke's law, Modulus of Elasticity, Bars of Varying Section, Bars of Composite Section.

### **Unit – IV**

Shear stress, types of Strain, poissons Ratio, Shear modulus Bulk Modulus Relation between the three Elastic Constants members subjected to 3 mutually perpendicular forces

### **Unit – V**

Types of Beams, types of loads, calculation of reactions for simply supported beam (Using Point loads & Udl's) definition shear force & Bending Moment SFD& BMD for Cantilever beams.

### **Unit – VI**

Shear force & Bending Moment diagrams for simply supported & over hanging beams for point loads & UDL, point contra flexure & its location, Relation between loading, SF & BM

### **Unit – VII**

Definition of centroid, line of symmetry ,centroid for some standard shapes, calculation of centroid for shapes like L,T,C,I Sections etc., moment of inertia, Derivation of M.I formula for Rectangle, circle, Triangle, calculation of M .I for L,T,C,I Sections etc.,

## Unit VIII

Types of joints, lap joint & butt joint, failure of riveted joints, strength of the joint, efficiency of joint, Unwins formula, chain riveting & Diamond Riveting

### Reference Books

**Khurmi. R.S.** Engineering Mechanics, S. Chand and Co. Ltd., New Delhi, 1999.

**Ramamrutham. S.** Engineering Mechanics, 7th ed. Dhanpat Rai Pub. Co. Ltd., Delhi, 2004.

**Timoshenko. S.** and **Young, D.H.** Engineering Mechanics, McGraw-Hill International Editions.

## AR17B1.6C INTRODUCTION TO ART AND ARCHITECTURE

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*L/s:2/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr: 2*

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### Course Overview:

Introduces fundamental ideas, methodologies and terminologies in art and architecture, shedding light on why certain works were produced, what meanings they communicated, and how they are important to our contemporary society. Emphasis will be placed on styles and the unique historic contexts and circumstances that shaped them.

### Objectives of the Course:

To analyze various art forms, and understand the techniques involved in creative thinking.

Expected Skills / Knowledge Transferred: Understanding various art forms, appreciate art and architecture.

### Course Contents:

#### Unit – I

Purpose and relevance of art, Art consciousness: Aesthetics, perception, symbolism, expression, style, fashion, appropriateness and values. Understanding works of art.

Its role meaning and purpose in terms of basic characteristics and development as an expression of culture

#### Unit – II

Development of art; A survey of history of art forms; pre-historic period to the

present times; Changing nature of art through time in terms of content; form and material

### **Unit – III**

Exploration of art forms - Role and meaning of art-various types of arts - fine arts, performing arts, commercial arts, industrial arts, folk arts, abstract art, visual arts, spatial arts, temporal arts, pop art etc.

Nature and characteristics of art forms such as Painting, Sculpture, Architecture, Photography, Almost Art; Nature and characteristics of art forms such as Dance, Drama, Music, The Film, Literature

Relationship between art and architecture from earliest times. ▸

### **Unit – IV**

Definitions and general understanding of architecture, role of architect in a building project. The changing role of architects, his relation with other consultants, contractors and client, technical knowledge and other skills required as inputs. Various subjects to be learnt by architecture students, their relevance to practice.

### **Unit – V**

Various factors influencing the architecture of a region, architecture as a response to social, technological and environment forces. Evolution of shelter forms in regions of the world and examples of vernacular architecture in the world, with particular reference to India.

### **Reference Books:**

**Craven, C. Roy.** Indian Art a Concise History.

**Kumar, Raj (Ed.).** Essays on Indian Art and Architecture. Discovery Pub., New Delhi, 2003.

**Fisher, E. Robert.** Buddhist Art and Architecture. Thames and Hudson, London, 1993.

**Ghosh, A (Ed.).** Jain Art and Architecture Vol. 1-3. Bharatiya Jnanpith, New Delhi.

**James C. Snyder,** Introduction to Architecture, New York: Mc Graw Hill.

**Christopher Alexander,** Pattern Language, New York: Oxford University Press

**Thomas Mitchell,** Redefining Designing: From to Experience,

**James snyder and Anthony Y catanse,** Introduction to Architecture, Mc Graw-Hill Book company, New York, 1979.

**Rapoport, Amos, House form & Culture.**

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**AR17B1.7C      WORKSHOP- CARPENTRY & MODEL MAKING**

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*L/s: 4/Wk    Int: 50    End Exam: Nil    Total: 50    End Exam: Nil    Cr: 4*

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**Course Overview:**

The course provides the foundation and capability to represent the concepts three dimensionally.

**Objectives of the Course:**

To introduce various fabrication skills and techniques necessary to produce scale-models and to encourage preparation of models as an essential phase in design development and evaluation.

Expected Skills / Knowledge Transferred: Dexterity; Knowledge of materials and their properties; craft skills; visualization skills;

**Course Contents:**

**Unit – I**

Introduction to model-making: Need; role of scale-models in design; general practices; Digital models.

**Unit – II**

Essentials of model-making: understanding of various tools and machines employed, best practices involved in operating the tools and the techniques.

**Unit – III**

Survey of various materials available for model making such as papers , mount boards , wood, plastics, films, plaster of paris, acrylic, Styrofoam, wax, metals, glass, FRP, etc. and exploring their potential in model-making. .chamfering at 45 degrees in mountboard.

**Unit – IV**

Techniques of Scale-modeling: Use of different scales; templates; measuring aids; conventions followed.

**Unit – V**

Techniques for preparation of presentation models, mock-ups, simulation of various materials and textures such as wood, glass, aluminum, steel, bricks, roofing tiles, flooring, corrugated sheets, upholsteries etc.

**Unit – VI**

Carpentry: Introduction to the use of different types of tools and different types

of joints used in carpentry. Joinery details which are commonly used in timber construction. Application of surface finishes such as polish, varnish, lacquer on wood.

## **Unit—VII**

Photography in built models, using lighting and natural background.

### **Assignments.**

At least three major assignments involving the individual students to fabricate

- a. Scale model of a piece of furniture
- b. Presentation of models
- c. mock-up of an everyday object
- d. Three-dimensional forms etc.

Documentation of the important phases of fabrication is must which shall become the basis for internal evaluation.

### **Reference books:**

**Bernald, S and Copplene, Myers.** History of Art.

**Craven, C. Roy.** Indian Art a Concise History.

**Krier, Rob.** Element of Architecture. Academy Editions, London, 1992.

**Lang, Jon.** A Concise History of Modern Architecture in India. Permanent Black, Delhi, 2002.

**Magnet, Jacque.** The Aesthetic Experiences: An anthropologist looks at the Visual Art.

**Preble, Duame.** Art Forms.

**Snyder, C. James and Catanese, J. Anthony.** Introduction to Architecture.

**Tapert, Annette. Swid Powell:** Objects by Architects. Rizzoli, New York, 1990. **Thyagarajan.** Basic practical photography

**Ching Francis D.K:** Architecture: Form, Space, and Order.

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## **GN17B1.2A ENVIRONMENTAL STUDIES**

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*L/s: 2/Wk Int:50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:2*

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**Course Overview:** A compulsory subject for all the undergraduate students of various discipline highlights significance of maintaining balance and sustainability of various components of the environment.

**Objectives of the Course :** To sensitize the students towards sustainable environment.

### **Course Contents:**

#### **Unit – I**

Environmental studies – Introduction: - Definition, scope and importance, Measuring and defining environmental development indicators.

#### **Unit – II**

Environmental and Natural Resources: Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation, case studies - Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water - Floods, drought, conflicts over water, dams-benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

#### **Unit - III**

Basic Principles of Ecosystems Functioning: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers.- Energy flow in the ecosystem Ecological succession. - Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

#### **Unit - IV**

Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values -

Biodiversity at global, National and local levels. - India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### **Unit - V**

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

### **Unit - VI**

Social Issues and the Environment: From unsustainable to sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. - Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

### **Unit - VII**

Human Population and the Environment: Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. -Case Studies.

### **Unit - VIII**

Field work: Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems - pond, river, hill slopes, etc.

### **TEXT BOOK:**

ErachBharucha, A Text Book of Environmental Studies for Undergraduate Courses, University Grants Commission.



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## SEMESTER - II

### AR 17B2.1C ARCHITECTURAL DESIGN – I

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*L/s: 9/Wk Int: 200 End Exam: 200 Total: 400 End Exam: 5 hrs Cr: 9*

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#### **Course Overview:**

This course is intended to provide framework for understanding design as a process.

#### **Objectives of the Course:**

Simple space organization starting with single activity to multifunctional spaces.

Spaces responding to human anthropometrics

#### **Expected Outcome:**

To understand principles of design. To develop the ability to translate abstract principles of design into architectural solutions for small problems.

#### **Course Contents:**

##### **Unit - I**

**Anthropometrics:** Basic -average measurements of human body in different postures-its proportion and graphic representation, application in the design of simple household and street furniture. Use of mannequins in defining spatial parameter of design.

##### **Unit - II**

Study of functional spaces and the issues like clearances, lighting and ventilation, furniture arrangements; Minimum and optimum areas for various functions; Detailed study of spaces such as living, dining, bedrooms, kitchen, toilet, etc.

Study of the human considerations like, privacy, convenience, comfort, etc.; Case study of a house and a critical appraisal of the spaces.

##### **Unit - III**

Introduction to design process. Pre- Design Studies: Preparation of design brief, the user requirement and their implications, Study of the site and the context;

Design Response: Development of concept, Graphic tools like circulation diagrams, Figure Ground studies, etc. Integration of form and function in the design of an enclosed object/space using the materials studied. e.g. Security cabin, grocery store, caravan, bus shelter, milk booth, traffic police kiosk, flower stall, ATM Center, etc.

## **Unit – IV**

Listing of important local buildings and understanding the reasons for their importance.

Listing and Drawing silhouettes of favourite buildings or places.

Observing the built environment around and experiencing enclosures (field trips)

Local stories on architecture.

Introduction to basic development of forms: additive form, deductive form, rhythm, contrast, balance and symmetry.

Concepts of volume and scale, width to height ratio.

Study models to explore the design principles. Multiple sectional drawings of study models.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

### **Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1980.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors Offices and Clinics, 2nd ed. Reinhold Pub., USA, 1960.

**Neufert, Ernst. Ernst Neufert Architects Data, Granada Pub. Ltd., London, 1970. Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Shah, S. Charanjit.** Architects Hand Book Ready Reckoner. Galogotia Pub. Co., New Delhi, 1996.

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**AR 17B2.2C      ARCHITECTURAL DRAWING AND GRAPHICS – II**

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L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 4

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**Course Overview:**

The course is intended to develop the techniques of architectural drawing pertaining simple and complex solid geometrical forms of Building geometry Sciography and Documentation.

**Objectives of the Course:**

To impart the skills of three dimensional visualization and presentation.

**Course Contents:**

**Unit – I**

Orthographic Projections (first angle projection): Principles of orthographic projection; projections of points, lines, planes –all combinations; Orthographic projection of solids; Orthographic projection of architectural built elements and built forms: (with increasing complexity)

Building Geometry: Study of points, lines, and planes leading to simple and complex solid geometrical forms; Representation of 3D elements in Plan and Elevations

Use of circle in mouldings and arch forms - Ovolo Covetta, Ogee, Lancet, Horse shoe, Moorish, Stilted and Rampant, Tudor, three centered and drop. Exercises on Ionic volute, Entasis of column etc., working with models to facilitate visualization.

**Unit –II**

**Sciography:**

Simple and composite forms, shadows on horizontal, vertical planes and on their own surfaces. Study of shade and shadows of simple geometrical solids of various forms and groups of forms.

Shade and shadow techniques leading to advanced practical examples: shades and shadows on buildings or parts of buildings. Relative changes in building shades and shadows with sun angle, time, building height. Introduction to sciography in perspective.

**Unit-III**

**Architectural Documentation:**

Detailed measured drawing and documentation of any interesting historical or modern building – preparation of maps, plans, elevations, sections, views etc.

**Reference books:**

**Thoms, E. French.** Graphic Science and Design, New York: MC Graw Hill.

**Nichols, T.B. and Keep, Norman.** Geometry of Construction, 3rd ed. Cleaver – Hume Press Ltd., London, 1959.

**Bhatt, N.D. and Panchal V.M.** Engineering Drawing: Plane and Solid Geometry, 42nd ed. Charotar Pub., Anand, 2000.

**Gill, P.S. T.B.** of Geometrical Drawing, 3rd ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986.

**Shah, M.G., Kale, C.M. and Patki, S.Y.** Building Drawing: with an integrated approach to built environment, 7th ed. Tata McGraw Hill Pub., Delhi, 2000.

**Claude Batley:** Design Development of Indian Architecture

**Ernest Burden:**-Architectural Dilineation

**AR 17B2.3C BUILDING CONSTRUCTION – II**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 5hrs Cr: 4*

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**Course Overview:**

The course introduces to the methods and techniques of construction of doors and windows, stairs and partitions of a building using different materials.

**Objectives of the Course:**

To understand the elementary and simple construction methods like joinery details in wood, fixing of hardware.

**Expected Skills / Knowledge Transferred:**

To understand the techniques of constructing doors and windows, staircase and partitions using different materials

**Unit – I**

Carpentry and joinery: Terms defined; mitring, ploughing, grooving, rebating, veneering. Various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon etc;

**Unit – II**

Doors: Definition of terms, types of doors: wooden, ledged, ledged and braced, paneled, flush door. Hinged, single and double shutters, sliding, folding, revolving, pivoted.

### **Unit – III**

Windows: Casement, top and bottom hung, pivoted and sliding sash, UPVC doors and windows.

Hardware: fixtures, locks, hinges, fastenings for doors and windows.

### **Unit – IV**

Steel: windows, rolling shutters and grills. Aluminium doors and windows.

### **Unit – V**

Partition Walls: Various types of glazed and wooden partitions and paneling; Sound proof and light weight partitions; Brick partition, reinforced brick partition, brick nogged partition, lath and plaster partition, pre-cast concrete partition, glass block and glass create partition, common wooden partition, trussed partition.

### **Unit – VI**

Staircases: Principles of staircase construction and its elements; Terms defined, Tread, riser, stringer, nosing, flight, landing, head room, handrail, balusters, newel post etc., types of stairs i.e., straight, doglegged, open well, geometrical, circular, spiral, bifurcated, wooden stairs, stone stairs, metal stairs and elementary knowledge of R.C.C. stairs. Details of various staircases in wood, stone, steel and RCC.

### **Unit – VII**

Flooring & Flooring finishes: Various natural and manufactured materials: Types of Stone flooring: Granite, Marble, Kota, Shahbad (Limestone), Flagstone, Wooden Flooring, Ceramic and Vitriified Tiles. Concrete floors, Brick on edge, Indian patent floor, granolithic, terrazzo, pitch mastic, Magnesium Oxide, Chloride.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

### **Reference Books**

**Barry, R.** The Construction of Buildings Vol. 2, 5th ed. East-West Press. New Delhi, 1999.

**Bindra, S P. and Arora, S P.** Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub. New Delhi, 2000.

**Hailey and Hancork, D.W.** Brick Work and Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R.** Mitchell's Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.

**Sushil Kumar. T.B.** of Building Construction, 19th ed. Standard Pub, Delhi, 2003.

## **AR 17B2.4C BUILDING MATERIALS – II**

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*L/s: 2/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3hrs Cr: 2*

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### **Course Overview:**

The course is intended to provide information on the properties, uses, installation and costs of building materials. The course highlights on Mechanical and physical properties of various materials. Influence of various factors on these properties. Causes of defects, their prevention and remedies. Testing of materials.

### **Objectives of the Course:**

To provide knowledge on the various types of building materials used while highlighting the current innovations and trends.

### **Expected Skills / Knowledge Transferred:**

Knowledge required for specifying appropriate materials for various spaces in buildings.

### **Course Contents:**

#### **Unit – I**

Laminates and Veneers: Resin bonded ply wood, types of laminates, laminated wood, insulating boards and other miscellaneous boards, veneers from different varieties of timber, their characteristics and uses MDF & HDF Boards.

#### **Unit – II**

Paints and Varnishes: Protective coating, paints, constituents of paints, their functions, water paints, distempers, and cement based paints, emulsion paints, selection of paints, and storage of paints.

Types varnishes (oil and spirit): characteristics and uses of varnishes. French polish, anti-corrosive paint, damp proofing finishes.

#### **Unit – III**

Glass and glass products: Composition and fabrication of glass, types of glass, wired glass, fiber glass, rock wool, laminated glass, glass-crete blocks, structural glass, their properties and uses in buildings.

## Unit – IV

Plastics: Polymer types, thermo setting and thermo plastics, resins, common types of moldings, fabrication of plastics, polymerization and condensation, plastic coatings.

Composite materials, classification, properties and uses - linoleum, plastic coated paper, polythene sheets, reinforced plastic, plastic laminates and PVC.

Properties and architectural uses of plastics – structural plastics – Reinforced plastics and Decorative laminates-plastic coatings, Adhesives and sealants – Modifiers and

Primary plastic building products for walls, roof and partitions. Secondary building products for rooms, windows, roof lights, domes, gutters and handrails.

## Unit – V

Floorings: Introduction, essential requirements of a floor, factors affecting selection of flooring material, Various natural as well as artificial flooring materials like brick, flag stone, tiled, cement concrete, granolithic, terrazzo, marble, shahbad stones timber flooring, timber floor supported on RSJ, flag stone floor resting on RSJ,, vitrified tiles, ceramic tiles, , Mosaic, rubber, Linoleum, and PVC and PVA flooring

## Unit – VI

Roof Coverings: Introduction, requirements of good roof, technical terms, classification, types of roof coverings for pitched roof. : Roofing tiles and roofing with cement products like A.C. sheet roofs, G.I. Sheets roofs, slates.

## Unit – VII

**Miscellaneous Materials and treatments:** Properties and uses of Asbestos, cork, felt, mica, adhesive, Bakelite, china clay, fiber glass, leather, canvass, jute, rubber, Asphalt and Bitumen

**Materials for Special Treatments:** Fire resistant, waterproofing, and anti-termite treatment. Damp proofing: Hot applied and cold applied – Emulsified asphalt, Bentonite clay. Butyl rubber, silicones, Vinyls, Epoxy resins and metallic water proofing materials, their properties and uses. Water proofing: waterproofing membranes such as rag, asbestos, glass felt, plastic and synthetic rubber- vinyl, butyl rubber, neoprene, polyvinyl chlnide – prefabricated membranes sheet lead, asphalt their properties and uses.

**Application:** application of the above in basement floor, swimming pool, and terraces.

**Thermal insulation:** Heat transfer heat gain/ loss by materials - vapour barriers and rigid insulations, blanket, poured and reflective insulation – properties and uses of spun glass foamed glass, cork, vegetable fibers Gypsum, plaster of Paris, hydride gypsum properties and uses.

Acoustics insulation: porous, baffle and perforated materials such as Acoustic plastic, Acoustic tiles, wood, partition board, fiber board, cork, quilts and mats – their properties and uses – current developments.

Applications: Applications of the above insulations in seminar hall, theater and cold storage.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

### **Reference books:**

**Chowdary, K.P.** Engineering Materials are used in India, 7th ed. Oxford and IBH Pub. Ltd., New Delhi, 1990.

**Moxley, R.** Mitchell's Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction: Materials and types of Construction, 3rd ed. John Wiley and Sons, Inc., New York, 1963.

## **AR 17B2.5C      STRUCTURAL MECHANICS –II**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 3*

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### **Course Overview:**

Gives an in-depth understanding of the concepts associated with different Elements of Structures.

### **Objectives of the Course:**

To provide knowledge of behavior beams, columns stress behavior due to applied forces.

Expected Skills / Knowledge Transferred: Basic principles of mechanics and behavior of elements of structures.

### **Unit-I**

Theory of simple bending Introduction, pure bending & ordinary bending, Assumptions derivation of flexure formula section modulus Numericals on flexure equation.

### **Unit-II**

Shear stresses in beams Introduction, derivation of shear stress formula, shear



stress distribution for standard shapes like rectangle circle triangle I, T L, C Section Numericals.

### **Unit-III**

Direct & bending Stresses Introduction, stress distribution of eccentrically loaded column, middle third rule, core or Kernal of Section, stress distribution for column with one axis eccentricity, two axis eccentricity, Numericals.

### **Unit IV**

Deflection-I-Introduction of slope & deflection, slopes & deflections for cantilever beams with point load & udl's using double integration method & moment area methods

### **Unit V**

Deflection-II- Introduction of Macaulay's method, slopes & deflections simply supported beams with point load & udl's double integration & Macaulay's methods

### **Unit-VI**

Fixed beams Introduction Advantages and disadvantages of fixed beams over simply supported beams, SFD & BMD for fixed beams with combination of point loads & udl's (No formula derivations)

### **Unit-VII**

Propped Cantilevers Introduction, Reaction of a prop, Cantilevers with Udl's, point loads, prop at end & at intermediate positions, slope & deflection

### **Unit-VIII**

Welded joints: Introduction, Advantages and disadvantages of welded joints, types, strength of fillet weld, design of welded joint for plates and unsymmetrical sections for axial loading

### **Reference Books:**

**Khurmi. R.S.** Engineering Mechanics, S. Chand and Co.Ltd., New Delhi, 1999.

**Ramamrutham. S.** Engineering Mechanics, 7th ed. Dhanpat Rai Pub. Co. Ltd., Delhi, 2004.

**Timoshenko. S. and Young, D.H.** Engineering Mechanics, McGraw-Hill International Editions

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**AR 17B2.6C      HISTORY OF ARCHITECTURE - I**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr: 3*

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**Course Overview:**

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and not on specific examples of buildings

**Objectives of the Course :**

- To expose the students to a wide spectrum of architectural styles ranging from pre-historic to modern times.
- To explain to the students the evolution of architecture in relation to time with special emphasis on social, religious and environmental factors.
- To make the students understand the developments in the construction technology in different periods.

**Expected Skills / Knowledge Transferred:**

- 1) Acquire knowledge to identify the common characteristics among the monuments of a particular style.
- 2) Acquire graphic skills to present a building, analyze its elements and explain the composition.
- 3) Acquire knowledge on good practices of architecture in the past.

**Course Contents:**

**Unit – I**

Architectural development in the ancient civilizations in Indus valley, Egypt and Mesopotamia, Study of Pyramids, Temples, Mastabas, Ziggurats.

**Unit – II**

Architecture in the Classic Greek periods, different orders, optical correction and appreciation of perfection.

**Unit – III**

Architecture in Roman period; Grand scale, application of Greek orders; Construction of vaults; study of different typologies of buildings; development of roads and aqueducts;

### **Unit – IV**

Architecture in the early Christian, Byzantine, Romanesque, Gothic periods in Europe and rest of the world excluding Asia.

### **Unit – V**

Architecture in Renaissance and Baroque: revival in architecture, study of building typologies.

### **Unit-VI**

The other architecture styles preceding the advent of Industrial revolution in Europe - Mannerist architecture, Jacobean architecture, Elizabethan architecture, Victorian architecture and Moorish architecture.

#### **Reference books:**

**Fletcher, Sir Banister.** A History of Architecture, 19th ed. CBS Pub., Delhi, 1992.

**Yarwood, Doreen.** A Chronology of Western Architecture. B.T. Batsford Ltd., London, 1987.

**Schulz, Christian Norberg.** Meaning in Western Architecture, 2nd ed. Rizzoli Intl. Pub., New York, 1981.

**Copplstone, Trewin and Others.** World Architecture: An Illustrated History, 11th ed. Hamlyn, London, 1979.

**Bindoo. D.D,** History of Architecture, Milind P Lakshana, Hyderabad – 2006.

Wittkaner R Architectural Principles in the Age of Humanism, Chichester :Academy Editions 1998

### **AR 17B2.7C      SURVEYING AND LEVELING**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 3*

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#### **Course over view**

To explain the different techniques and instruments used in survey of land tracts

#### **Objectives of the Course:**

To explain the techniques and instruments used in survey of land tracts.

#### **Expected Skills / Knowledge Transferred:**

Surveying skills and related theory.

## **Course Contents:**

### **Unit – I**

Introduction – Definitions – Basic Principles of Surveying; Classification of Survey; Uses of Survey - Scales and Symbols-Sources of errors in Survey – Linear Measurement: accurate and approximate methods, duties of Surveyor.

### **Unit – II**

Chain Surveying – Introduction – Types of chains and tapes. Instruments for chaining and taping – ranging-cross staffs – offsets – obstacles in chain surveying – errors and corrections (standardization, temperature and pull) composition of Areas ( Trapezoidal rule – Average ordinate-Simpson rule).

### **Unit – III**

Compass Surveying: Introduction – Prismatic Compass and Surveyors Compass – Types of Bearings-Designation of bearings – Fore bearing and back bearing – Types of Traverse – Temporary adjustments of prismatic compass, local attraction, Corrections, precautions, errors.

### **Unit – IV**

Plane Table Survey: Introduction – Types of Plane Tables and their Accessories – Setting up the plane table – traversing – Radiation Method – Intersection Method – Resection Method (two point problem). Three point problem

### **Unit – V**

Leveling – Introduction –Definitions of terms used in leveling – Principle of leveling – Classifications temporary adjustments of dumpy level, RL's by height of Instrument and rise and fall method, Contouring and their characteristics, uses, – errors in leveling.

### **Unit – VI**

Theodolite – Introduction – vernier Theodolite – uses of Theodolite - Temporary adjustments – Traversing.

### **Unit – VII**

Automated Surveying – Introduction to use of Digital Surveying – Instruments such as distomat – total station, Electronic Theodolite, G.P.S.

### **Unit – VIII**

Site Studies – Plot, site, land and regions, size and shape of site, Analysis of accessibility, Topography, Climate, land forms, Surface Drainage, Soil, Water, Vegetation, Ecology and Visual aspects.

**Reference books:**

**Arora, K.R.** Surveying Vol. I, 6th ed. Standard Book House, Delhi, 2000.

**Lynch, Kevin.** Site Planning. MIT Press, Massachusetts, 1962.

**Punmia, B.C.** Surveying Vol. 1, 13th ed. Laxmi Publications Pvt. Ltd., New Delhi, 1996.

**GN 17B2.1A COMMUNICATION SKILLS**

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*L/s: 2/Wk Int: 50 End Exam: 50 Total: 100 End Exam: Viva-Vose Cr: 2*

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**Course Overview:** To prepare students to acquire understanding and fluency in English for professional work

**Objectives of the Course:** To provide an adequate mastery of technical and communicative English Language training primarily, reading and writing skills, and also listening and speaking skills.

**Expected Skills / Knowledge Transferred:** To prepare students for participation in seminars, group discussions, paper presentation and general personal interaction at the professional level.

**Unit I**

Communication: Importance of Communication; Elements of good individual communication; organizing oneself; different types of communication; Barriers in the path of Communication

**Unit II**

Listening skills: Listening to conversation and speeches (Formal and Informal)

Reading: Techniques of reading, skimming, Scanning, SQ3R technique

**Unit III**

Creative Writing: Scope of creative writing; Writing skills Signposting, Outlines, Rephrasing

Writing a report/ format of the report; Paragraph, Letter Writing, Essay writing, Memo, Circular, Notice, Cover Letter, Resume, Writing with a thesis, Summary, Précis, Product description – Description of projects and features

Oral Report; Periodical Report; Progress Report; Field Report

Preparation of minutes; Video conference; Tele conference / Virtual meeting

## **Unit IV**

**Speaking:** How to converse with people, How to communicate effectively; Language and grammar skills; Pronunciation drills, Phonetics, vowels, Diphthongs, consonants, Stress, Rhythm and intonation, Conversational skills

Features of effective speech- practice in speaking fluently –role play – telephone skills – etiquette.

Short Extempore speeches – facing audience – paper presentation – getting over nervousness – Interview techniques – preparing for interviews – Mock Interview – Body Language.

## **Unit V**

Impact of internet on communication; communication through computers;

voice mail; broadcast messages; e-mail auto response; etc.

### **Reference books:**

1. Krishna Mohan & Meera Banerji: Developing Communication Skills Macmillan India
2. C S Rayudu: Principles of Public Relations, Himalaya Publishing House
3. K. Ashwathappa: Organizational Behavior, Himalaya Publishing House
4. Daniel Colman: Emotional Intelligence,

## SEMESTER - III

### AR17B3.1C ARCHITECTURAL DESIGN – II

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*L/s: 9/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr: 9*

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#### **Course Overview :**

This course is intended to provide skills for designing a single use, small span and single-storey buildings.

#### **Objectives of the Course :**

To develop abilities in design in the context of user requirements.

Expected Skills / Knowledge Transferred: Use of standards, handling of space, and application of knowledge gained from other subjects in design.

#### **Course Contents:**

The design issues to be addressed:

- Various functions and their spatial implications.
- Formulations of concept.
- Anthropometry and furniture layout
- Horizontal circulation
- Interior volumes and space articulation through different materials.
- Integration of form and function.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

The list of suggested topics to be covered as design problems:

Balwadi, Kindergarten School, Primary Health Centre, Doctor's Clinic, small Cafeteria, Highway Restaurant, Village Post Office, Bank extension counter, Police Station, Architect's Office, Departmental Store, School Gymkhana and Youth Club etc.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems will have to be covered by the Studio faculty members through lecture/slide show sessions and site visits.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Note: In end exam which is a viva-voce the students have to present the entire semester work for assessment.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

#### **Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1980.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors Offices and Clinics, 2nd ed. Reinhold Pub., USA, 1960.

**Neufert, Ernst. Ernst Neufert Architects Data,** Granada Pub. Ltd., London, 1970.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Shah, S. Charanjit.** Architects Hand Book Ready Reckoner. Galogotia Pub. Co., New Delhi, 1996.

### **AR17B3.2C      ARCHITECTURAL DRAWING & GRAPHICS – III**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 3*

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#### **Course Overview:**

The course is intended to develop the techniques of architectural rendering, graphic skills required for effective presentations and documentation techniques.

#### **Objectives of the Course:**

To impart the skills of composition, rendering and documentation

#### **Course Contents:**

**Geometrical Drawing:** Solid Geometry: Multi- view projection of solids – cube, prism, pyramids, cones, cylinders etc. Sections of solids, true shape of solids.

#### **Introduction to Pictorial Views:**

**Solid Geometry :** Simple Projections – Projection of solids – Developments

#### **Isometric & Axonometric**

Isometric Views of Objects, building components such as Steps, Canopy etc. Diametric and Trimetric Views, Oblique View etc.

**Axonometric view:** Axonometric view of objects, interior view of rooms etc.



## **Unit –I**

### **Perspective:**

Characteristics of perspective drawings: perspectives of simple geometric solids and spaces and complex geometries. Advanced examples in one point or parallel perspective, two point or angular perspective, introduction to three point perspective.

## **Unit-II**

### **Rendering techniques:**

Introduction to surfaces and media, observation, recording and basic representation techniques in different media through drawing pencil, pen, brush, charcoal, crayons etc.

Introduction of rules of composition, color study, values, tones and general approach to rendering, Entourage, Treatment of sky, clouds, landscape elements, human figures, foreground and surroundings, shadow projections in renderings.

## **Unit-III**

### **Graphic skills and Presentation Techniques:**

Page layout and Composition grids; Illustration techniques; Portfolio design and formats; Digital techniques in graphics

### **Reference books:**

**David E. Carter**, The Big Book of Design, David E. Carter Books

**Joyce Rutter Kaye**, Design Basics, Rockport.

**Graphics Book**, Rotovision

**Ellen Lopton and Jennefer Cole Phillips**, Graphic Design The New Basics, Princeton Architectural Press

**Atkin, William W, Corbelletti, Raniero and Fiore, R. Vincent**. Pencil Techniques in Modern Design, 4th ed. Reinhold Pub. Corporation, New York, 1962.

**Bellings, Lance Bowen**. Perspective-Space and design.

**Burden, Ernest**. **Architectural Delineation: A photographic approach to presentation**, 2nd ed. McGraw-Hill, Inc., New York, 1982.

**Conli, Claudius**. Drawings by Architects.

**Hagarth, Paul**. Drawing Architecture.

**Pranchlay, H**. Perspective

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**AR17B3.3C      BUILDING CONSTRUCTION-III**

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L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr:4

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**Course Overview:**

The course focuses on understanding the potentials as well as shortcomings of RCC as a building material.

**Objectives of the Course:**

To introduce and expose the students to various ways in which RCC is used in building construction. The course intends to impart the theory of reinforced concrete construction (in conjunction with the Theory of Structures which is a separate course), and practical knowledge through site visits to the construction sites.

**Course Contents :**

**Unit I :**

**Introduction to RCC:** Understanding the properties and characteristics of RCC. Its advantages and disadvantages. Cast-in-situ and pre-cast constructional methods in RCC.

**Unit II :**

Understanding the structural components of a typical RCC frame structure with reference to their location, junctions, load transfer and design.

**Unit III :**

Substructure: RCC foundations – isolated footing (rectangular and trapezoidal footings), pile foundation, combined footing, raft foundation.

**Unit – IV**

Superstructure: RCC columns – different shapes, different combinations and loading conditions (axial, bending, non axial), slenderness factor. RCC beams - Single and doubly reinforced beams, T and L beams, continuous beams, lintels and brackets. RCC slabs – One way and two way slabs.

**Unit - V**

Miscellaneous: RCC staircases and ramp – Waist slab and folded plate staircases. RCC Balconies, chajjas, lintels, arches etc.

**Unit VI:**

Advanced concepts: Flat slab, coffered slab, diaphragms, retaining walls and water tanks.

Note: This is a studio subject and students should be made to prepare construction drawings as studio exercises along with the theoretical inputs.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.

### References:

**Bindra and Arora.** Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub., New Delhi, 2000.

**Foster, J. Stroud.** Mitchell Building Construction: Elementary and Advanced, 17th ed. B.T. Batsford Ltd, London, 1963.

**McKay, W.B.** Building Construction Metric Vol. 1 – IV, 4th ed. Orient Longman, Mumbai, 2005.

**Sushil Kumar. T.B.** of Building Construction, 19th ed. Standard Pub. Distributors, Delhi, 2003.

## AR17B3.4C STRUCTURAL MECHANICS –III

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3hrs Cr: 3*

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### Objectives of the Course:

To impart sound knowledge of strength, behavior of various materials and techniques in the analysis of structures.

### Expected Skills / Knowledge Transferred:

Ability to analyze the standard members in structures.

### Course Contents:

#### Unit – I :

**Continuous beams:** Shear Force and Bending Moment diagrams for continuous beams using theorem of three moments (excluding derivation and sinking of supports).

#### Unit – II

**Moment Distribution Method:** Introduction, carryover, relative stiffness, application of Moment Distribution Method to Continuous beams, single bay frame without sway (excluding sinking of supports)

### Unit – III

**Kani's method / Rotation Contribution Method:** Introduction, rotational factors, application of Kani's method for beams and frames (single bay with out sinking of supports).

### Unit – IV

**Columns and Struts:** Buckling and crushing failures, types of end conditions, Euler's theory of long columns for different end conditions and equivalent length derivations, Rankine's equation, Derivation and application of the basic formula.

### Unit-V

wind pressure on chimneys ,Maximum & Minimum intensities of stress at bottom of chimneys Retaining walls subjected to earth pressure.

### Unit – VI

**Torsion of Shafts:** Assumptions, Derivation of basic equation  $T/J = G\theta/l = fs/R$ , Power Transmitted by shafts, application of basic equation to shafts.

### Unit – VII

**Arches:** Determination of horizontal thrust, bending moment and radial shear for three-hinged parabolic and segmental arches with supports at same level and different levels.

### Reference books:

**A.K.Jain and Punmia.** Strength of Materials

**Ramamrutham, S.** Theory of Structures, 17th ed. Danpat Rai Pub. Co. Ltd., New Delhi, 2005.

**Reddy, C.S.** Basic Structural Analysis, 18th ed. Tata McGraw Hill Pub.Co.Ltd., New Delhi, 1991.

## AR17B3.5C HISTORY OF ARCHITECTURE - II

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3hrs Cr: 3*

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### Course Overview:

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and not on specific examples of buildings.

**Objectives of the Course:**

- To expose the students to a wide spectrum of architectural styles ranging from pre historic to pre independence period in India.
- To explain the students the evolution of architecture in relation to time with special emphasis to social, religious and environmental factors.
- To make the students understand the developments in the construction technology in different periods.

**Expected Skills / Knowledge Transferred:**

- 1) Acquire knowledge to identify the common characteristics among the monuments of a particular style.
- 2) Acquire graphic skills to present a building, analyze its elements and explain the composition.
- 3) Acquire knowledge on good practices of architecture in the past.

**Course Contents:**

**Unit – I**

Development of Vedic Architecture, Development of architecture in India and rest of Asia in Buddhist Architecture

**Unit – II**

Evolution of Hindu temple form, early rock cut examples; Early Chalukyans.

**Unit – III**

Development of Hindu Architecture: Nagara style in Orissa, Kahjuraho, Gujarat etc.

**Unit – IV**

Development of Hindu Architecture: Dravidian style in Pallava, Chola, Pandya periods.

**Unit – V**

Development of Hindu Architecture under late Chalukyans, Development of Jain Architecture.

**Unit-VI**

Islamic Architecture in India: Early Saracenic School in India: Imperial school at Delhi

**Unit-VII**

Islamic Architecture in India: Provincial styles at Gujarat, Deccan, Bengal, Moghul Architecture in India.

**Reference books:**

**Brown, Percy.** Indian Architecture: Buddhist and Hindu Periods. D.B. Taraporevala Sons and Co., Mumbai, 2003.

**Grover, Satish.** The Architecture of India. Vikas Pub. House Pvt. Ltd., Ghaziabad, 1980.

**Rowl, Benjamin.** Art and Architecture of India.

**Tadgell, Christopher.** The History of Architecture in India: from the Dawn of Civilization to the End of the Raj. Om Book Service, New Delhi, 1990.

**Vistara.** The Architecture of India

**AR17B3.6C BUILDING SERVICES – I**

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3hrs Cr:3*

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**Course Overview:**

Understanding the significance, design and functioning of water and sewerage systems as essential components in building design and site planning.

**Objectives of the Course:**

To introduce and provide information on the principles and appurtenance of water supply and sanitation systems, and their integration with architectural design.

Expected skills and knowledge transferred: To enable students to design sanitary and water supply systems for buildings, and prepare water supply and drainage plans for building sites.

**Course Contents:**

**Unit I:**

**Introduction to water supply:** Traditional sources of water supply and sanitation. Different sources of water supply such as wells, reservoirs, etc. Conventional water treatment – sedimentation, coagulation, filtration and disinfection. Classification of water based on its usage. Water and its qualities; Impurities and treatment; Hardness of water – softening.

Demand of water for domestic, commercial, industrial and public utility purposes as per BIS standards. Per capita demand.

**Unit – II**

Elements of public / private water supply system, Storage and Distribution of Water - Different methods of water distribution; gravity and pressure distribution by storage tanks of individual buildings. Pumping and Distribution at city level, boosting water.

### **Unit – III**

Domestic water supply system- water meter, sump, pump, centrifugal pump, check valves, foot valves and pressure test gauges, overhead tank; System of water supply: Continuous, intermittent, their advantages and disadvantages Service connections, types and sizes of pipes, Types of fittings like taps, bathtubs, showers, jets, cocks, valves, electrical fixtures, etc. Faucets for kitchens, bathrooms and toilets.

### **Unit – IV**

Building service connections, cold and hot water distribution systems in buildings and their design, materials, joints, fittings and valves (gate, flap, ball, flush valves etc.). Direct and indirect systems, individual water supply, water supply for multistory buildings, Fire hydrants, Hot water supply systems, solar heating systems. Simple exercises on water supply, fire fighting and sanitary layout of residential and public buildings.

### **Unit – V**

Sanitation - Introduction, purpose and importance Types of refuse, collection and disposal; Separate, combined and partially separate systems, advantages, disadvantages; Sanitary requirements of buildings, types of pipes, sanitary fittings Inspection chamber: sizes and construction, manhole, traps used in the plumbing system; Septic tank, Dispersion trench and soak pits, house drainage & layout; Ventilation of house drainage: Anti siphonage and vent pipes, single stack and double stack system

Design of sewerage systems, Location of sewage systems, conventional wastewater treatment, activated sludge, trickling filters etc.; septic tank and its design, soil absorption system, alternatives, solid wastes collection and removal from buildings. On-site processing and disposal methods. Aerobic and Anaerobic decomposition, purifying capacity of water bodies.

Sewage treatment (outline of various processes)

Biochemical Oxygen Demand

### **Unit – VI**

Drainage: Principles of drainage, surface drainage combined and separate system oGf drainage, shape and sizes of drains and sewers, storm water over flow chambers, methods of laying and construction of sewers

Design of drainage and vent pipes, system for low-rise and high-rise buildings, building drains, sewers, gullies, connection to public sewer, cross connections.

### **Unit VII**

Types of fixtures and materials - wash basins, water closets, urinals, bidets, sinks etc. Conditions of flow in building drainage pipes, traps, vents and their material specifications. Over-head and under-ground reservoirs. Detailed study of Independent House and Apartment

### **Unit –VIII**

Solid Waste Disposal: Properties of Solid Wastes: Physical and chemical composition of municipal solid wastes, waste generation rates. Management of Solid Wastes in India: Prevalent SWM practices and deficiencies: Storage of waste at source, segregation of wastes, primary collection of waste, transportation of waste, disposal of wastes.

Disposal of Wastes: Sanitary landfilling, Composting, Incineration, Pyrolysis – advantages and limitations.

### **Unit – IX**

Roads and Pavements – Different types, water bound macadam, tar bitumen, asphalt and Cement concrete roads, soil stabilization, types of paving-murram, brick, and stone paving. Drainage of roads, sub-drains, culverts, ditches and gutters.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

#### **References :**

**Hussain, S.K.** T.B. of Water supply and Sanitary Engineering, 3<sup>rd</sup> ed. Oxford and IBH Pub. Ltd., New Delhi, 1994.

**Kshirsagar, S.R.** Water Supply Engineering, 6<sup>th</sup> ed. Roorkee Pub., Roorkee, 1980. Rangwala, S.C. Water supply and Sanitary Engineering : Environmental Engineering, 19<sup>th</sup> ed. Charotar Pub.

### **AR17B3.7C CLIMATOLOGY**

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|           |         |              |            |                |      |
|-----------|---------|--------------|------------|----------------|------|
| L/s: 3/Wk | Int: 50 | End Exam: 50 | Total: 100 | End Exam: 3hrs | Cr:3 |
|-----------|---------|--------------|------------|----------------|------|

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#### **Course Overview:**

Science (tools, data, standards, methods and principles) of building design and site planning as related to climate, particularly to tropical climates as found in India.

#### **Objectives of the Course:**

To equip the student with the basic understanding of climatic types in India, and the impact on requirements of building design and site planning; to introduce them to the basic science of building design and site planning for thermal comfort, daylighting and natural ventilation; familiarize them with the data, methods, principles, standards and tools for planning and designing for climatic comfort

#### **Expected Skills / Knowledge Transferred:**

The student should be able to 'predict' climatic conditions in a given building (simple residence) and undertake redesign for given parameters



## **Course Contents:**

Note: The topics here to be dealt with keeping in mind Indian climatic conditions. NBC and BIS guidelines / standards have to be introduced at all relevant contexts.

### **Unit – I**

#### **Introduction to Building Climatology:**

Climate and built form interaction. Global Climatic factors, elements of climate, graphic representation of climatic data, Mahoneys Tables, macro and micro climate; challenge of rapid, extreme environmental change

### **Unit – II**

#### **Tropical Climates:**

Definition, classification of tropical climates, characteristics of different climatic zones, Design considerations for warm-humid, hot-dry, composite and upland climates.

### **Unit – III**

#### **Thermal Comfort:**

Thermal comfort factors, Physiological aspects, Body heat balance, comfort range, comfort charts.

### **Unit – IV**

#### **Heat flow through Buildings:**

Basic principles of heat transfer through buildings, performance of different materials, Periodic heat flow.

### **Unit – V**

#### **Sun and the Design process:**

Solar geometry, Solar charts, Sun angles and shadow angles, orientation for sun, sun control, design of shading devices, building form and heat gain, basic principles of day lighting, sunlight and glare.

### **Unit – VI**

#### **Natural Ventilation:**

Air movement around and through buildings, Orientation for wind, stack effect, Induced ventilation.

### **Unit – VII**

#### **Passive Cooling:**

Passive methods of Cooling, traditional and contemporary; roof pond, desiccant cooling, evaporative Cooling, and earth sheltered buildings etc.

Site Planning (including landscaping) and building planning and design considering climate factors

Detailed appraisal/analysis of climatological performance of an existing residence and or a workplace; followed by redesigning or the same to improve climatological performance.

**Reference books:**

**Koenigsberger, O.H. and Others.** Manual of Tropical Housing and Building. Orient Longman, Chennai, 2003.

**Konya, Allan.** Design for Hot Climates.

**Kukreja, C.P.** Tropical Architecture. Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 1978.

**Markus, T.A. and Morris. E.N.** Buildings, Climate and Energy. Pitman Pub. Ltd., London, 1980.

**Olgay and Olgay.** Solar Control and Shading Devices.

**GN17B2.2A VALUE EDUCATION**

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*L/s: 2/Wk Int: 50 End Exam: Nil Total: 50 End Exam: Nil Cr:2*

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**Course Overview:** To provide guiding principles and tools for the development of the whole person, recognizing that the

individual is comprised of Physical, Intellectual, Emotional and Spiritual dimensions.

**Knowledge Transfer /Expected Skills:**

- To help individuals think about and reflect on different values.
- To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications in relation to themselves and others, the community and the world at large
- To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening them.

**Unit I**

Value Education—Introduction – Definition of values – Why values? – Need for Inculcation of values – Object of Value Education – Sources of Values – Types of Values: i) Personal values ii) Social values iii) Professional values iv) Moral and spiritual values) Behavioral (common) values

**Unit II**

Personal values – Definition of person – Self-confidence – Relative and absolute confidence, being self-determined, swatantrata (loosely equivalent to freedom). Self-discipline – Self Assessment – Self-restraint –Self motivation – Determination – Ambition – Contentment  
Self-respect and respect to others; expression of respect

### **Unit III**

Social values – Units of Society - Individual, family, different groups – Community – Social consciousness – Equality and Brotherhood – Dialogue – Tolerance – Sharing – Honesty-Responsibility – Cooperation; Freedom – Repentance and Magnanimity.

Peer Pressure – Ragging - examples - making one's own choices

### **Unit IV**

Professional values – Definition – Competence – Confidence – Devotion to duty –Efficiency – Accountability

– Respect for learning /learned – Willingness to learn-Open and balanced mind – Team spirit – Professional Ethics – Willingness for Discussion; Difference between understanding and assuming

Time Management: Issues of planning, as well as concentration (and aligning with self-goals)

Expectations from yourself. Excellence and competition, coping with stress, Identifying one's interests as well as strengths.

### **Unit V**

Behavioral values – Individual values and group values. Anger: Investigation of reasons, watching one's own anger; Understanding anger as: a sign of power or helplessness, distinction between response and reaction.

Right utilization of physical facilities. Determining one's needs, needs of the self and of the body, cycle of nature.

Relationship with teachers. Inside the class, and outside the class, interacting with teachers.

### **Unit VI**

Complimentary nature of skills and values. Distinction between information & knowledge

Goals: Short term goals and long term goals; How to set goals; How to handle responsibilities which have to be fulfilled while working for goals.

### **Reference Books**

**Ramancharla Pradeep Kumar.** Compiled Reading Material IIIT Hyderabad

**Dr. S. Ignacimuthu S. J.,** Values for life, Better yourself Books, Bandra Mumbai-600 050 (1999).

**Values (Collection of Essays),** Published by : Sri Ramakrishna Math., Chennai—4.,(1996)

**Prof. R.P.Dhokalia.,** Eternal Human ValuesNCRT –Campus Sri Aurobindo Marg., New Delhi

5. **Swami Vivekananda.,** Education. Sri Ramakrishna Math., Chennai-4(1957)

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**SEMESTER - IV**

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*L/s: 9/Wk Int: 200 End Exam: 200 Total:400 End Exam: Viva-voce Cr: 9*

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**AR17B4.1C ARCHITECTURAL DESIGN- III**

**Course Overview:**

This course focuses on buildings for residential use.

**Objectives of the Course:**

To enhance the understanding of the complexities of architectural design for residential needs and develop creative design solutions for good living environments.

**Course Contents:**

The design issues to be addressed:

- Organization of functional activities in relation to user requirements and the site.
- Relating the system of horizontal and vertical circulation, open spaces, parking etc.
- Responding to socio-economic factors such as income levels, privacy, territoriality, interaction etc.
- Considering materials, structure and services in relation to the design proposal.
- Integration of plan forms and three dimensional compositions.
- Detailing for the physically handicapped and the elderly.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

**The list of suggested topics to be covered as design problems:**

Large guest house, students hostel, small hotel, holiday resort, motel, row houses, block of flats and residential complexes at a small scale, housing for specific communities in urban and rural areas such as home for the aged, fishermen's housing etc.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems will have to be covered by the Studio faculty members through lecture/slide show sessions and site visits.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Note: In end exam which is a viva-voce the students are to present the entire semester work for assessment.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.

#### **Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1990.

**Neufert, Ernst.** Ernst Neufert Architects Data, Granada Pub. Ltd., London, 2000.

**Peloquin, Albert.** Barrier-Free Residential Design. McGraw-Hill, Inc., New York, 1994.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Shah, S. Charanjit.** Architects Hand Book Ready Reckoner. Galogotia Pub., New Delhi, 1996.

**Untermann, Richard and Snall, Robert.** Site Planning for Cluster Housing.

### **AR17B4.2C      BUILDING CONSTRUCTION-IV**

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*L/s: 4/Wk    Int:50    End Exam: 50    Total: 100    End Exam: 5 hrs    Cr:4*

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#### **Course Overview:**

The course work deals with principles, methods and construction practices of structural steel work.

#### **Objectives of the Course:**

To introduce and expose students to various aspects involving use of steel for construction activity of buildings and structures.

#### **Course Contents:**

##### **Unit - I**

Structural Steel Work: General principles and terms defined, standard sections i.e. beams joints, angles, channels, tees, bolts, rivets and welding.

## **Unit – II**

### **Steel Work Connections**

Bolt Connections, Riveting and welding methods.

## **Unit – III**

Steel Members

Columns and stanchions, stanchions or column bases, beam and girders, column and beam connections plate girders, lattice or warren girder.

## **Unit - IV**

Steel Roof Trusses

Steel trusses, types for various spans, tubular steel roofs, monitor roof, north light roof truss, details of steel –roof trusses.

## **Unit – V**

Lantern light, dome light, structural steel practice and drawings as per IS Code.

## **Unit – VI**

Portal frame, Geodesic principles, cable net and tensile structures.

Note:A hands-on fabrication project to be taken up as part of the internal assignments. This is a studio subject and students should be made to prepare construction drawings as studio exercises along with the theoretical inputs. The studio work should be supplemented with appropriate site visits.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.

### **Reference books:**

**Bindera and Arora.** Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub., New Delhi, 2000.

**McKay J.K.** Building Construction Metric Vol. 4, 4th ed. Orient Longman Pvt. Ltd., Mumbai, 2002.

**Mitchell.** Advanced Structures.

**Rangwala, S.C.** Engineering Materials: Material Science, 31st ed. Charotar Pub. House, Anand, 2004.

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**AR17B4.3C      DESIGN OF STRUCTURES -I**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr:3*

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**Course Overview:**

This course focuses on structural design of different elements of building in RCC.

**Objectives of the Course:**

To develop the structural design skills in RCC elements

**Course Contents:**

**Unit – I**

Introduction to RCC design, Design Philosophies: Working stress and limit state method, singly reinforced beam, Analysis and Design using both working stress and limit state methods.

**Unit – II**

Situations where doubly reinforced beams are used, analysis and design of doubly reinforced beam using limit state method only.

**Unit – III**

T-beams: introduction, analysis and design of T-beam using Limit State method only. Design of shear reinforcement for all types of beams with and without cranking (Limit State method only)

**Unit – IV**

Slabs: Introduction, Design of One way and two way reinforced slabs (simply supported, Restrained, continuous) by limit state method only.

**Unit-V**

Design of axially loaded RCC columns and columns subjected to BM about one and two axis using limit state method only.

**Unit-VI**

Design of stair case (Dog-legged only) using working stress method.

Design of lintels and cantilever beams and slabs using limit state method only

**Unit-VII**

Design of RCC Isolated footings for columns (Square and Rectangle) - working stress method only.

## Unit-VIII

Introduction, to prestressed concrete, Pretensing & Post tensioning methods, Problems of beams.

### Reference books:

**A.K.Jain.** Reinforced Concrete: Limit State Design, 5th ed. New Chand and Bros., Roorkee, 1999.

**Ramamrutham. S. and Narayan, R.** Design of RCC Structures, 12th ed. Dhanpat Rai Pub. Co. Pvt. Ltd., Delhi, 1998.

## AR17B4.4C HISTORY OF ARCHITECTURE- III

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*L/s: 3/Wk Int: 50 EndExam:50 Total: 100 End Exam: 3hrs Cr:3*

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### Course Overview:

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and theories and not on specific examples of buildings.

### Objectives of the Course:

To expose the students to a wide spectrum of architectural styles and theory.

To explain the students how architecture evolved in relation to time with special emphasis to social, religious and environmental factors.

To make the students understand the developments in the construction technology in different periods.

Expected Skills / Knowledge Transferred:

Acquire knowledge to identify the common characteristics among the monuments of a particular style.

Acquire graphic skills to present a building, analyze its elements and explain the composition.

Acquire knowledge on good practices of architecture in the past.

### Course Contents:

#### Unit – I

Influence of Industrial Revolution on building materials, Construction Technology, evolution of new building types and increasing user requirements.



## **Unit – II**

Characteristic styles of modern architecture up to First World War. Steel structures, Arts and crafts movement, Art Nouveau, Vienna School, Chicago School,

Monumentalism, Expressionism and beginning of RCC. Theories of John Ruskin, William Morris, Henry Vandevelde, Otto Wagner, Peter Behrens and Louis Sullivan.

## **Unit – III**

Contributions to Architecture and Theory made by pioneers-Le-Corbusier, Frank Lloyd Wright, Walter Gropius, Mies Van der Rohe in the periods between the Worlds Wars.

## **Unit – IV**

Characteristics of modern architecture after the Second World War. Study of Alvar Aalto, Ero Saarinen, Richard Neutra, Louis I Kahn, Phillip Johnson, etc.

## **Unit – V**

Design theories and contributions of Engineer- architects like Pier Luigi Nervi, Felix Candela, Buckminster Fuller, and Frei Otto.

## **Unit – VI**

Pre-independence architecture in India: Development of secular architecture from the end of the 18th Century to the middle of the 20th Century.

### **Reference books:**

**Benevolo, Leonardo.** History of Modern Architecture: the tradition of modern architecture Vol.1. Routledge and Kegan Paul, London, 1971.

**Frampton Kenneth** Modern Architecture: A Critical History London: Thames& Hudson, 1980

**Benevolo, Leonardo.** History of Modern Architecture: the modern movement Vol.2. Routledge and Kegan Paul, London, 1971.

**Curtis, J.R. William.** Modern Architecture since 1900. Prentice-Hall, Inc., New Jersey, 2002.

**Giedion, Sigfried, Space,** Time and Architecture: the growth of a new tradition, 4th ed. Harvard University Press, Cambridge, 1962.

**Hilberseimer, L.** Contemporary Architecture: Its roots and trends. Paul theobald, Chicago, 1964.

**Pevsner, Nicolaus Oersonem:** Pioneers of Modern Design from William Morris to Walter Gropius-.

**Sharp, Dennis.** Twentieth Century Architecture: A Visual History, Facts on File. New York, 1991

**Norberg schul C.,** Principles of Modern Architecture, London Andreas papadakes, 2000.

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## AR17B4.5C BUILDING SERVICES – II

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L/s: 3/Wk Int:50 End Exam: 50 Total: 100 EndExam:3 hrs Cr: 3

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### Course Overview:

The study to focus on understanding basic working, principles, terms and definitions, as well as practical aspects and solutions utilized in architecture.

### Objectives of the Course:

### Course Contents:

To impart knowledge and skills related to electrical services, illumination and mechanical service and their integration into Architectural design.

### Unit – I

**Fundamental principles of Electricity:** Voltage, Amperage, wattage, generation, and transmission of power, distribution in cities, HT and LT consumers, Transformers and load calculations, Single and three phase connections, Indian Electricity rules, Types of Generators, UPS

### Unit – II

**Building Wiring System:** Service wires, metering, light and power circuits, electrical safety devices, MCB, ELCB, distribution boards, wiring methods, ISI Codes and standard materials, Conductors, switch boards, electrical points in general building, pipe earthing, plate earthing.

### Unit – III

**Electric layouts:** Electrical symbols, NBC, preparation of layouts for residences, offices, Domestic appliances their location in buildings, Types of electric motors and pumps.

Principles of illumination – Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candle– utilization factor – Solid angles -Depreciation factor – Laws of illumination, inverse square law, Lamber’s Cosine law, application of laws in lighting calculations using point by point method.

**Light Flux Method:** Calculation of number of lamps required for achieving a particular level of illumination.

Introduction to power and lighting circuits,

### Unit – IV

### Electrical load estimation:

Indian Electricity Rules- relevant codes of practice’, energy auditing

Building lighting system: artificial illumination, various types of lamps, advantages and disadvantages, method of lighting, direct, semi direct, indirect, concealed lighting, spot lighting, task lighting, decorative lighting, rope lights, neon lights, flood lighting, yard lighting, under water lighting.

Preparation of a lighting and electrical scheme

## **Unit – V**

### **Lighting Design**

Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types. Lighting Calculation: NBC standards, nominal illumination levels in building interiors, lux, lumen, intensity, lighting schemes.

## **Unit – VI**

**Principles of air-conditioning:** IAQ, comfort conditions, gas laws, refrigeration cycle, a/c equipment, compressor heat exchangers, condenser, evaporators,

## **Unit – VII**

**Types of Air-conditioning:** single zone, multi zone, window air conditioners, split air conditioners, ductable air conditioners, package system and central air conditioning, all air systems and chilled water systems. a/c plant room, AHU's

Building ducting, diffusers and grills, FC units.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

### **Reference books:**

**Electrical wiring and Contracting (Vol.1 to Vol.4)**, London The New era Publishing Company.

**Dr. Frith Abnwoos and others**, Electrical Engineering hand Book

**William. J. Guinnesss**, Mechanical and electrical Equipment for Buildings, New York: Willey

**Bovay. H.E.**, Handbook of Mechanical and Electrical Systems for Buildings New York: MC Graw Hill

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**AR17B4.6C      LANDSCAPE DESIGN AND SITE PLANNING**

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*L/s: 3/Wk    Int:50    EndExam:50    Total:100    End Exam: 3 hrs    Cr: 3*

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**Course Overview:**

This course introduces students to landscape design and site planning and relate it to design and planning of built environments. It provides an overview of development of landscape design, site studies, plant studies and application of the knowledge at various levels of design.

**Objectives of the Course:**

1. To develop a conceptual understanding of landscape design and site planning principles.
2. To develop skills in integrating landscape design with built environments.

**Course Contents:**

**Unit – I**

Introduction and History of Landscape Architecture. Introduction to landscape Architecture and Role of Landscape design in built environment.

A brief review of Landscape Design and garden design in history in various regions Persian, Spanish, Italian, French, Moghul, English, Japanese Garden styles.

Changing perception of mans relationship with nature in various phases of history and its influence on environment.

Evolution of concepts in landscape design after the industrial revolution leading to new theories in integrating built spaces to open spaces. Increasing awareness of ecological variables in landscape design.

**Unit - II**

Site Studies and Site Planning

Principles of site Planning and land use; review of definition applied in typical landscape development situations.

Site survey and appraisal – understanding different site characteristics –topography, vegetation, Hydrology, Access, Surroundings etc. documents, site characteristics and establishing relationship with design / Architecture Programme requirements. Provision of vehicular and pedestrian circulation; parking; street widths; turning radii; street intersections; steps and ramps.

Site planning considerations in relation to surface drainage, water systems, sewage disposal, outdoorelectrical systems.

Philosophical and design issues related to site development – sitting of buildings, spatial and contextual relationships of built and outdoor space and circulation, site

and its relationship to surroundings. Importance of climate and social factors in development of site.

Process of design development. Identifying functional requirements of site. Development of site by mutual exploitation of forms and use of grading principles.

### **Unit -III**

#### Plants and Design

Introduction to study of plants in relation to landscape design and architecture. An overview of use of plants in history.

Study of Plant material – Botanical Nomenclature anatomy and physiology of plant growth study of trees, shrubs, ground cover, indoor plants in Indian context.

Design with plants – Basic principles of designs. Plant selection criteria -The physical attribute of plants and relation to design. Appearance, functional and visual effects of plants in landscape design and built environment.

Selection and management of plant material in relation to built environment.

### **Unit -IV**

#### Elements in Landscape Design

Use of landform, water and vegetation in landscape design.

Hard landscapes: design of paths, roadways streets, terraces etc and use of land form effectively.

Soft landscapes: design of lawns, shrubs, hedges, trees – in relation to buildings and other landscape elements.

Design concepts related to use of sculpture, outdoor lightings, Architectural feature, street furniture and grouping them into meaningful compositions for visual and functional effects.

### **Unit -V**

#### Landscape Construction and Services

Study of landform its technical expression through grading plan, sections and earthwork computations.

Irrigation systems – sprinkler trickle irrigation, drip irrigation and laying irrigation networks.

Construction of structure in landscape circulation roads, parking, paths, level changes – walls, steps lamps, construction of screens, trellis, wall fences gales decks, pools etc.

### **Unit -VI**

Contemporary concepts and concerns and design of open spaces – Urban landscape, Parks, Rural landscape etc.

Introduction to concepts of green architecture and micro climate planning. The role of landscape components in modifying micro climate with respect to temperature, humidity, precipitation and percolation.

### **Assignments**

Simple exercises in using plants and landscape elements

Studio exercise emphasizing relationship between built form and outdoor areas and site planning issues.

### **Reference books:**

**Blake, Alan.** Landscape Construction and Detailing. B.T. Batsford Ltd., London, 1996.

**Colvin, Brenda.** Land and Landscape.

**Hacheat, Brian.** Planting Design.

**Harris, C.W. and Dines, T. Nicholas.** T.S.S for Landscape Architecture. McGraw Hill, New York, 1995.

**Laurie, Michael.** An Introduction to Landscape, 2nd ed. Prentice Hall, New Jersey, 1986.

**Lynch, Kevin.** Site Planning. MIT Press, Massachusetts, 1962.

**John I.Mutloch.** Introduction to Landscape Design, 2nd ed. John Wiley & Sons, Inc, New York, 2001

**Santapau. H.** Common Trees. National Book Trust, New Delhi, 1981.

**Trivedi, P. Pratibha.** Beautiful Shrubs. Indian Council of Agricultural Research, New Delhi, 1990.

## **AR17B4.7C      COMPUTER APPLICATIONS-I**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: Practical    Cr:3*

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### **Course Overview:**

To orient the student to create two and three-dimensional objects in space with special emphasis on presentation and visualization of interiors and exteriors of building using different rendering techniques using CAD.

Objectives of the Course: To explore computer modeling techniques using CAD

### **Expected Skills / Knowledge Transferred:**

To learn basic skills of modeling, scripting (rendering) in CAD, and to exercise methods of interface within CAD.

## **Course Contents:**

### **Unit - I**

Starting Auto CAD: Introduction to the menu, starting drawings from scratch, Creating and using templates starting drawings with setup wizards. Saving and closing a file.

### **Unit - II**

Using co ordinate system: The UCS, Working with Cartesian and polar co ordinate systems, using displays with key shortcuts.

### **Unit – III**

Setting up the drawing environment: Setting the paper size, Setting units, setting grid limits, drawing limits, Snap controls, Use of paper space and model space.

### **Unit - IV**

Basic commands dealing with drawing properties: Layer control, change properties, line weight control, etc.

### **Unit - V**

Inquiry methods: Using database information for objects, calculating distance and angle, areas etc.

### **Unit - VI**

Dimensioning commands and Blocks: Dimensioning the objects in linear, angular fashions along with quick time dimensioning etc. Creating and working with blocks, creating symbols, use of blocks in creating a layout of a residential area one exercise to be done as lab assignment.

## **Reference books:**

**Teyapoovan, T.** Engineering Drawing with Auto CAD 2000. Vikas Pub. House Pvt. Ltd., New Delhi, 2000.

**Parker, Daniel and Rice, Habert.** Inside Auto CAD Daniel. 1987.

**Georgeomura,** Auto CAD Release 2000.

**AutoCAD 2010** Textbook-AutoCAD 2010: A Problem-Solving Approach-Customizing AutoCAD 2010

**Beginning AutoCAD 2007-** By Bob McFarlane, Robert McFarlane

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**GN17B4.1A            CULTURAL AND POLITICAL STUDIES**

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*L/s: 2/Wk    Int:50    Total: 50    End Exam:Nil    Cr:2*

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**Course Overview:** Course aims to equip students with the skills needed to function in their professional careers in a well-rounded manner. It supplements and enriches core domain of technical and academic knowledge with awareness of broader issues and challenges faced in development.

**Expected Skills / Knowledge Transferred:**

A familiarity with contemporary issues in the global and national context covering political ideologies and scenarios, globalization, sectoral development in the country, transnational migration, social and cultural changes in society due to globalization. It helps students in technical courses to understand their location in the overall scheme and also their role and skills.

**Unit I**

Changing International Political Scenario: The Cold War and after – shift from unipolar to multipolar – growth of alternative centres of power – countries with political influence – changing economic and trade – Non- Aligned Movement, BRIC, European Union – Environmental issues in the context of politics. Major countries, their leaders and political ideologies. Current Indian political scenario in the last few decades – regionalism.

**Unit II**

Contemporary India

Agrarian issues; industrial labour; urbanization; transnational migration; environment and development; caste as a system and ideology; relationship between caste and class; the middle classes and consumption; media depictions; gender identities; education and employment; inequalities in access to resources.

**Unit III**

Globalisation

Globalisation as a process which links people, cities and countries - dimensions of interconnectedness- global village - basic concepts, processes and trends; global business organization; economic globalization; socio-cultural globalization; global workforce; Anti-globalisation movement; Global inequalities; impacts of globalization; the major drivers of globalization and their linkages, evaluation of globalisation .

**Unit IV**

Cultural Psychology

Definition of culture – its transmission Cultural psychology as a study of psychological and behavioral tendencies rooted in and embodied in culture. Sociocultural perspective in psychology: impact of circumstances surrounding individuals on their behaviours , cultural models, the four Is culture cycle, Whiting



model,; Culture and Empathy across Cultures; Criticisms – Stereotyping

### **Unit V**

Anthropology and Popular Culture: Theoretical foundations and approaches; founders of the discipline; methods of study

Seminars to be arranged and various professionalsto supplement the inputs by the core teachers of the subject.

Note: A presentation at a public event: debate, skit etc. on appropriate topics to form part of internal assignment.

## SEMESTER - V

### AR17B5.1C ARCHITECTURAL DESIGN – IV

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*L/s: 9/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr: 9*

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#### **Course Overview:**

This course focuses on institutional design - facilities required and detailing design for institutions in urban context.

#### **Objectives of the Course:**

To enable the student to design institutions within the given conditions.

Expected Skills / Knowledge Transferred:

Detailing skills required for the design of institutions in urban contexts.

#### **Course Contents:**

The following issues relating to institutional design will be addressed to:

- Nature of contemporary institutions, correlation to urban structure.
- Development control and urban infrastructure affecting design.
- Various attitudes to building in urban context.
- Integration of function: movement, climate, acoustics, structure and services into the group of buildings.
- Landscaping and site planning
- Institutional character from abstract to detail.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems may be covered by the studio faculty members through lecture/slide shows. And site visits.

#### **The topics to be covered as design problems may include:**

- Institution of learning –colleges with its various departments such as medical, engineering. Law, business, music and dance colleges, vocational training institutions etc.
- Institutions of health such as hospitals, reformatories and rehabilitation institutes for the disabled.
- Institutions of research in various disciplines.

- Administrative and Legal institutions such as high courts, secretariat, development authorities, directorates etc.

At least two major exercise (one problem should be pertinent to the urban fabric) and two minor design/time problems should be given and the final submission shall necessarily include a model for at least one of the two main problems.

Note: For the end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

#### **Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1990.

Hand Book of Planning and Design Data.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors' Offices and Clinics, 2nd ed. Reinhold Pub., USA, 1960.

**Konya, Allan.** Libraries: A Briefing and Design Guide. The Architectural Press, London, 1986.

**Neufert, Ernst.** Ernst Neufert Architects Data. Granada Pub. Ltd., London, 2000.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Rosenfield, Isadore.** Hospital Architecture and Beyond. Van Nostrand Reinhold, New York, 1969.

**Stone, G. Louis.** Institutional Buildings Architecture of Controlled Environment.

**Tergsone, W.R.** Practical Laboratory Planning.

**Wild, Friedemann,** Libraries for Schools and Universities. Van Nostrand Reinhold, New York, 1972.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

#### **AR17B5.2C BUILDING CONSTRUCTION - V**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 5 hrs Cr:4*

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#### **Course Overview:**

Course focuses on issues related to failures in buildings, decay and damage, approaches for maintenance, repairs and renovation of buildings.

### **Objectives of the Course:**

To create awareness among the students regarding problems related to old buildings and renovations and methods to deal with them.

### **Course Contents:**

#### **Unit - I**

##### **Failures:**

Introduction to building failures: causes of decay and damage in old buildings, issues of maintenance and repair. Preliminary inspection and general observation, decayed elements difference between decay and damage.

#### **Unit - II**

##### **Timber:**

Moisture content, treatment prior to installation, factors reducing strength of timber, approach to repair and to the timber roofing system.

#### **Unit - III**

##### **Bricks:**

Strength reducing factors in brick work, effect of ageing, weathering, temperature variation of brick-work, joints and cracks, construction defects, repair and maintenance.

#### **Unit - IV**

##### **R.C. Concrete:**

Mixing methods at site, structural design for repairs, causes of failure in concrete structures, pressure-grouting.

#### **Unit - V**

##### **Methodical approach to Repairs:**

Cracks over openings, sinking and sagging balconies, repairs to decayed floors and floor joints, example: Jack arch., madras roof terrace, foundation sinking, repairs to walls. Propping, shoring, strutting and under pinning.

#### **Unit - VI**

##### **Unusual problems:**

Repairs to large span rooms, water proofing the roof terraces, leakages from toilets, case studies and site visits.

Note: This is a studio subject and students should be made to document the problems in old buildings through inspections and propose remedial measures by preparing construction drawings as studio exercise with the theoretical inputs given through lectures.

Reference books:

**Feilden, M. Bernard.** Conservation of Historic Buildings. Butterworth Scientific, London, 1992.

**McKay, W.B.** Failures and Repair of Concrete Structures Vol. IV.

**Raikar, R.N.** Learning From Failures: Deficiencies in Design. Construction and Service, R and D Centre, New Bombay, 1987.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.

**AR17B5.3C      DESIGN OF STRUCTURES -II**

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*L/s: 3/Wk    Int:50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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**Course Overview:**

Course focus is on Structural Design of elements of Industrial Building in Steel.

**Objectives of the Course:**

To develop the structural design skills of the student in steel.

Expected Skills / Knowledge Transferred: Develop capability to design Steel structures.

**Course Contents:**

**Unit – I**

Design of simple beams including check for shear and deflection for laterally supported and unsupported conditions, analysis of simple beam from strength and stiffness considerations.

**Unit – II**

Design of built up beams with flange plates only, Introduction to plate girders (No Design calculations)

**Unit – III**

Axially loaded tension members: introduction, net effective areas, analysis and design of tension members including rivet and welded connections, (L-Angle and T-section only)

**Unit – IV**

Columns: Analysis and design of axially loaded steel columns using single I-section, 2 channels placed back to back and toe to toe, 4-angles etc., including lacing system.

### **Unit-V**

Design of slab base and gusseted base for axial loads (with out moments) for different columns.

### **Unit-VI**

Design of grillage foundation for isolated columns only

### **Unit-VII**

Purlins: Introduction, Dead load, live load and wind loads, design of angle purlin and I-section purlin.

### **Unit-VIII**

Bracket Connections, Riveted & Welded Connections design of Joints.

### **Reference books:**

**Ram Chandra.** Design of Steel Structures Vol. I, 10th ed. Standard Book House, Delhi, 1999.

**Dayaratnam, P.** Design of Steel Structures. Wheeler Pub., Allahabad, 1992.

**Ramamrutham, S. and Narayanan, R.** Design of Steel Structures, 4th ed. Dhanpat Rai and Sons, Delhi, 1995.

## **AR17B5.4C HISTORY OF ARCHITECTURE - IV**

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*L/s: 3/Wk Int:50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:3*

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### **Course Overview:**

The course is designed to study the contemporary developments in Architecture and its impact on built form, structure, construction methods etc.

### **Objectives of the Course:**

To orient the students to various developments in the field of architecture for a greater understanding of trends in contemporary architecture.

### **Course Contents:**

#### **Unit – I**

Contemporary trends in architecture of India after Independence. Influence of Le Corbusier and. Louis.I.Khan.

#### **Unit – II**

Theory and works of Achyut Kanvinde, J.A. Stein, Habib Rehman etc.

#### **Unit - III**

Contributions made by Pioneers - Charles Correa and B.V. Doshi. Anant Raje, Raj Rewal

#### **Unit – IV**

Design Theories and works of contemporary architects - Uttam Jain, Hasmukh Patel, including Chandravarkar and Thacker, Jaisim, Anil Laul, Shirish Beri, Romi Khosla, Ranjit Sabiki, Shashi Bhooshan and Sanjay Mohe.

#### **Unit – V**

Familiarisation of architecture at Auroville and Laurie Baker's work in Kerala.

#### **Unit – VI**

Contemporary trends in the rest of the world architecture. Theory of Post Modernism.

#### **Unit – VII**

Design Theories and works of Charles Moore, Michael Graves, Richard Meyer, Aldo Rossi, Cesar Pelli, I.M. Pei, Yamasaki, Peter Eisenmann etc.

#### **Unit – VIII**

Design Theories and works of Hassan Fathy, Geoffery Bawa, Norman Foster, Renzo Piano, Richard Rogers, Frank Gehry, Zaha Hadid, Santiago Calatrava, Tadao Ando etc.

#### **Reference Books:**

**Bahga, S.S:** Post Independent Architecture.

**Bhatt, Vikram and Scriver, Peter.** Contemporary Indian Architecture After the Masters. Mapin Pub. Pvt. Ltd., Ahmedabad, 1990.

**Curtis, J.R. William.** Modern Architecture since 1900. Prentice-Hall, Inc., New Jersey, 2002.

**Jencks, Charles.** The Language of Post-Modern Architecture, 4th ed. Academy Editions, London, 1984.

**Frampton, K** Tad Ando- buildings, Projects Writings, New York Rizzoli, 1984.

#### **AR17B5.5C      COMPUTER APPLICATIONS – II**

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*L/s: 4/Wk    Int:50    End Exam: 50    Total: 100    End Exam Practical    Cr:4*

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#### **Course Overview:**

This subject aims to further architectural design skills through advanced computer applications. The subject focus is in the area of computational media techniques and technologies and their impact on architectural design and production. This digital studio critically explores the impact of existing and emerging digital media and software, for advanced digital visualization, simulation and communication as well as associated theories and methods on the conceptualization and development of architecture. Computational media is broadly defined across three categories: digital techniques for visualization; data collection and analysis, building information modeling (BIM) and introduction to physical model making using computer technologies.

### **Unit –I**

Introduction to digital theory and this unit equips students with an understanding of the territory of computational design through its theoretical vocabulary and relevant histories.

Making of Architectural vector diagrams to explore design and for digital communication using vector applications like coreldraw, illustrator etc.

### **Unit –II**

3d modeling and different types of methods in 3 modeling like polygonal modeling , NURBS modeling ,subdivision surface modeling and building information modeling etc to design and test Architectural built environments virtually.

### **Unit –III**

Scene setup involves arranging virtual objects, lights, cameras and other entities on a scene which will later be used to produce a still image or an animation. Image processing and video editing to create Architectural walkthroughs.

Digital solar studies

### **Unit –IV**

Building information modeling; using 3 dimensional, real-time, dynamic building modeling software to increase productivity in building design and construction. The process produces the Building Information Model (also abbreviated BIM), which encompasses building geometry, spatial relationships, geographic information, and quantities and properties of building components.

Design and documentation using building information modeling application like Revit Architecture, ArchiCAD, Bentley Architecture etc

### **Unit –V**

Introduction to Organic modeling and 3d printing to explore biomimetics and emergent concepts in the field of architecture and design by using advanced computational technologies

### **References:**

Catalytic Formations: Architecture and Digital Design. Ali Rahim

BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors- Chuck Eastman

Building Information Modeling – Willem Kymmell



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**AR17B5.6C BUILDING ESTIMATING, COSTING AND SPECIFICATIONS**

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L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4

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**Course Overview:**

The course deals with various methods of quantity surveying, rate analysis of building and valuation and specifications for different materials used.

**Objectives of the Course:**

To provide the student adequate knowledge to write the specifications for a given item of work, to work out the unit cost of individual items based on their specifications and arrive at the overall cost of the project.

Expected Skills / Knowledge Transferred:

Techniques of estimating and costing and writing specification related to building construction in order to control/ monitor quality of work and project cost.

**Course Contents:**

**Unit - I**

Quantity Surveying: Introduction - Definitions and terms used, principles, units of measurements. Methods of preparing approximate/preliminary estimates (plinth area and cubic content method), basic differences and advantages.

**Unit - II**

Detailed estimate – data required, factors to be considered, methodology of preparation, abstract of estimate, contingencies, work-charged establishment, bill of quantities, different methods for estimating building works,

Method of obtaining detailed quantities of building items (center line method, long wall and short wall method) PWD System to be followed.

**Unit - III**

Detailed estimation for load bearing structure in brick masonry and framed structure (ground floor only)

**Unit - IV**

Example and exercise in obtaining all items from excavation to finishes including arches, steps, polygonal, circular rooms, measurement of RCC work in slabs, columns, beams, staircase etc.

**Unit - V**

Preparing approximate estimates for services like water supply, plumbing, sanitation, electrical work, mechanical equipment and air conditioning. (for residential building).

Simple earth work calculations for road work – mid sectional area, mean area, prismoidal formula methods (no transverse slope)

## **Unit - VI**

Rate analysis: definition; method of preparation; quantity and labour estimate for unit work; Cost of materials and labour for various works, data sheet for different items of works, different methods of execution i.e. piece work, daily basis, lump sum, labour rates and percentage etc; task or outturn work; rate analysis for: earth work, concrete works, first class brick work, reinforced brick work, cement plastering, DPC with cement mortar/ concrete, finishing (cement paint, distemper, acrylic emulsion, enamel paint) to walls & ceiling.

## **Unit - VII**

Specifications: Definition, purpose and importance of specifications, General or brief specifications, Detailed specifications, writing of specifications for the purpose of calling for tender types of specifications, general specifications for 1st, 2nd, 3rd and 4th class buildings

Specifications for items like earthwork excavations, foundation, CRS masonry, DPC, PCC, RCC, brickwork, doors and windows (wooden), steel and aluminum, mortars, plaster, different types of painting, flooring like terrazzo flooring and tiles, ceramic tiles, marble, granite, distemper, glazing, painting to joinery, varnishing, French polishing; Specification, writing to include materials, tests pre and post installation, modes of measurements.

## **Unit-VIII**

Introduction to computer software for cost estimation; Introduction to cost accountancy and book keeping

### **Reference books:**

**Datta, B.N.** Estimating and Costing in Civil Engineering: Theory and Practice, 23rd ed. UBS Pub. Distributors Ltd., New Delhi, 1993.

**Bride, G.S. Estimating and Costing**, 2nd ed. Dhanpat Rai and Sons, Delhi, 1982.

**Rangwala, S.C.** Valuation of real Properties, 6th ed. Charotar Pub.

6 House, Anand, 2003.

**Standard Specification and rates**, Government of Andhra Pradesh, Government Press, Hyderabad

**Indian Standards Institution.** National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

**Lerrs, Jack.** Engineering Construction Specification.

**Macey, W. Frank.** Specification in Detail, 5th ed. Technical Press Ltd, London, 1955.

**Lewis, R. Jack.** Building Construction Specifications. Prentice-Hall, Inc., New Jersey, 1975.

**Govt. of Maharashtra.** Standard Specifications, Government Press, Nagpur, 1972.

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**AR17B5.1E      WORKSHOP - VERNACULAR ARCHITECTURE (Elective – I)**

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*L/s: 3/Wk    Int:50    End Exam: Nil    Total: 50    End Exam: Nil    Cr:3*

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**Course Overview:**

To expose the students to traditional architecture of various parts of the country.

**Expected Skills / Knowledge Transferred:**

Students will have knowledge of the planning aspects, materials used in construction, constructional details and settlement planning in various parts of the country.

**Introduction to Vernacular Architecture**

Approaches and concepts to the study of Vernacular architecture – A study of major typologies in various parts of the world.

**Dravidian South**

Planning aspects, materials of construction, Constructional details & Settlement Planning of

- Kerala – Nair houses (Tarawads), Kerala Muslim houses (Mappilah houses), Temples, Palaces and theaters – Thattchushastra.
- TamilNadu – Toda Huts, Chettinad Houses (Chettiars) & Palaces
- Karnataka – Gutthu houses (land owning community), Kodava ancestral home (Aynmane)
- Andhra Pradesh –Kaccha buildings
- Telangana – Gadhis and forts

**Western Region**

Planning aspects, Materials used, Constructional details, Climatic factors influencing the planning of

- Jat houses for farming caste, Bhungas(Circular Huts) and Havelis (Pukka houses) of Rajasthan
- Pol houses of Ahmedabad - Primitive forms, Symbolism, Colour, Folk art etc in the architecture of the
- Desert settlements and houses of Kutch & Gujarat state.
- Vernacular architecture of Goa.

## **Northern and Eastern India**

- Kashmir – Typical Kutcha houses, mosque, Dhoongas (Boathouses), Ladakhi houses, bridges
- Himachal Pradesh – Kinnaur houses
- Uttar Pradesh – Domestic housing of Uttar Pradesh
- Bengal – Bangla (Rural house form), Aat Chala houses – change from Bangla to Bungalow, Kutcha & Pucca
- Architecture of Bengal. Nagaland – Naga houses & Naga village, Khasi houses

Studies to be taken up in groups in any one of the different regions indicated above. Field visits, documentations to be taken up and a Report to be prepared based on literature review and field visit. Reports should include factors influencing planning aspects, religious practices and beliefs, culture & climatic factors, materials of construction and constructional details. Field visits may be planned in the preceding vacation periods/clusters of holidays so as not to disturb class work.

## **Appropriate Materials**

Study of Appropriate Materials based on Vernacular techniques of construction from different parts of the country. A study of BMTPC technologies, Auroville Earth Institute

## **Text Books**

1. Traditional buildings of India, Ilay Cooper, Thames and Hudson Ltd., London

## **Reference Books**

1. Architecture of the Indian desert, Kulbushan Jain & Meenakshi Jain, Aadi Centre, Ahmedabad
2. The Royal Palaces of India, George Michell, Thames and Hudson Ltd., London
3. Chettiar Heritage, S.Muthiah, Meenakshi Meyappan, Visalakshmi RAMASWAMY, Lokavani-Hallmark Press Pvt. Ltd., Chennai
4. Encyclopaedia of Vernacular architecture of the World, Cambridge University Press
5. Haveli – Wooden houses & mansions of Gujarat, V.S.Pramar, Mapin Publishing Pvt. Ltd., Ahmedabad
6. The Tradition of Indian architecture – Continuity & Controversy – Change since 1850, G.H.R.Tillotsum Oxford University Press, Delhi
7. VISTARA – The architecture of India, Carmen Kagal. Pub : The Festival of India, 1986.
8. House, Form & Culture, Amos Rappoport, Prentice Hall Inc, 1969.

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**AR17B5.2E      WORKSHOP - UNIVERSAL DESIGN (Elective – I)**

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*L/s: 3/Wk    Int:50    End Exam: Nil    Total: 50    End Exam: Nil    Cr:3*

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**Course Overview:** The objective of this course is to acquaint the students of architecture regarding the various provisions and design issues for universal design

**Knowledge Transfer /Expected Skills:**

Multi sectoral collaborative approaches in design for persons with disabilities and elderly persons / Inculcate skills required for designing for barrier free built environments for physically challenged persons. Techniques involved in making such provisions.

Syllabus to be covered by a 'learning by doing' approach and seminars by faculty and students. It should be project oriented with a hands on approach for eg: detailing for making a public space universally accessible etc.

**Course Contents:**

**Unit – I**

Introduction to Provisions of persons with Disabilities (Equal opportunities, Protection of Rights and Full Participation) Act, 1995, Type of disabilities - Orthopedic, Hearing, Visual Impairments, National Policy for provisions for elderly persons, Concept of equal opportunity, human rights, social justice and empowerment of physically challenged persons.

**Unit - II**

Introduction to similar efforts in other countries. Initiatives at global and International level for protection of rights of disabled and also elderly person. American disabilities Act 1990 etc.

**Unit - III**

Information on various types of national Institutes, agencies and professional bodies involved in disabled welfare, associated norms and standards thereof. The role of NGO's, professional and outreach.

**Unit - IV**

Principles of Universal Design; Design principles in Architecture for creating environments friendly for various types of physically challenged persons. Barrier free concept Educational Institutions, Hospitals, Transportation terminals such as bus, railway stations and airports for barrier free spaces. Study of Standards as given in TSS, TCPO, CPWD, ADA etc., and others.

**Unit-V**

Provisions in public spaces and site planning – parks, play grounds, public transportation, parking lots, Details of sidewalks, road intersections, access to public toilets.

## **Unit-VI**

Provisions in design of public buildings - Details in, ramps, guide rails, lifts, dimensions of wheel chairs, accessibility in public buildings, Signage, audio visual facilities etc. Design of Toilets and interiors spaces for use of physically challenged.

Exercises in design of user friendly spaces for physically challenged persons. Term paper on certain type of disability and requirements thereof for making environs barrier free or any other exercise appropriately framed by the subject faculty.

### **Reference books:**

**Micheal J. Bednar.** "Barrier Free Environments", Dowden, Hutchinson and Ross, I've 1977.

**Ministry of Urban Affairs and Employment.** Central Public Works Department, India, "Guidelines and Space Standards for Barrier Free Environment for Disabled and Elderly Person, 1998.

**Unnati.** "Design Manual for a Barrier – Free Built Environment", Handicap International, December, 2004

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**SEMESTER - VI**

**AR17B6.1C ARCHITECTURAL DESIGN –V**

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*L/s: 9/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr: 9*

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**Course Overview:**

Course aims at teaching the design of buildings for passive recreation and large span buildings for public uses.

**Expected Skills / Knowledge Transferred:**

Design vocabulary, enhancement and sensitization of student in design preparation and its relation to structural systems

**Course Contents:**

Design issues should address the following:

- Environmental and micro climate.
- User behavior and requirements.
- Utility and space enhancement.
- Form and function.
- Circulation: horizontal and vertical.
- Site Planning and Landscape detailing.
- Structural details such as beam framing, Building Services / HVAC etc.
- Design detailing considering the barrier free environment.
- Socio-economic profile of user group.
- Parking details and standards.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

**Topics considered for design are:**

Passive Recreation buildings such as:

- Infotainment center.
- Civic Centre
- Convention Centre.
- Cultural Centre.
- Community Centre.

### **Public Buildings - Large Span structures:**

- Bus terminals.
- Multiplex.
- Auditorium Complex.
- Museum and Art Gallery.
- Kalyana Mandapam.

At least two major exercises and one minor design / time problem need to be covered. Design proposal along with a scale model / digital model must be submitted for the two main problems.

Sufficient theoretical inputs need to be given highlighting the norms and standards of design parameters.

Note:For the end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

### **Reference books:**

**Chiara Joseph de and others. Time Savers Standards of Building Types. McGraw – Hill, 1980.**

**Dawes, John.** Design and Planning for Swimming Pools. The Architectural Press, London, 1979.

**Ruknitein, M. Harvey.** Central City Malls.

## **AR17B6.2C      WORKING DRAWINGS & DETAILS**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: Viva-voce    Cr:4*

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### **Course Overview:**

The focus of the course is to impart skills related to the preparation of drawings meant for construction work on the site and to improve the students' ability of detailing.

### **Objectives of the Course:**

To impart training in the preparation of working drawings for buildings with specific reference to code of practice as per IS Code No. 962 of 1969 and incorporating specifications as complementary to the working drawings.

To sensitize the students in preparing finer design details required for buildings.



### **Expected Skills / Knowledge Transferred:**

To prepare working drawings for a project and resolve complex aspects in the buildings with appropriate materials and design details.

### **Course Contents:**

#### **Unit - I**

Preparation of working drawings: Suitable scales of drawings, methods of giving dimensions: on plans, sections, elevations and other standards.

#### **Unit – II**

Preparation of Plans Building marking plan, excavation plan, centerline plan, foundation plan, column centerlines drawings, floor plans, terrace floor plan.

#### **Unit - III**

#### **Elevation and Sections**

Detailed elevations, detailed sections – at least one through staircase and one through toilet, typical wall profile sections and elevations.

#### **Unit - IV**

#### **Details**

Layout for Sanitation: and detailed plans, Electrical layout: plans and details, details of staircases, toilets and kitchens.

#### **UNIT – V**

Detailing for walls, floors, ceilings through detail drawings to large scale in the form of plans, sections, elevations. Surface Treatment; Cladding, texture treatment.

#### **UNIT – VI**

Detailing of architectural elements such as staircase, balcony, verandah, shading devices vertical and horizontal components of the building.

#### **UNIT – VII**

Detailing of Doors, windows, storage shelves for frames, shutters, joinery of frame to shutter, shutter to panelling etc. and other fixing details.

#### **UNIT – VIII**

Design details appropriate for creating Barrier Free Environment.

Note: Students shall prepare at least two working drawing sets, one for a small residence and one for a large building. (Load Bearing and R.C.C. framed structure with part/basement, ground floor and first floor with lift/elevator including interior detail drawings)

To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for

students attending these seminars/site visits and maintaining the records/ observations as required by the subject faculty.

**Reference books:**

**Lerrs, Jack.** Engineering Construction Specification.

Liebing, W. Ralph and Raul, Ford Mimi. Architectural Working Drawings, 2nd ed. John Wiley and Sons, New York, 1983.

**Macey, W. Frank.** Specification in Detail, 5th ed. Technical Press Ltd, London, 1955.

Shah, M.G., and Others. Building Drawing: with an integrated approach to build environment, 3rd ed. Tata McGraw Hill Pub., co. Ltd, New Delhi, 1996.

**Standard Specification of Government of Andhra Pradesh State.**

**Lewis, R. Jack.** Building Construction Specifications. Prentice-Hall, Inc., New Jersey, 1975.

**Govt. of Maharashtra. Standard Specifications,** Government Press, Nagpur, 1972.

**Datta, B.N.** Estimating and Costing in Civil Engineering: Theory and Practice, 23rd ed. UBS Pub. New Delhi, 1993.

**Wakita, Osamu A. & Linde, Richard M.** The professional practice of architectural detailing, 2nd ed. New York: Wiley, 1987.

**Robert, C. Mc Hugh.** Working Drawing Hand Book, New York: VNR, 1977.

**AR17B6.3C ARCHITECTURAL ACOUSTICS**

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 Course Overview:*

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**Course Overview:**

Acoustics to be studied as a determinant of built form and understand the behavior of sound.

**Objectives of the Course:**

To equip the students with tools for application of acoustical design in architecture.

**Expected Skills / Knowledge Transferred:**

The knowledge of specific acoustic requirements of different spaces

Skills to deal with acoustic problems within buildings

Knowledge that enables to deal effectively with specialists and consultants in acoustics

## **Course Contents:**

### **Unit – I**

Need to study acoustics; pioneers and their works. Acoustics examples from the past: methods used for good acoustics.

### **Unit – II**

Basic theory: Generation, propagation, transmission; reception of sound; Frequency, wavelength and velocity of sound; sound intensity; inverse–square law; decibel scale, decibel addition, small numerical examples in intensity of sound.

### **Unit – III**

Human ear characteristics, Binomial hearing, Loudness perception, subjective effects, characteristics of speech, music and hearing and music,- distribution of energy in speech and music frequencies, intelligibility of speech, high fidelity reproduction of music. A-weighted sound levels.

### **Unit – IV**

Room acoustics: Behavior of sound in enclosed spaces. resonance, reverberation, echo, reverberation time, simple exercise using Sabine's formula. Ray-diagrams, sound paths, effect of geometry and shapes, sound adsorption, sound absorption coefficients, Sound insulation, materials and resonant panels.

### **Unit – V**

Acoustic design process and requirements of different types of buildings: Auditoriums, concert halls, cinema halls, Seminar rooms, lecture halls, class rooms and open offices. Exercises involving reverberation time and absorption coefficient.

Case study of an auditorium with a report containing drawings and calculations of reverberation time etc. Detailed acoustic design for any one type of building.

### **Unit-VI**

Sources and types of noise in and around buildings, characteristics and effect of noise impact on human beings/behavior, noise curves, transmission of noise, noise control for buildings - laws and legislation, regulations.

Legislations related to transportation, examples- airports, railway stations, railway tracks, MRTS etc.

Noise reduction: Sound isolation, transmission loss TL, TL for walls, sound leaks in doors, noise reduction between rooms, Construction details for noise reduction. Noise reduction and built form, Noise reduction through landscapes elements, land use planning for noise control.

Noise reduction from mechanical equipment, Rubber mounts, vibration isolation guidelines, characteristics of duct system, noise in AC ducts, vibration isolation of pumps and generators.

## Unit-VII

### Acoustics in Building Design and Construction

Design: Shape, volume, treatment for interior surface, basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls, theatres, auditorium.

Construction: Constructional detailing, relation to walls/ partition, floor / ceiling/ opening/ windows/ doors.

Insulating fittings and gadgets machine mounting and installation of machinery.

## Unit-VIII

Speech privacy, annoyance, background noise. Communication in open plans, electronic sound systems, loud speaker's layout.

### Reference books:

**Poella. L. Lestie.** Environmental Acoustics.

**Moore, J.E.** Design of Good Acoustics, The Architectural press, London, 1961.

**Burris, Harlod.** Acoustics for the Architect.

**Lord, Peter and Templeton, Duncan.** The Architecture of Sound: Designing Places of Assembly. Architectural Press Ltd., London, 1986.

**Egan, David.** Architectural Acoustics, MC Graw-Hill Book Company, New York, 1988

## AR 17B6.4C BUILDING ECONOMICS AND SOCIOLOGY

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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### Course Overview:

To introduce the economics and sociological aspects in architecture.

### Course Contents:

#### Unit – I

Brief introduction of general economics through an introductory survey of concepts in micro and macroeconomics as applicable to building industry as follows.

Micro Economics: The market, budget constraint, choice, demand and supply, uncertainties, equilibrium, technological constraints, profit maximization and cost minimization, monopoly and oligopoly, production welfare and public good.

Macro Economics: GNP, NNP, demand and supply, inflation, interest rate, employment, saving and investment, monetary and fiscal systems and policies.

#### Unit – II

General discussions on various economic issues such as public versus private

participation, equity, labour intensive versus capital intensive projects.

### **Unit – III**

General economics of the basic inputs into building construction- land, labour, capital and materials. Market Demand and Supply – Choice of Technique in production – Laws of returns governing production.

Urban land values, land utilization, factors involved in development of urban land. Cost and cost indices, preliminary for building. Concepts of life cycle costing with reference to buildings. Time value of money-present worth and inflation.

### **Unit – IV**

Financing for projects, sources costs and utility in financing. Agencies and institutions directly and indirectly influencing economic aspects of project.

### **SOCIOLOGY:**

#### **Unit – V**

Family as the basic unit of 'Society'. Differences in lifestyles due to regional background, religion, caste, income group, etc. and their implication in Architectural design of the housing units.

Sociological aspects in the history of the evolution of housing / shelter forms.

#### **Unit – VI**

Urban and Rural Society: Sociological problems of interaction, isolation, privacy, accessibility, conflict, alienation related to the planning and design of different buildings with the references to the people of different age group/population groups.

#### **Unit – VII**

Power structures in society – local self-government, administrative structures – structure of decision making processes related to building projects at various government and private organizations levels.

### **Reference books:**

Amos Rappoport, House Form and Culture

**Wallis, Wilson D and Willey, M.M**, Text book of Sociology, 1st ed., Khel Sahitaya Kendra, New Delhi, 2001.

**Charon, Joel M**. The Meaning of Sociology, 6th ed., Prentice Hall, New Jersey, 1999.

**Thio, Alex**. Sociology: a brief introduction, 4th ed. Allyn and Bacon, Boston, 2000.

**Schaefer, Richard T**. Sociology: a brief introduction, 4th ed. McGraw Hill, Boston, 2002.

**Bilton, Tony and Oth**. Introductory Sociology, 3rd ed. Palgrave, New York, 1997.

**Stone, P.A**. Building Economy: Design Production and Organisation a synoptic view, 2nd ed., Pergamon Press, Oxford, 1976.

**Koutsoyiannis, A.** Modern Microeconomics, 2nd ed., ELBS with MacMillan Press, 1994.

**Nobbs, Jack and Hopkins, Ian.** Economics: a core text, 4th ed. McGraw-Hill, London, 1995.

**Teck, HoonHian and Oth.** Economics: theory and applications, McGraw-Hill, Taiwan, 1998.

**Dewett, K.K.** Modern Economic Theory, Shyam Lal Charitable trust, New Delhi, 2005.

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## **AR 17B6.5C      HUMAN SETTLEMENTS AND TOWN PLANNING**

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L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4

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### **Course Overview:**

This course focuses on the review of origin of Human Settlements to the level of understanding the various Town Planning problems.

### **Objectives of the Course:**

To make the student understand about various planning related issues.

Expected Skills / Knowledge Transferred:

Should be in a position to make a neighbourhood plan for 5000 people.

### **Course Contents:**

#### **Unit - I**

Historic Evaluation: Brief review of the origin of early human settlements, factors responsible. Development of various settlement forms. Types of settlements (urban and rural) classification of areas within the urban settlements in terms of types of land uses, densities, administrative division, building types etc. Land use and factors influencing it in urban and rural settlements.

#### **Unit - II**

Sociological aspects: Essential elements of society Rural and Urban Communities, Growth of Socio-cultural thought through the ages.

Influence of religion and culture on domestic and civil architecture.

#### **Unit - III**

Urbanization: Facts, Theories. Socio-spatial problems of migrants, slums, high and low density housing; high rise living such as isolation, alienation, accessibility, conflicts etc as related to planning and design of buildings in different areas of the city. Social Survey and social research.

#### **Unit - IV**

Transportation and communication: potential and limitations of roadways, railways,

airways and waterways in the development of a settlement.

### **Unit - V**

Principles of Ekistics: Brief introduction to the theory of "Ekistics". Introduction to the concepts of green belts, satellite towns, neighbourhood, roads in solving some of the problems in urban development. Indian context: Growth pattern of urban and rural settlements; problems and potentials.

## **TOWN PLANNING**

### **Unit - VI**

A brief introduction to the implication of town forms in urban planning and development processes. National, regional, urban, rural, local etc. emphasizing the difference and relationships among them.

### **Unit - VII**

A general and introductory study of inputs, objectives, preparation and outputs of Master plan for a city; land-use classification, features and relationships with transportation. Meaning and use or implication of O-D surveys, desire line diagrams trip generation, attraction, distribution and modal split.

### **Unit - VIII**

Introduction to housing and community facilities; role of F.S.I, densities in housing.

### **Unit - IX**

Basic methodology for planning of industrial areas and recreation areas.

### **Unit - X**

Brief introduction to redevelopment schemes and urban renewal, problem of slum and shanty areas and a review of the concepts regarding solutions: clearance, rehabilitation and improvement.

At least one exercise related to the preparation of a layout for a residential neighbourhood of about 5000 populations.

### **Reference books:**

**Bhagiratha Rao, E.L.** Land Acquisition Manual in Andhra Pradesh.

**Buch, N. Mahesh.** Planning the Indian city.

**Chand, Mahesh & Puri, Vinay Kumar.** Regional Planning in India. Allied Pub. Ltd., Bombay, 1990.

**Doxiadis, C.L.** Ekistics: Introduction to the science of Human Settlement.

**Gallion, B. Arthur & Eisner, Simon.** Urban Pattern: City Planning & Design, 5th ed. Van Nostrand Reinhold, New York, 1986.

**Hyderabad Urban Development Authority.** Hyderabad Urban Development Authority, HUDA, 1981.

**Khosla, R.K.** Urban and Rural Development in India.

**Patterson, T. William.** Land-use Planning Techniques of Implementation.

**Rama Reddy, Padala & Srinivas Reddy, Padala.** Commentates on Hand Reforms Laws in Andhra Pradesh.

**Rame Gowda, K.S.** Urban and Regional Planning. Univ. of Mysore, Mysore, 1972.

**Rangwala, S.C. & Others.** Town Planning, 18th ed. Charotar Pub. House, Anand, 2003.

**Rappoport, Amos.** House, Form and Culture.

**Singh, Alok Kumar, & Others (ed).** Strategies in Development Planning.

## **AR17B6.6C ENVIRONMENT RESPONSIVE DESIGN**

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:3*

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### **Course Overview:**

The course focuses on developing an understanding regarding environmental sustainability and environmentally responsible green buildings. It address the design concerns in architecture to develop resource-efficient buildings that have minimum adverse impact on the natural environment.

The emphasis is to gain an understand regarding the existing concepts, ideas and processes in Architecture and built environment and also recognize rapidly emerging building solutions and technological initiatives that complement current practices in order to attain human health and environmental goals.

### **Objectives of the Course:**

Develop skills to promote eco-friendly characteristics in the area of architecture and buildings and identify crucial technologies, facilities and applications that help in developing green buildings.

### **Course Contents:**

#### **Unit - I**

Introduction to Macro Environment: Elements of climate, weather, Water cycle, Carbon cycle, Environmental quality, Deforestation, climatic change, Ozone depletion and implications.

#### **Unit - II**

Micro-environment: Natural environment Vis a vis built environment. Living environment Characteristics and components of Urban Ecosystem solar radiation, heat flow, air-movement, Land use, drainage and sanitation.

#### **Unit - III**

Concepts of green field development: Brown field development, environmental



impact and ecological balance, FAR, layouts, sustainable Site development, vegetation, landscape elements, alternative services and technologies, rain water harvesting, on site sewerage retention, treatment, recycle and reuse

#### **Unit - IV**

Building Resources: Passive energy system design, Building envelope, orientation and components of building fabric and Shading, High rise buildings, modular building Construction, curtain walls, Sourcing and recycling of building materials, alternative Calcareous, metallic and non-metallic, materials

#### **Unit - V**

Building Infrastructure: Active Energy Systems in buildings, Utilities and services, building automation. electro-mechanical systems, lifts and transportation, captive power plant and equipment, operation & maintenance

#### **Unit - VI**

Indoor air quality: fresh air requirements standards, Sick Building Syndrome, VOC and pollutants.

#### **Unit - VII**

Introduction to building rating systems: building auditing, points system, components, and weight age, agencies and institutions, GBC, TERI etc, green buildings in the contexts of Indian sub-continent,

#### **Reference books:**

**Green Building Technologies** - Godrej Centre CII a Madhapur, Hyderabad.

**Greening Building** – Green Congress, US.(web).

**HSMI. Sustainable Building Technology** – HUDCO, HSMI (Human Settlement Management Institution, New Delhi.

**Koenigsberger, O.H. and Others.** Manual of Tropical Housing and Building. Orient Longman, Chennai, 2003.

**Odum, P. Eugene. Ecology and Environments**, 2nd ed. Oxford and IBH Pub., New Delhi.

**TERI, The Building Energy Audit** – TERI (Tata Energy Research Institute).

**HMDA Hyderabad-** Green building guidelines

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**AR 17B6.1E      THEORY OF DESIGN AND ARCHITECTURE (Elective – II)**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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**Course Overview:**

To provide the student of architecture a foundation in the conception of forms, spatial aspects, compositions and their analysis in buildings

**Expected**

To develop understanding of the philosophy, basic principles of space and mass, and architectural composition in the various periods studied in History courses in previous semesters

**Unit I**

Design process –Integration of aesthetics and function - Understanding of formative ideas, organization concepts

An understanding of design activity and how designers think; categories of design;

Design as problem solving and decision making, uncertainties in design process, multi- faceted nature of design; as a mixture of creativity and analysis, other design methods and processes

: Iterative design process, waterfall process, classic approach by analysis-synthesis, evaluation;

Empathy, integrative thinking, experimentalism, collaboration, intuitive thinking, types of reasoning

Position of design and its relation to science, art, technology

**Unit II**

Architectural Space and Mass: Definitions of architecture; Architecture as space, structure and enclosure; Spatial qualities imparted by shape, density etc. size, degree of enclosure; Materialization in terms of enclosing planes, articulation of planes, openings, elements of structure; spatial relationship, spatial organization, Primary forms, properties of form, transformation of forms - dimensional transformation, subtractive, additive forms, organization of additive forms - Articulation of forms- Interplay between physical elements and space

Understanding architecture as an expression of the primary design elements: point, line, plane, volume; Exploration of buildings in terms of basic principles of design and composition such as Unity, Proportion, scale, Harmony, Balance, Contrast , balance, rhythm, symmetry, hierarchy, axis with building examples;

Accentuation, Restraint, Definition, Repose, Vitality, Strength, fluidity, etc. etc. - with the help of illustrations of buildings both historical as well as contemporary.

Expression of form and spatial organization in various periods and styles - Linear, Centralized, Radial, Clustered, Grid organization; Circulation: The building

approach, the building entrance, Configuration of path, Path space relationship, Form of circulation space

### **Unit III**

Design and use of technology - Use of different materials and technology for aesthetic and structural purposes.

Design to accommodate a programme: Fits between use/ user and design

Design and relation to context: site and cultural milieu

Style in architecture - basis for classification of styles - evolution of styles.

### **Unit IV**

Use and need of ornament in architectural design- Different types of ornamentations in buildings

Historical perspective of the use of ornament in buildings.

### **Unit V**

Values defining traditional and modern buildings; Metaphors in Design: Order, mystery; relation between parts and whole; Linkages between inside and outside;

Architectural theory and architectural practice

### **Reference books:**

1. **“Form Space and Order”** by Francis D K Ching
2. **“Design Fundamentals in Architecture”** by Parmar V S

## **AR17B6.2E      ADVANCED CONSTRUCTION TECHNOLOGY & STRUCTURAL SYSTEMS (Elective – II)**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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### **Course overview:**

The course supplements the previous courses on theory of construction and structures, and introduces the advanced developments in Building Construction and structures. . The students are expected to understand the systems of advanced construction and structural systems but not to solve numerical problems.

### **Objectives of course:**

To introduce the students to the latest developments in construction, building materials and structures. Students should be able to grasp the construction techniques and structural forms available for adopting to architectural forms.

### **Expected Skills / Knowledge Transferred:**

Gain knowledge about the recent developments and advanced concepts in construction and structures and analyse and understand the nature of stresses that are developed in the major elements of advanced types of structures.

## **Course contents:**

### **Unit I**

Relation between structure and architecture; Geometry of form and structural function; Aesthetic theories of the expression of structural function in architectural form.

### **Construction and form; Structure and Form**

#### **Unit II**

Equilibrium under simple tension or compression; Structural elements: Beams and slabs Arches and catenaries; vaults, domes and curved membranes; Trusses, Portal frames and space frames.

Advanced construction methods in RCC, pre-stressed concrete beams slabs frames, lift slab construction post tensioning, multi-storied building frames, circular slabs and beams. Uses of rapid-hardening cement, ready mix concrete [RMC], light weight concrete surface finishes of cement.

Pre-fabrication and Modular Construction:

A review of industrialised building: Basic principles, elements, assembly; Case studies.

#### **Unit III**

Folded plates like prismatic, V-type, trough type, pyramidal, prismatic and RCC folded plate and geometrical staircases, Shell structures, cyclonical shells, hyperbolic paraboloids,

#### **Unit IV**

Space frames: Folded plates, shells, cyclonical shells, Hyperbolic paraboloids, free forms.

Cable structures: Simply curved suspended roofs, membrane structures, cable structures, combination of cables and struts.

Structural Systems: single and double layer grids; braced domes, ribbed domes, plate type domes, Network domes, Lamella domes, Geodesic domes, Grid domes. Braced and folded structures.

#### **Unit V**

Curtain walls: types of curtain walls, components, structural solutions, construction and erection. glass wall system-glass; sheet metal wall systems sheet metal cladding.

#### **Unit VI**

Advanced Building Materials plastic, PVC, metals, synthetic boards, fire proof/resistant boards/tiles, acoustic materials, glass, composite panels and their applications, non- load bearing gypsum blocks

**Reference books:**

**James Ambrose**, Building Construction Enclosure System 1990

**Andrea deplazes (ED)**, Constructing Architecture: Materials processes structures-A hand Book Second Extended edition

**Robert E Fischer**, Engineering for Architecture 1989

**R Barry**, The construction of Buildings Volume 4 4th Edition

**Schall, Rolf**. Curtain Walls: Design Manual. Reinhold Pub., New York, 1962.

**Sandela, Felix**. Architecture and Structuralism. 1963.

**Lane, Allen**. Developments in Structural Form. Penguin Books Ltd, London, 1975.

**Macdonald, J. Angus**. Structure and Architecture, 2nd ed. Architectural Press, Oxford, 2003.

**Michaels, Leonard**. Contemporary Structures in Architecture. 1950.

**Schall, Rolf**. Curtain Walls: Design Manual. Reinhold Pub., New York, 1962.

**Siegel, Curt**. Structure and Form in Modern Architecture. Crosby Lockwood and Son Ltd., London, 1962.

**Subramanian, N**. Principles of Space structures. Wheeler and Co., Allahabad, 1983.

**Zannos, Alexander**. Form and Structure in Architecture: The role of statical function. Van Nostrand Reinhold Co., New York, 1987.

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## SEMESTER - VII

### AR17B7.1C ARCHITECTURAL DESIGN -VI

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*L/s: 9/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr:10*

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#### **Course Overview:**

This Course deals with the design of large scale, multi-storey, complex projects and aims to develop skills for a comprehensive design approach in the areas of Housing Design and Campus Design.

#### **Objectives of the Course:**

To develop skills for a comprehensive design in areas of housing and campus design for making a complete design portfolio.

Expected Skills / Knowledge Transferred: To develop skills for comprehensive understanding and dealing with Architecture of a group of buildings.

#### **Course Contents:**

I. Housing Design: Issues to be addressed for the design project pertaining to housing design:

- Density, mixed land use, ground coverage, development controls.
- Urban systems, services and their integration with the project.
- User requirements (derived from surveys)
- Issues in appropriate technology and costs.
- Issues of hierarchy, identity of space, public and private scales of space. Integration of community institutions etc.
- Detailing for the disabled and the elderly.
- Indian / local architectural responses to climate, culture, traditional values, building elements, symbols motifs and special character.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Design exercise related to housing design for specific target groups.

II. Campus Design: Issues to be addressed for the design project pertaining to campus design:

- Issue in preparation of Master Plan for Institutions: academic, administrative, staff housing, student hostels etc.
- Environmental considerations.
- Phases of development.
- Scope for expansion for future developments

- Safe and comfortable vehicular and pedestrian movement.
- Issues of character and landscaping.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Students would need to undertake one of the design subjects for the studio exercise. Students may be required to develop a brief, translate it into requirements and design.

One Major design exercise and one Time problem/minor design exercise should be given

The evaluation shall be through periodic internal reviews. The final submission will include a brief report of about 1000 words explaining the concept and design proposals for main portfolio. It will also include a model.

Note: In end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

**Reference books:**

Alexander, Christopher. Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.

Richard. D. Dober. Campus Architecture: Building in the Groves of Academy. McGraw Hill, New York, 1996.

Chiara, De Joseph and Others. Timesavers standard for Housing and Residential development, 2nd ed. McGraw Hill, Inc, New York.

Newman, Oscar and Others. Defensible space: People and Design in the Violent City. Architectural Press, London, 1972.

**AR17B7.2C      ADVANCED SERVICES**

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*L/s: 5/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:5*

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**Course Overview:**

Study of services and facilities used in special type of buildings. The emphasis is laid on operation of services, working of different equipment employed for carrying out building function in specific different building types

**Objectives of the Course:**

To develop understanding of special services, definitions and terms used, working of equipment, installation of facility, special provisions to be made in building design.

**Expected Skills / Knowledge Transferred:**

Principles and installations of specialized services in buildings and building complexes and NBC standards.

## **Course Contents:**

### **Unit - I**

#### **Elevators and escalators –**

Types of Elevators like traction, Hydraulic etc., Double-decker, sky lobby, lift lobby, lift interiors etc., Passenger, Capsule, Hospital bed lift; goods lift etc. Components; Working and operation of lifts, parts of lifts; industry standards

Planning for Elevators in a building: location in building, serving floors, grouping, size, capacity calculations. shape of passenger car, door arrangement etc. ,Provisions to be made in buildings for installation,

Service requirements: Quality of service, quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and their typical layout

Escalators – Definition, Application. Location and arrangement in buildings. Space requirement Introduction to working and design of escalator.

Escalators V/S Elevators, Conveyor belts - movement of passengers and goods

### **Unit - II**

Electronic Systems in Buildings: Telephone and communication, networks in buildings EPABX, Security systems, Burglar alarms, video surveillance, access control, design of computer labs, access flooring, server rooms.

### **Unit - III**

Fire Fighting Services: Behaviour of fire – ignition, igniter, Combustible contents, causes of fire, Mechanism of fire spread in building and prevention – fire safety standards – concepts in fire protection

High temperature effect and combustibility: High temperature effects and combustibility of building materials and structure – Fire resistance of buildings – Classification of buildings based on occupancy – fire fighting installation and requirements .Passive and active fire precautions – site planning and fire brigade access

– Roof covering – control of fire spread.Portable firefighting equipment, Heat sensitive detectors – smoke detectors –Automatic water system.built in wet riser system, dry standpipe, sprinkler system, fire hydrant Fire safety, fire & human behaviour – Means of escape, design and planning of escape halts and corridors to final exit. Psychological aspects – concept of panic – domestic, Multiple occupancy and Hospital fires.

### **NBC standards**

Cooking gas distribution in buildings, piped gas supply, bottled gas supply.



### **Unit - IV**

Swimming Pools: Pool and tank design, patio, finishes, Water circulation, cascades, channels, filtration and water treatment, Water quality and disinfection, balancing tank.

### **Unit - V**

Hotel services: Specialty services required for hospitality industry, Laundry services, Kitchen services, Channeled Music, Internet,

### **Unit – VI**

Environmental services: waste generation in Industrial buildings, various types of waste, solid, liquid, gas, treatment and disposal facilities, waste generation in hospital buildings, design provision for its disposal,

### **Unit - VII**

Alternative energy sources for buildings: hot water solar energy system, applications of photo voltaic cells, biomass digesters, wind energy.

### **Reference books:**

**Faber, Oscar and Kell, J.R.** Heating and Air-Conditioning of Building. Architectural Press, Surrey, 1945.

**Prasad, Manohar.** Refrigeration and air-conditioning, 5thEd. New Age Intl. Pub., New Delhi, 1996.

**Tiwari, Satish.** Water and Energy resources.

## **AR17B7.3C ENERGY CONSERVATION BUILDING CODE**

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*L/s: 5/Wk Int: 50 End Exam: 50 Total: 100 EndExam: Practical Cr:5*

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**Course Overview:** This will give an overall understanding and importance of Energy Conservation in built environment and will also help students to design buildings which are ECBC compliant.

**Objective of the Course:** To enable students to design and evaluate code compliant buildings.

**Expected Sills/Knowledge Transferred:** Basic understanding of building energy codes, compliance methods, day lighting, and whole building energy simulations.

### **Course Contents:**

#### **Theoretical Sessions**

#### **Unit I**

Building Physics and Energy in built environment: Physics of Heat – Heat and temperature, Types of Heat flow, Laws of thermodynamics, thermal behaviour of buildings – Solar control, ventilation, Steady State heat flow, Dynamic response

of buildings, Thermal Comfort – Thermal balance and comfort, factors of Comfort, adjustment mechanisms, comfort indices, comfort zone, HVAC, Thermal properties of materials – Glass (SHGC, VLT, U value), walls, other building materials.

### **Unit II**

International Practices - Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings, General status in regions in Europe, North America, Japan, New Zealand, Australia, China, Energy Codes in Singapore, Malaysia, Duabi and Middle east, ASHRAE 90.1, ASHRAE 90.2 IECC, Title 24.

### **Unit III**

ECBC Scope, Compliance and approach: Energy efficiency performance levels, building systems, precedence, building classifications, energy performance index, compliance approaches and requirements, approved analytical tools, administrative requirements, compliance documents, Benchmarking and Star Labelling.

### **Unit IV**

ECBC Building Envelope: Mandatory requirements – Fenestration, opaque construction, daylighting, building envelope sealing, Prescriptive requirements – roof, opaque external walls, vertical fenestration, skylights, Building Envelope trade –off method, standard building EPF calculation.

### **Unit V**

Comfort Systems and Controls: Mandatory requirements – ventilation, minimum space conditioning equipment efficiencies, controls, additional controls for ECBC + and super ECBC, additional controls for super ECBC buildings, piping and duct work, system balancing, condensers, Service water heating –solar water heating, heating equipment efficiency, other water heating systems, piping insulation, heat traps, swimming pools, Prescriptive requirements – pumps, cooling towers, economisers, variable flow hydronic systems, boilers, energy recovery, total system efficiency – alternate compliance approach, low energy comfort systems.

### **Unit VI**

ECBC Lighting and Controls: Mandatory requirements – lighting controls –automatic lighting shut off, space control, control in daylight areas, centralised controls for ECBC + and super ECBC buildings, Exterior lighting controls, additional controls, exit signs, Prescriptive requirements – interior lighting power, building area method, space function method, Installed interior lighting power, Exterior lighting power.

### **Unit VII**

ECBC Electrical and renewable systems: Mandatory Requirements – Transformers, energy efficient motors, Diesel generators sets, check metering and monitoring, power factor correction, power distribution systems, uninterruptible power supply, renewable energy systems.

## **Unit VIII**

Daylighting – Daylighting simulation, manual daylighting compliance method.

## **Unit IX**

Whole building performance method and Energy Simulation- General Scope, compliance, annual energy use, trade-off limited to building permit, documentation requirements, Mandatory requirements, Simulation requirements – energy simulation program, climate data, compliance calculations, calculating energy consumption of proposed design and standard design –energy simulation model, HVAC systems, compliance thresholds for ECBC Compliant, ECBC + and super ECBC Buildings, maximum allowed EPI ratios, Schedules.

Practical Sessions

## **Unit X**

How simulation software works, geometry of buildings, material and construction, openings and shading, lighting and controls.

Recommended software for whole building: Design Builder/Open studio/Synergy.

Unit XI Heating and cooling design, Unitary HVAC Systems, Central HVAC System, simulation parameters natural ventilation.

Unit XII Building energy code compliance, project: small office, large office, single family residence.

Unit XIII Daylight Simulation: Recommended Software: DIVA for RHINO/DAILUX EVO 6/Open Studio.

## **References:**

Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable Design. Architectural Press, Second Edition, 2010.

Vishal Garg, Jyothirmay Mathur, Surekha Tatali, Aviruch Bhatia. Building Energy Simulation: A workbook using Design Builder. CRC Press. 2017.

Energy Conservation Building Code 2017. Bureau of Energy Efficiency. New Delhi. 2017

American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.1 –Energy Standards for Buildings except Low-rise residential buildings. 2016.

American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.2 –Energy Standards for Low-rise residential buildings. 2016.

Jens Lausts. Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings. International Energy Agency (IEA) Information paper. March 2008.

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**AR17B7.1E      URBAN DESIGN (ELECTIVE – III)**

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L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4

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**Course Overview:**

The course focuses on creating awareness in students in the subject 'Urban Design' as a specialization in the area of architecture and urban planning.

**Objectives of the Course:**

To give an overview of urban design as an interface between the fields of architecture and urban planning.

To impart the knowledge about various developments in the field of urban design.

**Course Contents:**

**Unit - I**

Discussion on Architecture, Urban design, Town Planning Interface. Urban Morphology and Elements of Urban Design. Nature of urban design projects in public and private developments.

**Unit - II**

Classical cities, medieval towns, neoclassic cities, and industrial towns. Characteristics of towns built by Hindu and Muslim rulers in India. Colonial inheritance, growth of post towns, civil lines, cantonments, railway and resort towns and Design in New Delhi.

**Unit - III**

Modern movements in city design such as 'city- beautiful' and 'Garden city' movements, utopian model Towns in the west. Changing structure of cities: sectors, blocks, streets, squares, buildings and open spaces.

**Unit – IV**

Role of planning agencies such as development authorities, Urban Arts Commission in the design of cities. Influence of city development policies namely Master plans, zoning regulations, on Urban Design. Built-form and space requirement in residential, commercial industrial and recreational land uses, activities. Patterns of subdivision and land-development.

**Unit – V**

Elements of urban spaces: squares and streets. Use of landscape in urban design, such as tree avenues, street fencing, side walks etc.

Lighting and illumination of cities, methods of lighting, signage and elements of utility services in the city.

**Unit – VI**

Urban conservation and its role in urban design. Past and present trends in urban conservation. Role of architectural control in urban conservation and city character and style.

**Reference books:**

**Bacon, N. Edmund.** Design of Cities. Penguin Books, New York, 1976.

**Benevolo , Leonard.** History of the City.

**Krier, Rob. Urban Space**, 3rd ed. Academy Editions, London, 1984.

**Moughtin, Cliff and Others.** Urban Design: Ornament and Decoration. Butterworth-Heinemann, London, 1995.

**Moughtin, Cliff.** Urban Design Street and Square.

**Mumford, Lewis.** City in History: Its origin transformation and its prospects.

**Sprelregen, Paul.** Urban Design: The Architecture of Towns and Cities.

**Lynch, Kwin,** the Image of the city Cambridge mass: MIT press, 1965

**AR17B7.2E HOUSING (Elective – III)**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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**Course Overview:**

The course introduces the basic concepts and issues related to urban and rural housing.

**Objectives of the Course:**

To give an understanding and appreciation of housing in terms of issues, problems and directions.

**Course Contents:**

**Unit – I**

**Evolution of Housing:**

Brief review of the historical development of housing in various contexts.

**Unit – II**

**Housing situation in India**

Housing need and Demand: Housing and Habitat policy and perspective at the national level. Problems and Issues in urban & Rural Housing, Housing Agencies and their role in housing development.

**Unit – III**

**Housing Standards**

Issues involved in formulating housing standards for rural and urban areas, desirable and minimum standards. Residential Densities

## **Unit – IV**

### **Housing Strategies**

Review of different forms of housing globally – particularly with reference to the third world countries.

Brief acquaintance with some strategies such as sites and services upgrading existing shelter, stimulating private – sector production, developing building materials and alternative technologies, improving architectural design., protecting inner-city renters, land sharing, resettlement etc.

## **Unit – V**

### **Housing Layouts and Design**

Traditional pattern of housing design, Row Housing, Cluster Housing Apartment housing, low rise versus high rise housing, Incremental housing, neighborhood unit. Case studies of housing Projects

## **Unit – VI**

### **Housing Process**

Managing and financing of housing projects. People's participation, Technology Transfer, development control rules and environmental aspects

### **Reference books:**

**Alexander, Christopher.** Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.

**Chiara, De Joseph and Others.** Timesavers standard for Housing and Residential development, 2nd ed. McGraw Hill, Inc, New York.

**Desai, A.R. and Pillai, Devadas.** Slums and Urbanization, Popular Prakashan Pvt. Ltd.

**HUDCO.** Housing for the Low Income. HUDCO.

**Poulose, K. Thomas.** Reading Material on Housing. Institute of Town Planners, New Delhi.

**Cedric Prgh (1990)** Housing and Urbanisation, Sage Publication New Delhi

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## **AR17B7.3E BUILDING CONSTRUCTION MANAGEMENT (Elective – III)**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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### **Course Overview:**

To introduce the importance of construction management in the field of architecture.

## **Course Contents:**

### **Unit – I**

#### **Introduction**

Construction in India; its role in development, importance of Management in Construction, role of Construction Manager, Construction team, responsibilities and authorities of Construction Manager Organization.

### **Unit - II**

#### **Management Techniques:**

Planning for Construction Projects: Principles, objectives, advantages of planning, stages of planning.

**Scheduling:** Definition, advantages

Methods of Scheduling: Bar chart, Milestone chart, Controlling, Life cycle curves. Job layout, work break down structure

#### **Project Management through Networks**

Introduction, objectives, advantages, terms and definitions, types of networks, rules for drawing a network, Fulker son's Rate of numbering the events.

Introduction to PERT, CPM, difference between PERT and CPM, finding critical path.

### **Unit – III**

Introduction to construction equipments, performance, characteristics and usage of equipment used in large scale projects.

**Human Resource management:** manpower estimation at various stages, recruitment, training, under and over manning.

Materials Management: Materials of construction, classification codification, ABC analysis, estimation of materials procurement, inventory / stock control, purchase procedure, stores management.

Quality control in Construction: Importance of quality, elements of quality, organization for quality control, quality assurance techniques.

### **Unit – IV**

Labour Legislations pertaining to construction industry, payment of wages act, migration Act, Factories Act, Contract Labour Act, Labour Welfare Fund Act, Workmen's Compensation Act.

Construction Safety Management: Importance of safety causes of accidents, safety measures, safety benefits to employees, employees and customers.

### **Unit – V**

**Economics of Project Management:** Economic analysis of projects, economic

studies, sensitivity analysis. Cost estimating principles, parameter estimation, detailed estimates, cost concepts, classification of costs, elements of costs, and cost analysis for control.

#### **Unit – VI**

**Budgetary Control Systems:** Types of budgets, new approaches for budgeting, responsibility of accounting, profit centre approach.

**Financial Management:** Meaning and scope, financial statement analysis, ratio analysis, funds flow analysis.

**Working Capital Management:** Meaning, policy for working capital, estimating working capital needs. Capital investment decision, long term financing working of financial institutions in India and abroad, self-financing, financing mechanisms.

**Value engineering:** Definition, value engineering job plan, life cycle costing, value engineering applications.

#### **Unit – VII**

Introduction to Linear programming, Transportation problem, Sensitive analysis.

#### **Reference books:**

**Gupta, B.L. and Gupta, Amit.** Construction Management, Machinery and Accounts, 3rd ed. Standard Pub, 2005.

**Loraine, R.K.** Construction Management in Developing Countries. Thomas Telford, London, 1993.

**Srinath, L.S. PERT and CPM Principles and Applications**, 3rd ed. Affiliated East-West Press, New Delhi, 2003.

**Singh, Harpal.** Construction Management and Accounts 14th ed. Tata McGraw-Hill Pub., New Delhi, 1981.

**Gould, E. Frederick and Joyce, E. Nancy.** Construction Project Management. Prentice Hall, New Jersey, 2000.

**Shrivastava, U.K.** Construction Planning and Management, 3rd ed. Galgotia Pub., New Delhi, 2004.

#### **AR17B7.4E INTERIOR DESIGN(Elective – III)**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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#### **Course Overview:**

The course provides a frame work of the discipline by addressing to the theoretical, social, historical, technological, professional aspects of Interior Design.



## **Course Contents:**

### **Unit - I**

The profession of Interior Design; Role of an Interior Designer- past and present; Scope of services; Interior Design Process. Interior Design and Concepts: Elements and Principles of design- an overview and their applications in interior designing.

### **Unit - II**

Interior Space planning and human dimensions. Focuses on physical, psychological Behavioural and human factors, study of Proxemics, Behavioural settings.

### **Unit - III**

Introduction to the fundamentals of Interior Design such as Lighting, Furniture, Space, Materials, Furnishings, Art etc.

### **Unit – IV**

Colours in interiors – Colour Theory, Effect of light on colour, various colour schemes like analogues, complementary, triadic etc. Colour symbolism. Psychology of colour, Industrial colour codes. International standards.

### **Unit – V**

Introduction to Furniture and Accessories: An overview of historical perspective of furniture and styles, accent pieces and accessories from Egyptian period to the present. Basic Furniture vocabulary. Styles of Interiors – Italian, English, French, Japanese styles etc.

### **Unit – VI**

Interior lighting – direct and indirect lighting, location and light grid systems, types of luminaries, quality of lighting. Ambient, task and accent lighting. Exposure to eminent interior designers' works- Indian and international

### **Unit – VII**

Business perspectives of Interior design – an overview of practice of interior design in India.

## **Reference books:**

**Archi World. Interior Best Collection:** Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.

**Friedmann, Arnold and Others.** Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.

**Miller, E. William.** Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.

**Kurtich, John and Eakin, Garret.** Interior Architecture, Van Nostrand Reinhold, New York, 1993.

**Rao, M. Pratap.** Interior Design: Principles and Practice, 3rd ed. Standard Pub., 2004.

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**AR17B7.5E      LANDSCAPE ARCHITECTURE (Elective – III)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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**Course Contents:**

**Unit - I**

Study of landform its technical expression through grading plan, section, profiles layout plans and earthwork computations.

Principles of soil mechanics and landscape drainage and their application to surface and subsurface drainage of small scale projects.

**Unit –II**

Basic principles of outdoor lighting, types of fixtures and their use in varying situations.

Introduction to irrigation systems – sprinkler trickle irrigation, drip irrigation and laying irrigation networks.

**Unit -III**

Factors related to construction; of structures and systems.

Materials and techniques of landscape construction with emphasis on appropriateness for intended use.

Construction of structure in landscape

Circulation roads, parking, paths; Level changes – walls, steps, ramps; Construction of Garden, landscape feature Such as screens, trellis, wall fences gates decks; fountains and pool construction.

**Unit -IV**

Planting and establishment of woody plants, installing time, covers and herbaceous plants.

Planting principles – Bed preparation, mounding, application of fertilizers, roll preparation, pruning and maintenance.

**Reference books:**

**Landphair, C. Harlow.** Landscape Architecture Construction, 2nd ed. Elsevier, New York, 1988.

**Motloch, L. John.** Int. to Landscape Design, 2nd ed. John Wiley and Sons, Inc., New York, 2001.

**Moorhead, Steven (Ed.).** Landscape Architecture. Rockport Pub, Massachusetts, 1997.

**Pregill, Philip and Volkman, Nancy.** Landscapes in History: Design and Planning in the western Tradition. Van Nostrand Reinhold, New York, 1993

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## **GN17B7.1A PERSONALITY DEVELOPMENT**

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*L/s: 3/Wk Int: 50 End Exam: Nil Total: 50 End Exam: Nil Cr:3*

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### **Course Overview:**

The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential.

### **OBJECTIVE:**

To help the students achieve effectiveness in their professional activities, harness skills and develop qualities suited for the profession.

### **Course Content:**

#### **Unit I**

**Personality:** Nature of personality; Theories of personality- Type, Trait, Social Learning, Determinants of personality, Personality traits.

#### **Unit II**

##### **Attitude Building**

Importance of attitude, factors that determine our attitude, types of attitude, building positive attitude, developing optimism and discipline.

#### **Unit III**

##### **Group and Team Work**

Group and Team dynamics, Group Structuring- Leadership, role, Tasks, effective team work

Exercises to understand the nature of a team, team building, members and achieving a given task. Panel discussions.

Public speaking: Planning a speech, using presentations, speech outline, research for public speaking, language and style, analyzing audience, types of speeches, preparing for impromptu speech.

#### **Unit IV**

Stress Management Importance, Causes, Stress relief mechanisms

#### **Unit V:**

Class room activities planned to ensure full student participation. The group and individual activities are planned to develop the skills and talents of the students which they will need in various occasions in their careers.

Time management; Critical Thinking; Lateral Thinking (Situational); Leadership Qualities; Motivation

Business situation; Business plan presentation

Vocabulary games; Presentation Skills

### **Event Management**

Goal Setting; Analytical Thinking; Problem Solving;

Emotional Quotient; Assertiveness; Stress Management

### **Reference books:**

**Krishna Mohan & Meera Banerji.** Developing Communication Skills, Macmillan India

**C S Rayudu.** Principles of Public Relations, Himalaya Publishing House

**K. Ashwathappa,** Organizational Behavior, Himalaya Publishing House

**Daniel Colman.** Emotional Intelligence

### **OPEN ELECTIVE -1**

Open Electives will be announced by the Department/s before start of the Semester. If a student wishes to take any online course as Open Elective due permissions must be taken as prescribed.

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**SEMESTER - VIII**

**AR17B8.1C DESIGN STUDIO**

**AR17B8.1.1C ARCHITECTURAL DESIGN - VII (DESIGN STUDIO)**

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*L/s: 11/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr:11*

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**Course Overview:**

The course deals with the design of large, multi-storeyed complex projects.

**Objectives of the Course:**

To develop skills for a comprehensive design in urban context (Ex; Housing project, Shopping Malls etc.) for making a complete design portfolio.

Expected Skills / Knowledge Transferred:

To develop skills for comprehensive understanding and dealing with Architecture of a group of buildings interconnected with elements of urban design.

**Course Contents:**

Urban Design: issues to be addressed:

- Issues of urban structure, urban space and form.
- Issues of conservation.
- Issues in zoning, land use, density, development control.
- Issues of building in context, urban infill
- Integration of diverse functional needs, access systems, parking, services etc.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Design portfolio shall include (at least one example each) using

1. 'Hi-tech' materials / construction.
2. Conservation related materials / construction.

Students would need to undertake all of the above design subjects for the studio exercise.

The evaluation shall be through periodic internal reviews. The final submission will include a brief report of about 1000 words explaining the concepts and design proposals along with the main portfolio. It will also include a model.

Note: In end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

**Reference books:**

**Alexander, Christopher.** Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.

**Lynch, Kevin.** Image of the City

**Newman, Oscar and Others.** Defensible space: People and Design in the Violent City. Architectural Press, London, 1972.

**Watson, Donald & Others (Ed.)** Time Saver Standards for Urban Design. McGraw Hill, New York, 2003.

**AR17B8.1.2C BUILDING CONSTRUCTION MANAGEMENT  
(DESIGN STUDIO)**

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*L/s: 11/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr:11*

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**Course Overview:**

Major studio work, focusing on construction management of large scale projects for effective and efficient implementations.

**Objectives of the Course:**

To equip students of Construction Management specialization with various techniques of project implementation.

Expected Skills / Knowledge Transferred: The skills related to construction management of large building projects.

**Course Contents:**

Preparation of working drawings in detail for large building project (building more than 5000 sq. mtrs.) covering the following aspects Implementation scheduling – Resource planning- time, labour, material, equipment and personnel requirements, estimation-scheduling, control and procurement.

Preparation of network charts and flow charts with control mechanism in place, including quality and cost control – sticking to budgetary estimates and foreseeing any disturbances in scheduling, devise resilience and adaptive measures.

Report of Construction Management: Preparation of Project report on any live, ongoing or completed-large scale project.

**Reference books:**

**Gupta, B.L. and Gupta, Amit.** Construction Management, Machinery and Accounts, 3rd ed. Standard Pub, 2005.

**Loraine, R.K.** Construction Management in Developing Countries. Thomas Telford, London, 1993.

**Srinath, L.S. PERT and CPM Principles and Applications**, 3rd ed. Affiliated East-West Press, New Delhi, 2003.

**Singh, Harpal.** Construction Management and Accounts 14th ed. Tata McGraw-Hill Pub., New Delhi, 1981.

**Gould, E. Frederick and Joyce, E. Nancy.** Construction Project Management. Prentice Hall, New Jersey, 2000.

**Shrivastava, U.K.** Construction Planning and Management, 3rd ed. Galgotia Pub., New Delhi, 2004.

**Chitkara, K.K.** Construction Project Management: Planning, Scheduling and Controlling. Tata McGraw-Hill Pub., New Delhi, 1999.

**Sharma, S.C.** Construction Equipment and its Management, 4th ed. Khanna Pub., New Delhi, 2004.

### **AR17B8.1.3C LANDSCAPE ARCHITECTURE (DESIGN STUDIO)**

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*L/s: 11/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr:11*

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#### **Course Overview:**

This course will focus on design and development of small to medium scale projects and aims to develop skills for design of comprehensive landscape proposal for simple residential landscape, community level open spaces and campus design.

#### **Objectives of the Course:**

To expose students to issues concerned with landscape design and site planning.

To expose students to wide range of design alternatives and preparation comprehensive designs for landscape projects.

#### **Expected Skills / Knowledge Transferred:**

Basic skills in design and orientation in landscape design are prerequisites for the students. The student is expected to obtain skills in development of concepts based on perceptual evaluation of site and propose design alternatives. Solutions to small and medium scale landscape design projects

#### **Course Contents:**

- Emphasis on form and spatial relationships leading to open space order and frame work.
- Concerns for Social, Psychological considerations of the individual and large groups of people, their interaction and resultant forms of environment.
- Issues related to functional requirement and design strategies.
- Microclimate and environmental consideration.
- Issues related to health, welfare, safety and enjoyment.
- Issues related to zoning, density and develop controls.
- Issues related to services and site development.

- Issues related to visual and aesthetic and contextual consideration.

Students would need to undertake one small and one medium scale designs in site planning.

The exercises taken up shall deal the issues comprehensively from general understanding to providing complete landscape design solutions. The exercise can be split into different stages such as Data collection, Case studies, Synthesis and Design development.

**Reference books:**

**Southerland**, Designing the new landscape.

**Hacket, Brian**. Planting Design.

**Laurie, Michael**. An Introduction to Landscape, 2nd ed. Prentice Hall, New Jersey, 1986.

**Lynch, Kevin**. Site Planning. MIT Press, Massachusetts, 1962.

**Jellico**, Man and Landscape.

**AR17B8.1.4C INTERIOR DESIGN (DESIGN STUDIO)**

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*L/s: 11/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr:11*

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**Objectives of the Course:**

To enable the students to demonstrate design ideologies in the field of interior design

**Course Contents:**

Interior requires that students have a full understanding of the interior design field and have mastery of the design process, presentations, project administration and business skills.

Two interior schemes of different functional types: Residential / commercial at different scales will form the major design assignments.

Focus is on Portfolio creation by producing a complete and correct set of working drawings, from plans through details and specifications and sample boards

**Portfolio preparation**

The student will create a portfolio that clearly expresses his/her ability to design by using detailed drawing, rendering and Model Making. Usage photography and graphic design in preparing a professional portfolio is also encouraged.

**Reference books:**

**Archi World**. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.



**Friedmann, Arnold and Others.** Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.

**Miller, E. William.** Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.

**Kurtich, John and Eakin, Garret.** Interior Architecture, Van Nostrand Reinhold, New York, 1993.

**Rao, M. Pratap.** Interior Design: Principles and Practice, 3rd ed. Standard Pub., 2004.

## **AR17B8.2C      PRE-THESIS SEMINAR**

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*L/s: 4/Wk    Int: 100    End Exam: 0    Total: 100    End Exam: NIL    Cr:4*

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### **Course Overview:**

The course provides students with a framework to understand some emerging concepts in architecture and projects of design complexity and equip the student with adequate architectural design research methods for the realization of thesis concept. During the course of study, the subject of the thesis is developed and the project articulated.

**Objectives of the Course:** To impart knowledge to students, on the tools and methods needed to handle a design project of reasonable complexity individually,

Expected Skills / Knowledge Transferred: The skills required to collect, assimilate and synthesis data relevant to handle a design thesis project independently.

### **Course Contents:**

#### **UNIT - I**

Introduction to architectural thesis Project: Difference between design thesis and design studio, selection of topics for architectural design thesis, design thesis topics based on building typologies, preparation of synopsis, Methodology of design thesis

#### **UNIT - II**

Emerging concepts in architecture due changes in social, economic, technological variables. Review of design projects related to real world instances and relevant to community at large. Review of projects of design complexity, involving themes, sub themes and architectural expression.

#### **UNIT - III**

Research in architecture: Tools and Methods required to handle a design project. Scientific methods of research with special emphasis on architectural research methods. Architectural enquiry visual, observations, questionnaire formats of enquiry, Literature Review and case studies. Data analysis techniques interpretation of data.

## Unit IV

### Thesis report writing and presentation:

- Formats for presentation of data, case studies and analysis.
- Formats for presentation of thesis design- media appropriate in the architectural profession such as two dimensional drawing, physical models, three dimensional computer models.
- Report Writing: Techniques in report writing, presentation of contextual information relevant to interpretation of the data collected and design; reporting the design development from concept to design solution, explain the relation of the design to existing knowledge on the topic in the form of coherently written thesis report.

The inputs to the students on various design thesis topics would be in the form of Expert /Guest Lectures

Each student in consultation with the faculty shall choose a thesis topic, collect necessary data, review literature on the chosen topic and present a written paper and seminar at the end of the semester.

### Reference books :

**Mukhi, H.R.** Technical Report Writing: Specially prepared for Technical and Competitive Examinations, New Delhi: Satya Prakashan, 2000.

**Barrass, Robert.** Writing At Work \b a guide to better writing in administration, business and management, London: Routledge, 2003.

**Seely, John.** The Oxford guide to effective writing and speaking, 2nd ed., Oxford ; New York : Oxford University Press, 2005.

**Jo Ray McCuen, Anthony Winkler.** Readings for writers, 9th ed., Fort Worth : Harcourt Brace College Publishers, 1998.

**Treece, Malra.** Effective reports, 2nd ed., Boston: Allyn and Bacon, 1985.

## AR17B8.1E ARCHITECTURAL ILLUMINATION (Elective IV)

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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### Objectives of the Course:

The course is intended to give an in depth understanding of the scientific and design aspects of lighting in Architecture

### Course Contents:

#### Unit – I

Light and vision, basic units, photometry and measurement, quality and quantity of light of different sources of light. Daylight, incandescent lamps, halogen lamps,

electric gas discharge lamps, fluorescent lamps, high discharge lamps. A market survey of lamps with cost and technical specifications.

### **Unit – II**

Design of lighting; lumen method, point by point method, design tools, design documentation, simple numerical.

### **Unit – III**

Specific lighting design requirement of different buildings such as homes, offices, industrial, hospital, art galleries, museums and exhibitions, case study of at least one type of the building by each student.

### **Unit – IV**

Outdoor lighting: road lighting, high-mast lighting, tunnel lighting, landscape lighting, decorative lighting, facade lighting, spot lighting.

### **Unit – V**

Lighting as determinant of form for architecture with graphic examples.

### **Unit – VI**

Daylighting, advantages of daylighting; design tools in daylighting. Case studies and various examples, behaviour of daylighting in an interior spaces. Potentials of daylighting as an energy resource.

### **Unit – VII**

Integration of daylighting with artificial lighting; lighting controls, intelligent building systems for lighting.

### **Unit – VIII**

Conservation of energy in lighting use of daylight, optical fiber lighting, LED in lighting and the emerging trends in lighting.

### **Reference books:**

**Moore, Fuller.** Concepts and practice of Architectural Day Lighting. Van Nostrand Reinhold co., New York, 1985.

**Valia, Anil.** Designing with light: A Lighting H.B. International Lightning Academy, Mumbai, 2002, Architectural Physics: Lighting.

**Hopkinson R.G,** Her Majestrip stationery office, London.

**David Egan. M,** concepts in Architectural lighting Mc Grew Hill Book company, New York, 1983

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**AR17B8.2E ARCHITECTURAL JOURNALISM (Elective IV)**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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**Course Overview:**

The Course prepares ground for the students to gain an understanding into the fundamental issues in architectural Photography and develop the skill to create Articles/presentation capturing the essence through the photographs.

**Course Contents:**

**Unit – I**

Analysis of historical and contemporary examples of writings on architecture, including selected writings by Indian and overseas critics;

Discursive techniques; analysis of major critical

themes, thematic categories in architectural writing from the past.

Works of Indian and international writers and critics to be presented and discussed. Seminars on Indian

architectural writers, journalists and critics

Awards for Architectural Journalism

**Unit - II**

Development of writing skills: Usage of language and Vocabulary and grammar-introduction to methodology of writing essays, news writing, precis writing, writing in architectural blogs; listening comprehension, analyze talks and information gathered and to edit gathered information to build an article.

Collecting clippings from articles, blogs and books.

**Unit -III**

**INTRODUCTION TO PHOTOGRAPHY**

Visual awareness – visual survey - General introduction to the art of photography; ; concept of color; concepts of lighting, distance, visual angle, frames; media;

**PHOTOGRAPHIC TECHNIQUES**

Types of camera, properties and priorities; Exposure, Aperture, Speed; EDFAT methods in using the camera

**Unit - IV**

Photo Journalism in perspective - Brief History - Photographs as social Documentaries - Birth of modern Photojournalism; Equipment required for Photo Journalism; Public relations News Papers and Magazine Design elements: Page Layouts - color scheme - Font - Blurb - Pictures - Ads etc- Other magazines Documenting of Places - Rural- Urban.

### **Unit – V**

People journalism and law-legal boundaries-libel and invasions of privacy – ethics-  
the photo journalist on scene

### **Unit - VI**

Production of contemporary architectural journalism; Building pictures - Instant,  
Report - Editing - Editorial thinking – the picture Editor - Editing practices, creating  
drama - Photo editing -Documentary-evolution of the word document-methods and  
techniques.

Assignments should include an article based on ability to originate, plan, research,  
present and produce a piece of architectural journalism, integrating photography.

#### **Reference books:**

**Kopelow, Gerry.** How to photograph buildings and interiors, 3rd ed. New York:  
Princeton Architectural Press, 2002.

**De Mare, Eric Samuel.** Architectural photography, London: Batsford, 1975.

**Busch, Akiko.** The photography of architecture: twelve views, New York: Van  
Nostrand Reinhold Co., 1987.

**Mehta, Ashvin.** Happenings: \b a journal of luminous moments, Vapi, Gujarat:  
Hindustan Inks, 2003.

**Mohd, Al Asad.** Architectural Criticism and Journalism

**Sommer, Robert.** Tom Wolfe on Modern Architecture

### **AR17B8.3E      STRUCTURES PROJECT (Elective– V)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: Viva    Cr:4*

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#### **Course Overview :**

To understand the structural design concept and detailing for buildings up to G +  
3 Floors

#### **Objectives of the Course :**

To provide knowledge and capability in structural concepts and design of framed  
RCC and steel structures

#### **Course Contents :**

Students have to design any structure, either in RCC or steel, which has been  
designed by them in the previous semesters. The project should be at least G + 3  
Floors. It may be either RCC framed structure or steel structure and should include  
all basic structural elements.

### **Reference Books:**

**S. Ramamrutham**, Design of RCC Structures, Delhi, Dhanpati Rai Publishing

**Dayaratnam**, Design of RCC Structures, Allahabad, Wheelers Publishers

**Ramachandra**, Design of Steel Structures Vols. 1 and 2, Standard Publications, New Delhi

**Vazirani and Raywani**, Design of Steel Structures, Khanna Publishers, New Delhi

### **AR17B8.4E      WORKSHOP –TALL BUILDINGS (Elective - V)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Course Overview:**

To impart knowledge about the design approach to multi-storeyed buildings and the special service requirements of tall buildings; and to create awareness about the systems, equipment and materials commonly employed in high rise buildings.

#### **Objectives of the Course:**

Understanding the special systems required in mechanical, electrical and Fire safety services.

The ability to design vertical transportation systems, HVAC systems and Fire protection systems in line with the various standards, building codes and safety requirements.

#### **Course Contents:**

##### **Unit I**

##### **Design and Structure**

Design approaches to Tall buildings; Studying some famous examples as case studies; structural concepts of tall structures.

##### **Vertical Transportation**

Introduction to passenger elevator codes – Express & Local Elevators, Sky lobbies etc., - Study of elevator equipments, control systems and spatial requirements – Escalators and Capsule elevators – Stairways & Ramps

##### **Fire Protection**

Designing for fire safety – NBC – Fire alarm systems – Smoke detectors – Firefighting support systems – Fire rating of materials - Fire escape stairs & Safety regulations – Lightning protection.

##### **Thermal Control Systems**

Calculation of Heating and Cooling loads – Selection of suitable HVAC system – Special equipments and systems for heating and cooling – Spatial requirements for HVAC plants – Design of duct layouts etc.,

## **Water Supply and Sewage Disposal**

Basic planning for water supply – Calculation of capacity for sumps and water tanks —Skip stage pumping etc., - Rainwater harvesting methods – Sanitation arrangements in high rise structures – Service floors – Ducts and vertical shafts – Waste treatment etc.,

## **Electrical Systems**

Planning transformer & generator rooms, Preparation of electrical layouts for tall buildings – Spatial requirements of electrical rooms and ducts – Intelligent systems for electrical and illumination.

## **Text Books**

Stein Reynolds Mc Guinness – Mechanical and Electrical equipment for buildings – vol 1 & 2 – John Wiley & sons

## **Reference Books**

Francisco AsensioCerver – The architecture of Skyscrapers – Hearst Book International - New York, 1997

Bennetts Ian & others – Tall building structural systems

Proceedings of the council for tall buildings – vol 1 & 2

## **AR17B8.5E FURNITURE AND PRODUCT DESIGN (Elective -VI)**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: Viva Cr:4*

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### **Course Overview:**

The course provides a framework in understanding the Theoretical, historical functional and human issues of the subject.

### **Objectives of the Course:**

To impart a comprehensive understanding of the general theory and practice of the subject.

To inculcate in student a natural curiosity in allied discipline of design

### **Course Contents:**

#### **Unit – I**

Understanding of the functional and formal issues in design – study and evaluation of popular dictums such as “Form follows function”, form and function are one”, “Less is more”, “God is in details” etc.

Evaluation of visual design for functional objects.

Gestalt theory of design: Law of closure, law of proximity, law of continuity etc.

### **Unit – II**

Evolution of furniture through ages till present day

### **Unit – III**

Human factors engineering and Ergonomic considerations; Principles of Universal Design and their application in furniture and product design.

### **Unit – IV**

An introduction of various manufacturing processes most frequently adopted in furniture and product design such as, Injection Moulding; investment casting, sheet metal work, die-casting, blow-moulding , vaccum – forming etc.

### **Unit – V**

Signage and Graphics – Environmental graphics: signage categories and materials.

### **Unit – VI**

A detailed study involving the design aspects of any on of the following: Lifestyle accessories, Luminaire design, a piece of furniture, Point of Purchase design, Signage.

#### **References:**

**HéctorRoqueta.** Product design, London: teNeues, 2002.

**Morley, John.** The history of furniture: twenty-five centuries of style and design in the Western tradition, Boston: Little, Brown and Company, 1999.

**Aronson, Joseph.** The Encyclopedia of Furniture, 6th printing, New York: Crown Pub. 1944.

**Saville, Laurel.** Design secrets: furniture, Gloucester, Mass. : Rockport Publishers, 2006.

**Datschefski, Edwin.** The total beauty of sustainable products, Hove: Rotovision, 2001.

**Papanek, Victor J.** The green imperative: natural design for the real world, New York: Thames and Hudson, 1995.

### **AR17B8.6E ARCHITECTURAL DOCUMENTATION (Elective -VI)**

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*L/s: 4/Wk Int: 100 End Exam: Nil Total: 100 End Exam: Nil Cr:4*

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#### **Course Overview:**

To train the students in conducting detailed building measurements including the application of surveying techniques.

#### **Objectives of the Course:**

To impart skills of planning a detailed measured drawing of an existing building/



cluster of buildings (historical /contemporary/rural) and also to understand the background of the building design, construction, design concept.

1. Measurement of a modern building using plane table/TS
2. Village or neighbor-hood study, preparing settlement plans, socio economic studies and conservation studies etc.
3. Documentation of any Historical/Heritage Building / Architectural landmark

Any one of the above to be taken up as group work during the Semester. The study should include a detailed understanding of the reasons for constructing the building, design concept, source of finance, building material and technology, socio-economic-cultural factors affecting the design and also the environmental factors impacting it. Wherever relevant and possible an interview with the architect of the building is to be undertaken.

The final submission to include a written report of at least 10000 explaining all aspects studied, Site plans, Building Floor Plans, Elevations and Sections.

### **AR17B8.7E BUILDING INFORMATION MODELING (Elective -VI)**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: Practical Cr:4*

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**Aim:** The course shall impart theoretical and practical knowledge on BIM for building and infrastructure design, for preconstruction (- Estimating, Building analysis and optimization), for construction management (clash detection, constructability, trade coordination and scheduling), for IPD Integrated project delivery, and facility management.

#### **Unit - I**

##### **Introduction**

- History; building design process with purely drafting & modelling software and its limitations and disadvantages
- Difference between a purely drafting & modelling software and BIM software.

#### **Unit - II**

##### **Basics of producing building design using BIM software.**

- Introduction to Parametric 3D modelling and exploration of its advantages (Shall include Architectural, Structural, Electrical, Mechanical and all specialist consultant's elements) using any of the popular BIM software, preferably Revit 2018, Autodesk – the most popular software.
- Project Elements Planning – Creation of Project Tree. Hierarchical Identity creation of the project elements and intelligent internationally recognisable naming system.
- Building design – Creation of Digital Model of a building and its geo-physical location; creation of elemental details.

- Creation of Elements' families.
- Import of elements of all related trades. Format of digital model (IFC; acceptable formats and its advantages)
- Preparation of Project Documentation and Rendering
- Preparation of Schedules and BOQ (quantity take-off).
- Solar Studies – Daylighting simulation

### **Unit - III**

#### **BIM Information Sharing**

- Concept of Central Model ownership of the digital model and interoperability.
- Location of the Central Model
- Access to model for the projects various stakeholders – The Client, Architect, Project Managers, Contractor, Structural Engineer, Electrical Engineer, Mechanical Engineer, all specialist consultants and Vendors in some cases.
- Other ways of exchange of information, in case of non-availability of common platform like the internet.

### **Unit - IV**

#### **BIM as Project Design and Management Tool**

- Introduction to 4D and 5D.
- Project Estimate and Scheduling; Linking of software like MS Project, Primavera, MS Excel to BIM. Exchange and Analysis of information
- Preconstruction study; project optimization
- BIM as tool to integrate Sustainability issues to building design and construction process; linking of various sustainability related applications, output and Analysis.
- Construction process and Constructibility

### **Unit - V**

#### **BIM Execution Plan**

- Formats being used in different parts of the world to prepare a BIM execution plan.
- Need to prepare a project specific BIM Execution plan.
- LOD (Level of Development) for project specific requirement – production of Design Drawings, production of Working Drawings, coordination of various trades plus Clash Detection, production Shop Drawings, as-built drawings and compilation of information for Facility Managements (COBIE etc.).

**References:**

**Revit 2018 Suite** \_ Complete Reference Series, Mc Graw Hill Publication

**Mastering Revit Architecture** - Demchak, Dzambazova&Krygiel

**BIM Handbook / Eastman**, Teicholz, Sacks, Liston / Wiley

**Optional:** BIM and Construction Management: Proven Tools, Methods, and Workflows / Hardin / Sybex — A BIM reference with a focus on construction management

BIM – WillernKymmell

**OPEN ELECTIVE - II**

Open Electives will be announced by the Department/s before start of the Semester. If a student wishes to take any online course as Open Elective due permissions must be taken as prescribed.

## SEMESTER - IX

### AR17B9.1C PRACTICAL TRAINING

*L/s: 30/Wk Int: 150 End Exam: 150 Total: 300 End Exam: Viva -Voce Cr:30*

#### Course Overview:

Internship with training in an architect's office for a period of not less than 20 weeks excluding the examination/viva-voce etc. .

#### Objectives of the Course:

To provide experience in Architectural Practice.

Expected Skills / Knowledge Transferred: The skills required for an architect to grow into a complete professional.

#### Course Contents:

Every student must work in an Architect's Office as a full-time trainee for a period of 20 calendar weeks (excluding Viva-voce) from the date of commencement of training. The Chief Architect in the firm should be registered with the Council of Architecture and have a minimum of five years of practical/professional experience after her/his graduation. The student should involve herself/himself in various aspects of work in an office like working drawings, presentation drawings, quantity and cost estimation, site supervision, municipal drawings, etc.

Note: Detailed instructions which may be given by the University regarding the training, the frequency of reporting to the department, etc. are to be followed strictly.

After completion of training, every student will have to submit a detailed report with a set of drawings on at least four projects on which she/he has worked during the practical training period.

#### Evaluation:

- The Internal Assessment shall be evaluated at the end/towards the end of the training period and shall be conducted by the faculty deputed by the department in the institute.
- The Internal Assessment shall be of 100 marks. Each college can decide on the mode of evaluation of the work, either by deputing a faculty member of the College to visit the architect's office or by assessing the work at the Institute, just preceding the External Assessment. The monthly reports, Log book maintained, and reports from the Architect will be considered for Valuation. Each College will follow a uniform policy for all students in the College.
- The detailed report and drawings prepared during practical Training by students will be evaluated at a viva-voce by a jury consisting of one External member, one Internal member (Practical Training Co-ordinator or his nominee and Head of the Department or his nominee).

The Department shall arrange for the conduct of the viva-voce examination after submission of the report the department will arrange.

Students who are interested in training abroad are permitted to do so. The Chief Architect should be licensed/registered with the local appropriate authority and should have been in practice for a minimum of five years. The faculty members may satisfy themselves about the architect's by checking the website but the primary onus of the selection depends on the student. The student and Parent/Guardian must sign an undertaking to be wholly responsible for the expenses, safety and accommodation of the student beforehand.

#### **Additional Information to Colleges and students for Practical training:**

- A counseling session should be arranged for the students before they start applying to architects offices for internship positions. Apart from faculty members, practicing architects should also be invited to orient the students and guide the students on formats and etiquette of applications, remuneration, work and discipline expectations etc.
- Before giving final permission training abroad the college should conduct a background check of the architect (by seeing the website, listed projects etc.)
- To ensure that students are aware of the options available to them, the College should put up a list of all firms who are willing /interested in taking trainees.
- An Open Day may be organized at The College with a display of students' works and invite architects to view the works and select students for training.
- The College should compulsorily check the portfolios/profiles of the students before submission to the architects' offices.
- The work done at the office may also include a small component of research related to an on-going project. The student may take up a study to give specific inputs, or relate to a new material or product etc. However such work should not engage the student for more than 2 (two) weeks.
- The student should submit a 1000 word report on the projects that they have worked on which should include salient features such as design methodology, special construction features etc.
- The letter from the College to the architect at the time of the student joining should contain the starting and ending dates of training. The HoD/ Practical Training Co-ordinator should inform the architect directly by email or letter the dates when the student is expected to report at the college.
- The students may be permitted to change the office of training after only once, with prior permission from the College and strictly only where there are compelling reasons. Such cases may be dealt with on a case by case basis based on the merits of the situation.

## SEMESTER - X

### AR17B10.1C DESIGN THESIS

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*L/s: 23/Wk Int: 300 End Exam: 300 Total: 600 End Exam: Viva-voce Cr: 23*

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#### **Course Overview:**

Thesis should reflect the knowledge gained from all the courses undertaken by the student in all the previous semesters.

#### **Objectives of the Course:**

To develop assimilation, synthesis and application of research in Architecture

#### **Expected Skills / Knowledge Transferred:**

Student should be in a position to comprehend the design philosophy, theories, data analysis and application in a chosen area of study.

#### **Course Contents:**

Each student is expected to prepare a design thesis based on the preliminary work undertaken in the Pre Thesis Seminar, under an approved guide/adviser by the department.

The design Thesis shall comprise of Architectural Design proposals, Thesis should reflect the knowledge gained from the course learnt in the previous semesters. The particulars of schedule, content, presentation, format etc., is to be decided by the department, from time to time and shall be strictly followed.

At the end of the semester, each student is expected to submit all original drawings prepared as per the department's specifications. Three copies of the report in the specified format along with a model submitted to the department, after obtaining the approval of the respective guides / advisers.

The department shall schedule the final viva-voce, at its convenience, only after the receipt of the thesis submission by a student. The performance sheet submitted by the advisor and the thesis committee should be the basis for allowing the student to appear for the final viva-voce.

For End exam, viva-voce is to be conducted by a jury comprising of an external examiner, one internal examiner and head of the department or his nominee.

#### **Reference books:**

**Mukhi, H.R.** Technical Report Writing: Specially prepared for Technical and Competitive Examinations, New Delhi: Satya Prakashan, 2000.

**Barrass, Robert.** Writing At Work \b a guide to better writing in administration, business and management, London: Routledge, 2003.

**Seely, John.** The Oxford guide to effective writing and speaking, 2nd ed., Oxford ; New York : Oxford University Press, 2005.

**Jo Ray McCuen, Anthony Winkler.** Readings for writers, 9th ed., Fort Worth : Harcourt Brace College Publishers, 1998.

**Treece, Malra.** Effective reports, 2nd ed., Boston: Allyn and Bacon, 1985.

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## **AR17B10.2C PROFESSIONAL PRACTICE& BUILDING CODES**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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### **Course Overview:**

The course provides overview and specific conditions of COA regulations, Architects Act 1972 in Architectural practice.

### **Objectives of the Course:**

To impart awareness and technicalities of code of conduct, and the significance of Architects Act 1972 in Professional Practice.

Expected Skills / Knowledge Transferred: Legal, Technical and Financial aspects of Architectural practices and management skills for professional practice.

To develop understanding of the duties and liabilities of an architect along with knowledge of bye-laws that relate to the building and the environment in the Indian context.

### **Course Contents:**

#### **Unit - I**

Professional Role of an Architect: Role and responsibility of architect in society; architectural profession as compared to others professions; difference between profession and business;.

Architects approach to works; ways of getting works; types of works, works partly executed by other architect; various precautions to be taken before taking up the work; conditions of engagement between the architect and client; commencement of work.

Architect's Act 1972, registration of architect, COA, IIA and other organizations related to architectural profession. Professional Practice Regulations 1989 and Minimum Architectural Education Regulations under the Architect's Act. IIA Code professional conduct;

#### **Unit - II**

Architectural Services Rendered: Architect's duties; drawings to be prepared; Architects relation with other parties connected with works such as client, contractor, sub-contractors, consultants, municipal and public authorities.

Architectural services - conditions of agreement - scope of work, comprehensive architectural services and architectural competitions, remuneration, professional fees and charges as per IIA norms.

### **Architectural Competitions & Legislations**

Regulations governing the conduct of competitions, open & closed competitions, appointment & duties of Assessors, instructions to participants, award of premium.

Units and mode of measurements - clerk of work and his duties; Inspection of

work during construction; certification of contractor's bills; bill of quantities; defects liability; Schedule of rates, tenders; public, limited and negotiated tender documents and allied formalities.

### **Unit – III**

Tender and Contract: Calling for Tenders, tender documents, open & closed tenders, labour & demolition tenders, conditions of tender, submission, scrutiny, recommendations & award of contract.

Contracts; types of contracts such as item rate, lumpsum, cost plus percentage etc.

General principles of Indian Contract Act; Building contracts, conditions and forms of contract, study of standard contract of the Indian Institute of Architects. Articles of Agreement. Administration of contract.

Arbitration: Principle of Arbitration, Indian Arbitration act 1940, Powers and duties of arbitrators, revoking authority; umpire, award cost fixed fee, cost with penalty, labour day work, piece work daily

Easements: definition; various types of easements; Dominant, and servient owners; essential conditions for enjoyment of easement; Fire insurance's definition, cover note; insurance for new work and additions; insurable value of property, claim for damage due to fire. Insurance of completed and occupied building

### **Unit - IV**

Preliminary knowledge of transfer of property Act; registration, stamp duty under registration and Govt. Power. Income tax, wealth, land acquisition Acts; general information about land acquisition procedures.

Accidents during progress of work and after completion, damage to persons and properties affected; Workmen's Compensation Act with regards to the affected persons and properties.

Consumer Protection Act and related acts on architects

### **Unit - V**

Types of Architectural firms: Architects' Offices Proprietorship firms & Partnership firms combined concerns; Comparison between partnership and Proprietorship firms. Staff structure; filing of records; correspondence and drawings; maintenance of accounts; presentations in meetings, recording minutes of meeting.

A small report to be prepared by each student after visiting an architect's office.

Role of consultants and Co-ordination between different consultants on a big project.

### **Unit VI**

Valuation – purpose of valuation, types of valuation- terms: market value, book value, capital cost, capitalized cost, – salvage/scrap value- various methods of estimating the depreciation of building properties,-



sinking fund- land valuation- mortgage and lease- Annuity- definition; problems to calculate the value of the property by different methods.

Fixation of rent- out going- gross and net income – year's purchase- capital cost-standard rent- market rent –economical Rent.

## **Unit VII**

Building Codes (National Building Code, and Local Codes): Study of building byelaws to enable to design and prepare drawings for submission to concerned bodies and an understanding of the administrative processes for obtaining building permission.

General Land-use, building classifications and permissible uses; Norms for exterior and interior open spaces, Setbacks and margins, norms for building projections in open spaces, considerations in FAR, guidelines for open green areas.

Requirements for various parts of buildings, building height regulations, multi-storey regulations Requirements of parking spaces and vehicular movements, Nature of building codes in special regions like heritage zones, air funnels, environmentally sensitive zones, disaster prone regions, coastal zones, hilly areas, etc.

Norms for Fire Protection for various building classifications, norms for fire-exit ways and building materials, concept of fire zoning, doorways, stairways, passages and corridors, fire escapes etc.

### **Reference books:**

**Banerjee, D.N.** Principles and Practice of Valuation, 5th ed. Eastern Law House, Calcutta, 1998.

**Dalton, J. Patrick.** Land Law, 4th ed. Pitman Pub., London, 1996.

**Indian Institute of Architects.** H.B. Professional Practice. The Architects Pub. Bombay.

**Indian Standards Institution.** National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

**Namavati, H. Roshan.** Professional Practice, 8th ed. Lakshani Book Depot, Bombay, 2001.

**Namavati, H. Roshan.** Theory and Practice of Valuation, 2nd ed. Lakshani Book Depot, Bombay, 1991.

M. DEDBHAKTH Architectural practice in India by Prof.M.DEDBHAKTA

V. SAPTE : Architectural Practice Procedures

Hyderabad Municipal Bye laws.

Indian Standards Institution. National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

**Scott, G. James.** Architectural Building Codes, New York: Vanstrand Reinhold.

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## **AR17B10.1E DISASTER RESISTANT ARCHITECTURE (ELECTIVE – VII)**

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:3*

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### **Course Overview:**

This course introduces and explains disaster resistant methods of construction

### **Objectives of the Course:**

To develop understanding about the nature of disasters and their effects on built environment.

To develop understanding about the ways of building that would resist disasters.

### **Course Contents:**

#### **Unit - I**

##### **Building safety from Natural Hazards:**

Earthquake, Fire safety in buildings, Cyclone effects: High winds, storm surge and safety aspects in buildings, related to Cyclones, Floods, Landslides.

##### **Elementary Seismology:**

Occurrence of earthquake in the world, plate tectonics, faults, earthquake hazard maps of India and the states.

Causes of earthquake, seismic waves; magnitude, intensity, epicenter and energy release, characteristics of strong earthquake ground motions. Seismological Instruments: Seismograph, Accelerograph, Seismoscope / Multi SAR.

#### **Unit - II**

##### **Introduction to Theory of Vibrations:**

Single degree undamped and damped systems, resonance, response to earthquakes, elastic response, concepts of response spectrum. Flexibility of long and short period structures.

#### **Unit - III**

##### **Site Planning, Building Forms and Architectural Design Concepts for Earthquake Resistance:**

Historical experiences, Site Selection, Site Development.

Building forms: - Horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration. Plan and vertical irregularities, redundancy and setbacks, Special Aspects:- Torsion, appendages, staircases, adjacency, pounding; Contemporary international approaches.

#### **Unit – IV**

##### **Performances of Ground and Buildings in Past Earthquakes:**

Earthquake Effects:- On ground, soil rupture, liquefaction, landslides; Behavior of various types of buildings, structures, power plants, switch yards, equipments,

lifelines and collapse patterns; Behavior of Non Structural Elements like services, fixtures, mountings. Social and Economic Consequences of earthquakes, Lab simulations of models.

### **Seismic Design Principles:**

Concept of seismic design, stiffness, strength, period, ductility, damping, hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities; Ductility based design: Design of energy absorbing devices, Seismic base isolation and seismic active control.

### **Unit – V**

#### **Structural Detailing:**

Innovations and Selection of appropriate materials; IS Code provisions for the buildings: -IS:1893-2002, IS:4326-1993; Horizontal and Vertical seismic coefficients, valuation of base shear, distribution of shear forces in multi-storey building; Seismic Detailing Provisions: Masonry and Wooden Buildings (IS: 4326, IS: 13828), Adobe houses (IS: 13827); Seismic Designs and Detailing of RC and Steel Buildings: IS: 1893 – 2002; IS: 13920 – 1993; IS: 456 – 2000; IS: 800 – 2004; Special reinforcing and connection details in structural drawings.

### **Unit – VI**

#### **Earthquake Resistance Construction Details:**

Various Types and Construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, underground and overhead tanks, staircases and isolation of structures; Local practices: traditional regional responses.

### **Unit – VII**

#### **Construction Quality Control:**

Sequences of Construction: Good supervision practices, Critical check points and certification at certain stages, reporting, maintenance of records, testing.

#### **Vulnerability Assessments and Seismic Strengthening of Buildings:**

Seismic vulnerability evaluation of existing buildings; Weakness in existing buildings, aging, weathering development of cracks; Concepts in repair, restoration and seismic strengthening, materials and equipments for restoration of masonry and concrete structures. Methodologies for seismic retrofitting.

#### **Reference books:**

**Abbott, L. Patidc.** Natural disasters.

**Arhold, Christopher and others.** Building configuration and Seismic Design.

Disasters and Development

National Geographic. Restless Earth: Disaster of nature.

**Singh, P.P. and Sharma, Sandhir.** Modern dictionary of natural disasters.

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**AR17B10.2E INTELLIGENT BUILDINGS (ELECTIVE – VII)**

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:3*

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**Course Overview:** To provide an elementary understanding of Intelligent Buildings and the applications therein

**Expected Outcome:** To make the student familiar with the various applications of IT in building services and their advantages and risks

The inputs shall be provided in the form of lectures, field visits and seminars by various service providers. Reports and documentations to be prepared for various aspects of IT applications in buildings.

**Unit I**

Definitions of Intelligent Building and different areas of emphasis in various countries; Organisations associated with intelligent buildings; Advantages of Intelligent Buildings; Relation between intelligent buildings and energy efficiency and sustainability

**Unit II**

Intelligent buildings as: the achievement of productive and cost-effective environment through optimization of four basic elements: structure, systems, services and management, and the interrelationship between them. As an environment which maximizes the effectiveness of the building's occupants while enabling efficient management of resources with minimum life-time costs of hardware and facilities,

**Unit III**

Relation between traditional Building Automation Systems (BAS) and BloT (Building Internet of Things) BloT technologies and applications

Major recent shifts in building designs, operations and use. Challenges of space optimization, energy efficiency and connectivity vs. increasing occupant expectations of modern and flexible space design, improved comfort, productivity, and pervasive connectivity.

**Unit IV**

Integrated communications infrastructure that supports wired and wireless networks and applications. Person-to-person, person-to-machine and machine-to-machine communications within the building and with the outside world using a state of the art intelligent, flexible, wired and wireless platform. Use of wired LAN, Wi-Fi, in-building wireless, audio/visual, sensors, lighting, cloud connections and building management applications.

**Unit V**

Applications and Integration of information technology (IT) into design and construction in HVAC, lighting and metering, Hot water system, Alarms and security

## **Unit VI**

Risks in generational skills gaps, increasing capital expenses, project delays and rising operational and maintenance costs.

New Operational procedures: system interoperability, remote monitoring, centralized command & control, building system analytics, unified user interfaces and other big data tools for making data driven decisions and operational efficiency. Reliability and security of these and failure due to skills gaps, mismanagement or malicious intent. Cyber security implications for Building Automation Systems.

**Jawaharlal Nehru Architecture & Fine Arts University  
School of Planning and Architecture, Hyderabad**

**Academic Regulations**

(As Approved by Board of Studies in Architecture on 02-09-2010)

**Bachelor of Architecture – Five Years Degree  
Course**

**1. Award of the B. Architecture Degree:**

**A student will be declared eligible for the award of the B. Architecture Degree if he fulfills the following academic regulations:**

He has to pursue the course of study for not less than five academic years and not more than ten academic years.

- ii. He has to register for and study all the subjects and fulfill academic requirements of all subjects.

**Note:** Students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seat in the course and their seat shall stand cancelled.

**Courses of study:** The Following majors by means of elective subjects are offered.

Architecture  
Building Construction Management  
Landscape Architecture  
Interior Design

**3. Distribution and weight age of the marks:**

- i. The performance of the student in each semester/ shall be evaluated subject-wise with a maximum of 400 marks in Design Studio and 100 marks in other subjects. The Design thesis in the eight semester shall be evaluated for 600 marks. Practical Training in final Year (Ninth & tenth semesters) shall be evaluated for 400 marks.

- ii. The distribution of marks in general for the subjects shall be: For all Theory/Practicals/Studio subjects: 50 % for Internal Evaluation and 50 % for End Evaluation, unless specified otherwise.
- iii. Out of a total of 600 marks for the Design thesis, 300 marks shall be for Internal Evaluation and 300 marks for the End Evaluation which shall be by an external jury and viva-voce, The End Evaluation shall be conducted by a board of examiners consisting of the guide, Head of the Department (or his/her nominee) and an external examiner.

#### **4. Attendance:**

- i. A student has to put in a minimum of 75% of the attendance in aggregate of all the subjects for becoming eligible to register for the end examinations and for acquiring credits in the each semester.
- ii. Condonation of shortage of attendance in aggregate of attendance up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- iii. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester.

#### **Note:**

- a) Shortage of Attendance below 65% in aggregate shall in no case be condoned.
- b) Students whose shortage of attendance is not condoned in any semester are not eligible to take their End Examination of that class and their registration shall stand cancelled. They shall seek re- admission for that semester when offered next.
- c) Condonation of shortage of attendance as stipulated in 4(ii) above shall be granted on genuine and valid grounds with supporting evidence.
- d) A stipulated fee shall be payable towards condonation of shortage of attendance.

## 5. **Minimum Academic Requirements:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No.4.

- a. A student shall be deemed to have satisfied the minimum academic requirements in each subject if he secures not less than 45% of marks in the End Evaluation and a minimum of 50 % of marks in the sum total of the internal evaluation and End Evaluation taken together.
- b. A student shall be promoted from 3rd to 4th year only if he fulfills the Academic requirements of all the subjects of 1<sup>st</sup> year.

A student shall be promoted from 4th year to 5th year only if he fulfills the academic requirements of all the subjects of the 2nd year, however, as there is no course work in IX semester, the student shall be permitted to proceed with the work of the final year, but the results of which shall be with held & declared only after he has

- c. Satisfied the academic requirements, of all the subjects of the 2nd year.
- d. Re-registration:  
A student shall pass in all the subjects specified in the course structure. A student who fails to fulfill the minimum academic requirements in any subject and secures less than 50% of marks in the internal evaluation, may be permitted the option of re-registering in that subject, which will enable him to redo/improve and resubmit the work for internal evaluation. In such cases of re-registration, the student's previous performance both in the internal evaluation and end evaluation for the particular subject/s shall stand cancelled and he shall be required to appear for his end evaluation again.

However, such re-registration shall be subject to a limit of only two theory subjects or one theory subject and one studio /Seminar/ Practical subject at any given time. Re-registration of any course should be done within 15 days from the date of commencement of class work.

## 6. Withholding of the results:



The results of a student are withheld if:

- i. He has not cleared any dues to the Institution / Hostel.
- ii. A case of disciplinary action against him is pending disposal.

7. Course pattern:

1. The entire course of study is of five academic years.  
All the years shall be on semester pattern.

A student eligible to appear for the end examination in a subject, but absent or has failed in End

2. Examination may appear for that subject at the supplementary examination

8. **Award of Class:**

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of the B. Arch. Degree he shall be placed in one of the following three classes:

|                              |                                 |
|------------------------------|---------------------------------|
| First Class with Distinction | 70% and above                   |
| First Class                  | Below 70% but not less than 60% |
| Second Class                 | Below 60% but not less than 50% |

(The marks in the internal evaluation and examination shall be shown separately in the marks memorandum)

9. **Minimum Instruction Days:**

The minimum instruction for each semester shall be **90** days excluding the examination days.

10. **General:**

- I. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- II. The academic regulations should be read as a whole for the purpose of any interpretation.

- III. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- IV. The University may change or amend the academic regulations or syllabi at any time and the change or amendments made shall be applicable to all the students with effect from the dates notified by the University.

**JNAFAU School of Planning and Architecture  
Department of Architecture**

Effective for the students admitted to 1<sup>st</sup> year from Academic year 2010-2011 onwards.

**FIRST SEMESTER**

| S. No.       | Course No. | Course Title                         | *              |           | Credits   | Marks      |            |             |
|--------------|------------|--------------------------------------|----------------|-----------|-----------|------------|------------|-------------|
|              |            |                                      | S/L/Th/P (Hrs) |           |           | I          | E          | T           |
| 1            | AR 1.1     | Basic Design                         | S              | 9         | 9         | 200        | 200        | 400         |
| 2            | AR 1.2     | Architectural Drawing and Graphics-I | S              | 4         | 4         | 50         | 50         | 100         |
| 3            | AR 1.3     | Building Construction- I             | S              | 4         | 4         | 50         | 50         | 100         |
| 4            | AR 1.4     | Building Materials - I               | Th             | 2         | 2         | 50         | 50         | 100         |
| 5            | AR 1.5     | Structural Mechanics - I             | Th             | 3         | 3         | 50         | 50         | 100         |
| 6            | AR 1.6     | Introduction to Art and Architecture | Th             | 2         | 2         | 50         | 50         | 100         |
| 7            | AR 1.7     | Computer Applications-I              | L              | 2         | 2         | 50         | 0          | 50          |
| 8            | AR 1.8     | Workshop- I                          | L              | 4         | 4         | 50         | 0          | 50          |
| <b>Total</b> |            |                                      |                | <b>30</b> | <b>30</b> | <b>550</b> | <b>450</b> | <b>1000</b> |

## SECOND SEMESTER

| S. No. | Course No. | Course Title                            | *              |           | Credits   | Marks      |            |             |
|--------|------------|---|----------------|-----------|-----------|------------|------------|-------------|
|        |            |   | S/L/Th/P (Hrs) |           |           | I          | E          | T           |
| 1      | AR 2.1     | Architectural Design -I                 | S              | 9         | 9         | 200        | 200        | 400         |
| 2      | AR 2.2     | Architectural Drawing and Graphics - II | S              | 4         | 4         | 50         | 50         | 100         |
| 3      | AR 2.3     | Building Construction - II              | S              | 4         | 4         | 50         | 50         | 100         |
| 4      | AR 2.4     | Building Materials - II                 | Th             | 3         | 3         | 50         | 50         | 100         |
| 5      | AR 2.5     | Structural Mechanics - II               | Th             | 3         | 3         | 50         | 50         | 100         |
| 6      | AR 2.6     | History of Architecture - I             | Th             | 3         | 3         | 50         | 50         | 100         |
| 7      | AR 2.7     | Surveying and Leveling                  | Th /L          | 4         | 4         | 50         | 50         | 100         |
| Total  |            |   |                | <b>30</b> | <b>30</b> | <b>500</b> | <b>500</b> | <b>1000</b> |

## THIRD SEMESTER

| S. No. | Course No. | Course Title                             | *              |           | Credits   | Marks      |            |             |
|--------|------------|--|----------------|-----------|-----------|------------|------------|-------------|
|        |            |  | S/L/Th/P (Hrs) |           |           | I          | E          | T           |
| 1      | AR 3.1     | Architectural Design - II                | S              | 9         | 9         | 200        | 200        | 400         |
| 2      | AR 3.2     | Architectural Drawing and Graphics - III | S              | 4         | 4         | 50         | 50         | 100         |
| 3      | AR 3.3     | Building Construction - III              | S              | 4         | 4         | 50         | 50         | 100         |
| 4      | AR 3.4     | Structural Mechanics - III               | Th             | 3         | 3         | 50         | 50         | 100         |
| 5      | AR 3.5     | History of Architecture - II             | Th             | 3         | 3         | 50         | 50         | 100         |
| 6      | AR 3.6     | Building Services-I                      | Th             | 4         | 4         | 50         | 50         | 100         |
| 7      | AR 3.7     | Climatology                              | Th             | 3         | 3         | 50         | 50         | 100         |
| Total  |            |  |                | <b>30</b> | <b>30</b> | <b>500</b> | <b>500</b> | <b>1000</b> |

### FOURTH SEMESTER

| S. No. | Course No. | Course Title                         | *              |           | Credits   | Marks      |            |             |
|--------|------------|--------------------------------------|----------------|-----------|-----------|------------|------------|-------------|
|        |            |                                      | S/L/Th/P (Hrs) |           |           | I          | E          | T           |
| 1      | AR 4.1     | Architectural Design -III            | S              | 9         | 9         | 200        | 200        | 400         |
| 2      | AR 4.2     | Building Construction-IV             | S              | 4         | 4         | 50         | 50         | 100         |
| 3      | AR 4.3     | Design of Structures - I             | Th             | 3         | 3         | 50         | 50         | 100         |
| 4      | AR 4.4     | History and Theory of Architecture-I | Th             | 3         | 3         | 50         | 50         | 100         |
| 5      | AR 4.5     | Building Services-II                 | Th             | 3         | 3         | 50         | 50         | 100         |
| 6      | AR 4.6     | Landscape Design and Site Planning   | Th / S         | 4         | 4         | 50         | 50         | 100         |
| 7      | AR 4.7     | Computer Applications-II             | L              | 4         | 4         | 50         | 50         | 100         |
| Total  |            |                                      |                | <b>30</b> | <b>30</b> | <b>500</b> | <b>500</b> | <b>1000</b> |

### FIFTH SEMESTER

| S. No. | Course No. | Course Title                                   | *              |           | Credits   | Marks      |            |             |
|--------|------------|--|----------------|-----------|-----------|------------|------------|-------------|
|        |            |  | S/L/Th/P (Hrs) |           |           | I          | E          | T           |
| 1      | AR 5.1     | Architectural Design - IV                      | S              | 9         | 9         | 200        | 200        | 400         |
| 2      | AR 5.2     | Building Construction - V                      | S              | 4         | 4         | 50         | 50         | 100         |
| 3      | AR 5.3     | Design of Structures – II                      | Th             | 3         | 3         | 50         | 50         | 100         |
| 4      | AR 5.4     | History and Theory of Architecture-II          | Th             | 3         | 3         | 50         | 50         | 100         |
| 5      | AR 5.5     | Building Estimating Costing and Specifications | Th             | 4         | 4         | 50         | 50         | 100         |
| 6      | AR 5.6     | Environmental Studies                          | Th             | 3         | 3         | 50         | 50         | 100         |
| 7      | AR 5.7     | Computer Applications-III                      | L              | 4         | 4         | 50         | 50         | 100         |
| Total  |            |  |                | <b>30</b> | <b>30</b> | <b>500</b> | <b>500</b> | <b>1000</b> |

**SIXTH SEMESTER**

| <b>S. No.</b> | <b>Course No.</b> | <b>Course Title</b>                 | <b>*</b>              |           | <b>Credits</b> | <b>Marks</b> |            |             |
|---------------|-------------------|-------------------------------------|-----------------------|-----------|----------------|--------------|------------|-------------|
|               |                   |                                     | <b>S/L/Th/P (Hrs)</b> |           |                | <b>I</b>     | <b>E</b>   | <b>T</b>    |
| 1             | AR 6.1            | Architectural Design - V            | S                     | 9         | 9              | 200          | 200        | 400         |
| 2             | AR 6.2            | Working Drawings and Details        | S                     | 6         | 6              | 50           | 50         | 100         |
| 3             | AR 6.3            | Architectural acoustics             | Th                    | 3         | 3              | 50           | 50         | 100         |
| 4             | AR 6.4            | Building Codes and Bye Laws         | Th                    | 3         | 3              | 50           | 50         | 100         |
| 5             | AR 6.5            | Building Economics and Sociology    | Th                    | 3         | 3              | 50           | 50         | 100         |
| 6             | AR 6.6            | Human Settlements and Town Planning | Th                    | 4         | 4              | 50           | 50         | 100         |
| 7             | AR 6.7            | Barrier Free Built Environment      | Th                    | 2         | 2              | 50           | 50         | 100         |
| <b>Total</b>  |                   |                                     |                       | <b>30</b> | <b>30</b>      | <b>500</b>   | <b>500</b> | <b>1000</b> |

**SEVENTH SEMESTER**

| S<br>·<br>N<br>o<br>. | Course<br>No. | Course Title   | *<br>S/L/Th<br>/P (Hrs) |           | Cred<br>it<br>s | Marks      |            |             |   |
|-----------------------|---------------|--|-------------------------|-----------|-----------------|------------|------------|-------------|---|
|                       |               |  |                         |           |                 | I          | E          | T           |   |
| 1                     | AR 7.1        | <b>Advance Design Studio</b><br>Advance Architectural<br>Design (Design Studio)<br>Building Construction<br>Management (Design<br>Studio)<br><b>Landscape<br/>Architecture (Design<br/>Studio)</b><br><b>Interior Design (Design<br/>Studio)</b> | S                       | 12        | 12              | 200        | 200        | 400         |   |
|                       | AR 7.1.1      |  |                         |           |                 |            |            |             |   |
|                       | AR 7.1.2      |  |                         |           |                 |            |            |             |   |
|                       | AR 7.1.3      |  |                         |           |                 |            |            |             |   |
|                       | AR 7.1.4      |  |                         |           |                 |            |            |             |   |
| 2                     | AR 7.2        | Advanced<br>Construction and<br>Materials  | S                       | 6         | 6               | 50         | 50         | 100         |   |
| 3                     | AR 7.3        | Advanced Structural<br>Systems   | Th                      | 2         | 2               | 50         | 50         | 100         |   |
| 4                     | AR 7.4        | Green Buildings and<br>Infrastructure  | Th                      | 2         | 2               | 50         | 50         | 100         |   |
| 5                     | AR 7.5        | Advanced Services  | Th                      | 2         | 2               | 50         | 50         | 100         |   |
| 6                     | AR 7.6        | Pre Thesis Seminar   | Th                      | 2         | 2               | 100        | 0          | 100         |   |
| 7                     | AR 7.7        | <b>ELECTIVE - I</b><br>Urban Design<br>(Elective – I)  | Th                      | 4         | 4               | 50         | 50         | 100         |   |
|                       | AR 7.7.1      |  |                         |           |                 |            |            |             |   |
|                       | AR.7.7.2      |  |                         |           |                 |            |            |             | Housing [Elective – I]                                    |
|                       | AR 7.7.3      |  |                         |           |                 |            |            |             | Building Construction<br>and Management<br>[Elective – I] |
|                       | AR 7.7.4      |  |                         |           |                 |            |            |             | Interior Design<br>[Elective – I]                         |
|                       | AR 7.7.5      |  |                         |           |                 |            |            |             | Landscape Architecture<br>[Elective – I]                  |
| Total                 |               |  |                         | <b>30</b> | <b>30</b>       | <b>550</b> | <b>450</b> | <b>1000</b> |   |

**EIGHTH SEMESTER**

| S. No | Course No.   | Course Title  | * S/L/Th/P (Hrs) |    | Credits   | Marks      |            |            |
|-------|--|---|------------------|----|-----------|------------|------------|------------|
|       |  |   |                  |    |           | I          | E          | T          |
| 1     | AR 8.1   | Design Thesis   | P                | 22 | 22        | 300        | 300        | 600        |
| 2     | AR 8.2   | Professional Practice   | Th               | 4  | 4         | 50         | 50         | 100        |
| 3     | AR 8.3<br>AR 8.3.1<br>AR 8.3.2<br>AR 8.3.3<br>AR 8.3.4 | <b>ELECTIVE - II</b><br>Architectural Illumination (Elective – II)<br>Architectural Journalism (Elective – II)<br>Furniture and Product Design (Elective – II)<br>Disaster Resistant Architecture (Elective – II) | Th               | 4  | 4         | 50         | 50         | 100        |
| Total |  |   |                  |    | <b>30</b> | <b>30</b>  | <b>400</b> | <b>400</b> |
|       |  |   |                  |    |           | <b>800</b> | <b>800</b> | <b>800</b> |

**FINAL YEAR (NINTH & TENTH SEMESTER)**

| S. No.      | Course No. | Course Title       | * S/L/Th/P (Hrs) |  | Credits    | Marks       |             |             |
|-------------|------------|--------------------|------------------|--|------------|-------------|-------------|-------------|
|             |            |                    |                  |  |            | I           | E           | T           |
| 1           | AR 9.1     | Practical Training |                  |  | 60         | 200         | 200         | 400         |
| Total       |            |                    |                  |  |            | <b>200</b>  | <b>200</b>  | <b>400</b>  |
| Grand Total |            |                    |                  |  | <b>300</b> | <b>4200</b> | <b>4000</b> | <b>8200</b> |

Note: Students needs to choose the specific subjects for majors according to the table given below

| Major                            | Design Studio A.R 7.1 | Elective – I AR. 7.7   |
|----------------------------------|-----------------------|--|
| Architecture                     | AR 7.1.1              | Any one subject from AR 7.7.1, AR 7.7.2, AR 7.7.3, AR 7.7.4, AR 7.7.5. |
| Building Construction Management | AR 7.1.2              | AR 7.7.3   |
| Landscape Architecture           | AR 7.1.3              | AR 7.7.4   |
| Interior Design                  | AR 7.1.4              | AR 7.7.5   |

**\* S - Studio Class, L- Lab, Th – Theory, P – Project, I – Internal, E – External, T - Total**

Note: Students opting for major in Building Construction Management, Landscape Architecture and Interior Design are required to choose courses offered in Design studio and Elective – I, as per their major. For subjects Design Thesis and Practical Training students may choose topics / options related to their majors. The School / College reserves the prerogative of offering any one or more of the majors.



## FIRST SEMESTER

### AR 1.1 BASIC DESIGN

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: 5hrs    Cr: 9*

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#### **Course Overview:**

Basic Design provides the framework for understanding design as a new language by sensitizing students to the conceptual, visual and perceptual issues involved in the design process.

#### **Objectives of the Course:**

To impart an understanding of principles of composition, and to appreciate design and design elements. Exercises complement the lectures and ensure that the students learn to develop a series of compositions in two and three dimensions.

#### **Expected Skills / Knowledge Transferred:**

The Course prepares ground for the students to gain an understanding into the fundamental issues in design and develop the skill to create solutions for simple elements of building.

#### **Course Contents:**

##### **Unit – I**

Introduction to design –importance of design; Study and appreciation of design examples from natural and man-made environments

##### **Unit – II**

Elements of design: point, line, shape, form, space, texture, value, colour and material; Introduction to the principles of composition: unity, balance, symmetry, proportion, scale, hierarchy, rhythm, contrast, harmony, focus, etc; Application of the principles of composition in two dimensional compositions; Transformations in two dimensions: shapes and patterns; use of grids in creating repetitive patterns; Principles of composition-using grids, symmetrical /asymmetrical, rule of thirds, center of interest etc. Explorative exercises in two dimensional compositions.

##### **Unit - III**

Developing compositions in two dimensional designs like- logos, cover page, collage, mural, floor patterns, grills, railings, gates etc.

##### **Unit - IV**

Concepts of geometry –different three dimensional forms, primitive forms and

understanding the behavior when combined- Transformations to three dimensional forms; Explorative exercises in three dimensional compositions.

### **Unit - V**

Developing compositions in three dimensional designs like- Entrances, gateways, portal, compound walls built-in furniture etc.

### **Unit - VI**

Colour theory, color wheel, primary, secondary, tertiary colors, color schemes, color value and intensity. Theoretical inputs to be followed by exercises to develop the ability to translate abstract principles into two and three dimensional compositions.

### **Unit - VII**

Study of ornament in architectural design; Different types of ornamentation in buildings; Study and evaluation of artifacts and historic examples and their applicability

Exercises in related to documentation of artifacts at historical sites and to understand them with respect to the surround environment; to transform the designs to present context or usage.

### **Reference books:**

**Wucius, Wong.** Principles of two Dimensional Design. Van Nostrand Reinhold 1972.

**Maier Manfred** Basic Principles of Design, Vol.1, 2, 3 & 4, Van Nostrand Reinhold, NY. (1977)

**Ching, Francis D.K.** Architecture: Form, Space, and Order, 2<sup>nd</sup> ed. Van Nostrand Reinhold, New York, 1996.

**Hanks, A. David.** Decorative Designs of Frank Lloyd Wright, Dover Publications, Inc. New York, 1999.

**Hepler, E. Donald, Wallach, I. Paul.** Architecture Drafting and Design, 3<sup>rd</sup> ed. McGraw-Hill Book Company, New York, 1977.

**Itten, Johannes.** Design and Form: The basic course at the Bauhaus, Thames and Hudson Ltd., London 1997.

**Krier, Rob.** Architectural Composition, Academy Editions, London, 1988.

**Meiss, Pierre Von.** Elements of Architecture: From form to place, E and FN Spon, London, 1992.

**Pipes, Alan.** Drawing for 3-Dimensional Design. Thames and Hudson Ltd., London 1990.

**Shibikawa, Ikuyoshi and Takahashi, Yumi.** Designers Guide to Colour.

**Smithies, K.W.** Principles of Design in Architecture. Chapman and Hall, 1983.

## AR 1.2 ARCHITECTURAL DRAWING AND GRAPHICS – I

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 4*

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### **Course Overview:**

The course introduces the fundamental techniques of architectural drawing and develops the appropriate skills for visualization and representation.

### **Objectives of the Course:**

To introduce architectural drawing techniques and to facilitate effective visual communication.

**Expected Skills / Knowledge Transferred:** Freehand, scale drawing, conventional architectural representations in drawings and graphics.

### **Course Contents:**

#### **Unit – I**

**Introduction:** Fundamentals of drawing and its practice, introduction to drawing equipment, familiarization, use and handling.

#### **Unit – II**

**Drawing:** Drawing sheet sizes, layouts and composition. Simple exercises in drafting, line types, line weights; dimensioning, Typography –anatomy of Type, Styles, Roman and Gothic style lettering; Freehand lettering, title panels and legends.

#### **Unit – III**

**Geometrical Construction:** Constructing simple and complex geometrical shapes involving various drafting technique drawing regular shapes using T-squares, set-squares; Special methods of drawing regular polygons; Regular polygons inscribed in a Circle.

#### **Unit – IV**

**Architectural Symbols:** Representation of building elements, openings, materials, furniture and accessories; human postures; vegetation; vehicles; terminology and abbreviations used in architectural representation.

#### **Unit – V**

**Measuring and Drawing to Scale:** Scales and construction of scales, scaled drawings of simple objects, furniture, rooms, doors and windows etc., in plan, elevation and section. Reduction and enlargement of drawings.

## Unit – VI

**Free Hand Drawings:** line strokes, light and shade techniques of simple, natural and 3D geometric forms. Study of proportions and scale; structure and axes of objects; Outdoor sketching of simple building forms.

Note: This is a studio subject and students should be made to prepare drawings as studio exercises along with the theoretical inputs. The studio work should be supplemented with appropriate site visits.

### Reference books:

**Moris, I.H.** Geometrical Drawing for Art Students.

**Thoms, E. French.** Graphic Science and Design, New York: MC Graw Hill.

**Nichols, T.B. and Keep, Norman.** Geometry of Construction, 3<sup>rd</sup> ed. Cleaver – Hume Press Ltd., London, 1959.

**Bhatt, N.D. and Panchal V.M.** Engineering Drawing: Plane and Solid Geometry, 42<sup>nd</sup> ed. Charotar Pub., Anand, 2000.

**Gill, P.S.** T.B. of Geometrical Drawing, 3<sup>rd</sup> ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986.

**Shah, M.G., Kale, C.M. and Patki, S.Y.** Building Drawing: with an integrated approach to built environment, 7<sup>th</sup> ed. Tata McGraw Hill Pub., Delhi, 2000.

**Bies, D. John.** Architectural Drafting: Structure and Environment. Bobbs – Merrill Educational Pub., Indianapolis.

**Nelson, A. John.** H.B. of Architectural and Civil Drafting, Van Nostrand Reinhold, New York, 1983.

### AR 1.3 BUILDING CONSTRUCTION-I

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 4*

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#### Course Overview:

The course introduces to the methods and techniques of construction of basic elements of a simple building.

#### Objectives of the Course:

To understand the elementary and simple construction methods, explaining basic principles and considerations in the construction of one roomed rectilinear building with verandah.

#### Expected Skills / Knowledge Transferred:

To understand the techniques of construction of a simple load bearing structure with simple material like brick, stone etc.

#### Course Contents:

## **Unit – I**

Brickwork: Various types of bonds, stopped ends, junctions, piers, jambs, footings, foundations, corbelling, damp proof course, window sills, thresholds, copings, mortar joints and pointing.

## **Unit – II**

Stone masonry: stone walls, rubble work, ashlar work, masonry joints, window sills, plinth, cornices, surface finishes.

## **Unit – III**

Composite masonry: Brick backed ashlar, rubble backed ashlar, concrete backed masonry, ashlar faced concrete walls, marble faced masonry; tile faced concrete, hollow block masonry.

**Cladding:** Cladding of various materials-marble, granite, slate, tiles, metal etc.

## **Unit – IV**

Lintels: Lintels of wood, stone, brick.

Arches: arches; terms defined; various forms of arches like segmental, semi-circular, elliptical, three-centered, flat and relieving arch, etc.

## **Unit – V**

Ground and upper floors: solid floor, brick flooring, floor finishing and floor coverings, Basement floor

Flooring Finishes: Brick on edge, concrete, wood, Indian patent floor, granolithic, terrazzo, pitch mastic, Magnesium Oxide, Chloride, flag stone or shahbad stone flooring, etc.

## **Unit – VI**

Flat roofs: Madras terrace, Jack arch, elementary knowledge about R.C.C roof and floor slabs.

The class work and home assignments should include appropriate site visits by the students. Student will maintain field observations / record books. At least two exercises to be done in the construction yard.

## **Reference books:**

**Barry, R.** The Construction of Buildings Vol. 2, 5th ed. East-West Press. New Delhi, 1999.

**Bindra, S P. and Arora, S P.** Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub. New Delhi, 2000.

**Hailey and Hancork, D.W.** Brick Work and Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R. Mitchell's** Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.

## **AR 1.4 BUILDING MATERIALS – I**

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*L/s: 2/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 2*

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### **Course Overview:**

The course provides information on the properties, use, installation and costs of basic building materials.

### **Objectives of the Course:**

To impart knowledge on the various building materials,  
To highlight the current trends and innovations in the usage of building materials.

### **Expected Skills / Knowledge Transferred:**

Knowledge required for specifying appropriate materials for various spaces in buildings.

### **Course Contents:**

#### **Unit –I**

Brick: Composition of earths, standard, market and ISI.size properties, as per ISI brick manufacturing processes, requirements and tests foe good bricks. Fire clay bricks - varieties; sand lime bricks; paving bricks; Terra-cotta-its varieties: ordinary, glazed, porous, polished and fine; sun dried brick, Special types of bricks, uses and properties Different uses of brick in construction.

Building Tiles: Roof, floor and wall tiles.

#### **Unit –II**

Stones: Classification of stones: granite, laterite, quartzite, marble and slates -properties and uses; stone units - khandki, rubble, black stones, stone metal, flag stones. method of quarrying of building stones, types of stone dressings defects in stone, stones used in construction, uses in construction, aggregates. tool used, Preservation of stone work.

#### **Unit –III**

**Sand** : Pit, river sea sand, gravel, bulk age of sand, impurities in sand their removal, tests for silt and organic contents different grades of sand with respective to size and their application. I.S.I. standards, use in mortar and concrete.

#### **Unit –IV**

**Cement:** Ingredients and properties of cement, Types of cement, Grades of cement, Initial and final setting time, Test of cements, ISI Standards, Pozzolana material and its properties.

#### **Unit –V**

**Mortars:** Types, proportioning, mixing and grinding, mortar, cement mortar, lime mortar, methods of preparing, handling and uses of mortars, Surkhi-mortar, light weight mortars i.e. cinder, sawdust and fibrous plaster, gypsum plaster, Plaster of Paris and application

**Concrete:** Concrete and its constituents, aggregate: coarse and fine, properties of concrete, strength, durability, etc. Effect of age on strength.

Grading: importance, fineness modulus, combined aggregate, water cement ratio. Mixing and Curing.

#### **Unit –VI**

**Timber:** Building timber types and its properties, sawing of timber, shrinkage and distortion, wastage, methods of sawing. Drying and seasoning, moisture contents, purpose of seasoning, natural and artificial. Defects in timber. Use and application of timber in construction.

**Processed woods:** Plywood and Synthetic boards properties and application. Use of alternative materials as substitute to wood. ISI standards

#### **Unit –VII**

**Ferrous Metals - Pig iron, cast iron, wrought iron, steel, manufacturing processes and casting. Characteristics form and uses of cast iron, wrought iron and steel.**

Alloys steel, stainless steel, steel-treatment, steel tempering, annealing, normalizing, and case hardening, their objectives and effect on alloy steels. Galvanizing, oxidation and casting of metallic products, corrosion of iron and their prevention. Metallic protective coatings.

**Non ferrous Metals:** Basic idea of important ores, properties and uses of Aluminum, Zinc, Copper, Tin and Lead

#### **Reference Books:**

**Hailey & Hancork, D.W.** Brick Work & Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R.** Mitchell's Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22<sup>nd</sup> ed. Charotar Pub. House, Anand, 2004.

**Sushil Kumar.** T.B. of Building Construction, 19<sup>th</sup> ed. Standard Pub, Delhi, 2003.

**Note:** Students should be exposed to on site and Laboratory tests of above materials.

Students should conduct market survey of above

## AR 1.5 STRUCTURAL MECHANICS – I

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr: 3*

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### **Course Overview:**

Gives an in-depth understanding of the concepts associated with different Elements of Structures.

### **Objectives of the Course:**

To provide knowledge of different forces, force systems, Beams types sectional Properties behavior of different members due to applied forces.

**Expected Skills / Knowledge Transferred:** Basic principles of mechanics and behavior of elements of structures.

### **Course Contents:**

#### **Unit – I**

**Introduction:** Forces, system of forces, resultant, equilibrant Parallelogram law, Triangle law, Lamis Theorem, polygon law, resultant of coplanar, concurrent force system, couple, characteristics of couple, moment, Equilibrium, Varignon's Theorem.

#### **Unit – II**

Analysis of trusses, types of stresses, Loads on trusses, 2-D truss analysis using method of joint (Cantilever & Simply Supported)

#### **Unit – III**

Stress, Strain, type of stresses, stress-strain curve for ductile Material, Hooke's law, Modulus of Elasticity, Bars of Varying Section, Bars of Composite Section.

#### **Unit – IV**

Shear stress, types of Strain, poissons Ratio, Shear modulus Bulk Modulus Relation between the three Elastic Constants members subjected to 3 mutually perpendicular forces

#### **Unit – V**

Types of Beams, types of loads, calculation of reactions for simply supported beam (Using Point loads & Udl's) definition shear force & Bending Moment SFD&



BMD for Cantilever beams.

### **Unit – VI**

Shear force & Bending Moment diagrams for simply supported & over hanging beams for point loads & UDL, point contra flexure & its location, Relation between loading, SF & BM

### **Unit – VII**

Definition of centroid, line of symmetry ,centroid for some standard shapes, calculation of centroid for shapes like L,T,C,I Sections etc., moment of inertia, Derivation of M.I formula for Rectangle, circle, Triangle, calculation of M .I for L,T,C,I Sections etc.,

### **Unit VIII**

Types of joints, lap joint & butt joint, failure of riveted joints, strength of the joint, efficiency of joint, Unwins formula, chain riveting & Diamond Riveting

### **Reference Books**

**Khurmi. R.S.** Engineering Mechanics, S. Chand and Co. Ltd., New Delhi, 1999.

**Ramamrutham. S.** Engineering Mechanics, 7th ed. Dhanpat Rai Pub. Co. Ltd., Delhi, 2004.

**Timoshenko. S. and Young, D.H.** Engineering Mechanics, McGraw-Hill International Editions

## **AR 1.6 INTRODUCTION TO ART AND ARCHITECTURE**

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*L/s: 2/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr: 2*

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### **Course Overview:**

Provides knowledge on traditional art form, innovations in and influences on architecture and thinking process in design;

### **Objectives of the Course:**

To analyze various art forms, and understand the techniques involved in creative thinking.

**Expected Skills / Knowledge Transferred:** different skills for creative thinking, understanding various art forms, appreciate art and architecture.

### **Course Contents:**

#### **Unit – I**

Purpose and relevance of art,

## **Unit – II**

Development of art; A survey of history of art forms; pre-historic period to the present times; Changing nature of art through time in terms of content; form and material;

## **Unit – III**

Exploration of art forms - study of traditional and contemporary art forms - painting sculpture, architecture, decorative arts, design arts, digital art. Relationship between art and architecture from earliest times.

## **Unit – IV**

Definitions and general understanding of architecture, role of architect in a building project. The changing role of architects, his relation with other consultants, contractors and client, technical knowledge and other skills required as inputs. Various subjects to be learnt by architecture students, their relevance to practice.

## **Unit – V**

Various factors influencing the architecture of a region, architecture as a response to social, technological and environment forces. Evolution of shelter forms in regions of the world and examples of vernacular architecture in the world, with particular reference to India.

## **Reference Books:**

**Craven, C. Roy.** Indian Art a Concise History.

**Kumar, Raj (Ed.).** Essays on Indian Art and Architecture. Discovery Pub., New Delhi, 2003.

**Fisher, E. Robert.** Buddhist Art and Architecture. Thames and Hudson, London, 1993.

**Ghosh, A (Ed.).** Jain Art and Architecture Vol. 1-3. Bharatiya Jnanpith, New Delhi.

**James C. Snyder,** Introduction to Architecture, New York: Mc Graw Hill.

**Christopher Alexander,** Pattern Language, New York: Oxford University Press

**Thomas Mitchell,** Redefining Designing: From to Experience,

**James snyder and Anthony Y catanse,** Introduction to Architecture, Mc Graw-Hill Book company, New York, 1979.

Rapoport, Amos, House form & Culture

## AR 1.7 COMPUTER APPLICATIONS – I

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L/s:2/Wk    Int: 50    End Exam: NIL    Total: 50    End Exam: NIL    Cr: 2

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### **Course Overview:**

The course imparts basic knowledge on computers to upgrade the general understanding and ability in computing in the realm of architecture.

### **Objectives of the Course:**

To enable the student to make audio-visual presentations, word processing, and other basic computing.

Expected Skills / Knowledge Transferred: Knowledge on basic hardware and software required for architectural applications, Ms-Office, photo Editing techniques, use of World Wide Web.

### **Course Contents:**

#### **Unit – I**

**Introduction:** Introduction and history of computer, software and hardware concepts - bits, bytes - types of languages – operating systems (windows, DOS).

Introduction to Word Processing Package, Toolbar, creating a new document, formatting text, inserting tables, pictures, page Numbers and date/time, spelling and grammar checking, taking printouts.

#### **Unit – II**

**Spread Sheets:** Introduction to Spread Sheets, Microsoft Excel, creating formulas, basic operations, borders and shading, creating charts.

#### **Unit – III**

**Multi-media Presentations:** Introduction, multi-media presentation (like MS. Power point) Creating a Presentation, different views in PowerPoint, slide manipulation, slide animation, slide transitions, view slide show, navigating while in slideshow, hyper linking to various other media/ application outputs, scanning of different media in different formats, setting of options, resolution settings, management of file size, integrating partial scans of large documents. Pack up a presentation for use on another computer.

#### **Unit – IV**

##### **Exploring Microsoft Access:**

Introduction, creating new and opening existing, creating a database using a wizard, creating a database without using a wizard, tables – and their working, creating a table from scratch, Primary Keys, Switching views, entering data, manipulating data, advanced table feature examples.

relationships - linking multiple tables together, forms – and their workings, creating a form using a wizard, reports – and their working, creating, report and mail-merge, labels using a wizard.

### **Unit – V**

Internet concepts: Introduction to Internet, use of internet, various search engines, hyper text markup Language, e-mails.

### **Unit – VI**

Photo Editing and Desktop Publishing (application)-I: Import and export of photo edited files, objects in photo editing, fills, outlines, basic toolbox of photo editing software (like Coral Draw), color management tools, starting your page right, introduction to Flash multimedia software.

### **Unit – VII**

Photo Editing and Desktop Publishing (application) - II:

Introduction, software and system requirements, preferences, workspace, graphics terminology, image depth, resolution and image size, image sources, straightening and cropping of images, basic correction of images, printing, Photoshop software: selections, choosing foreground and background colors, filling with color, options and preferences, file browser, stepping back in time, use ram efficiently, sharpening images, working with layers, painting, color theory, image modes, channels, more advanced adjustment commands, file format categories.

### **Reference books:**

Adobe Creative Team. Adobe Photoshop CS (Class Workbook).

**Droblas, Adele.** Fundamental Photoshop: A Complete Introduction, Greenberg.HTML Black Book

**Sagman.** Microsoft Office for Windows, India Addison Wesley, 1999.

**Woody, Leon Hard.** Microsoft Office 2000, Prentice Hall of India, New Delhi.

## **AR 1.8 WORKSHOP**

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| <i>L/s: 4/Wk</i> | <i>Int: 50</i> | <i>End Exam: NIL</i> | <i>Total: 50</i> | <i>End Exam: NIL</i> | <i>Cr: 4</i> |
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### **Course Overview:**

The course provides the foundation and capability to represent the concepts three dimensionally.

### **Objectives of the Course:**

To introduce various fabrication skills and techniques necessary to produce scale-models and to encourage preparation of models as an essential phase in design development and evaluation.

**Expected Skills / Knowledge Transferred:** Dexterity; Knowledge of materials and their properties; craft skills; visualization skills;

**Course Contents:**

**Unit – I**

Introduction to model-making: Need; role of scale-models in design; general practices; Digital models.

**Unit – II**

Essentials of model-making: understanding of various tools and machines employed, best practices involved in operating the tools and the techniques.

**Unit – III**

Survey of various materials available for model making such as papers , mount boards , wood, plastics, films, plaster of paris, acrylic, Styrofoam, wax, metals, glass, FRP, etc. and exploring

Their potential in model-making. .chamfering at 45 degrees in mountboard.

**Unit – IV**

Techniques of Scale-modeling: Use of different scales; templates; measuring aids; conventions followed.

**Unit – V**

Techniques for preparation of presentation models, mock-ups, simulation of various materials and textures such as wood, glass, aluminum, steel, bricks, roofing tiles, flooring, corrugated sheets, upholsteries etc.

**Unit – VI**

Carpentry: Introduction to the use of different types of tools and different types of joints used in carpentry. Joinery details which are commonly used in timber construction. Application of surface finishes such as polish, varnish, lacquer on wood.

**Unit—VII**

Photography in built models, using lighting and natural background.

Assignments.

At least three major assignments involving the individual students to fabricate

- a. Scale model of a piece of furniture
- b. Presentation of models
- c. mock-up of an everyday object
- d. Three-dimensional forms etc.

Documentation of the important phases of fabrication is must which shall become the basis for internal evaluation.

**Reference books:**

**Bernald, S and Copplene, Myers.** History of Art.

**Craven, C. Roy.** Indian Art a Concise History.

**Krier, Rob.** Element of Architecture. Academy Editions, London, 1992.

**Lang, Jon.** A Concise History of Modern Architecture in India. Permanent Black, Delhi, 2002.

**Magnet, Jacque.** The Aesthetic Experiences: An anthropologist looks at the Visual Art.

**Preble, Duame.** Art Forms.

**Snyder, C. James and Catanese, J. Anthony.** Introduction to Architecture.

**Tapert, Annette. Swid Powell:** Objects by Architects. Rizzoli, New York, 1990.

**Thyagarajan.** Basic practical photography

Ching Francis D.K Architecture: Form, Space, and Order

## SECOND SEMESTER

### AR 2.1 ARCHITECTURAL DESIGN – I

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: 5 hrs    Cr: 9*

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**Course Overview:**

This course is intended to provide framework for understanding design as a process.

**Objectives of the Course:**

To impart knowledge related to design process and introduce various problem solving approaches.

**Expected Skills / Knowledge Transferred:**

To understand principles of design. To develop the ability to translate abstract principles of design into architectural solutions for small problems.

**Course Contents:**

**Unit - I**

Anthropometrics: Basic -average measurements of human body in different postures-its proportion and graphic representation, application in the design of simple household and street furniture. Use of mannequins in defining spatial parameter of design.

## Unit - II

Study of functional spaces and the issues like clearances, lighting and ventilation, furniture arrangements; Minimum and optimum areas for various functions; Detailed study of spaces such as living, dining, bedrooms, kitchen, toilet, etc.

## Unit - III

Study of the human considerations like, privacy, convenience, comfort, etc.; Case study of a house and a critical appraisal of the spaces.

## Unit - IV

Introduction to design process. Pre- Design Studies: Preparation of design brief, the user requirement and their implications, Study of the site and the context; Design Response: Development of concept, Graphic tools like circulation diagrams, Figure Ground studies, etc. Integration of form and function in the design of bus shelter, milk booth, watchman's cabin, traffic police kiosk, flower stall, ATM Center, etc.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

### Reference books:

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1980.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors Offices and Clinics, 2<sup>nd</sup> ed. Reinhold Pub., USA, 1960.

**Neufert, Ernst.** Ernst Neufert Architects Data, Granada Pub. Ltd., London, 1970.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

Shah, S. Charanjit. Architects Hand Book Ready Reckoner. Galogotia Pub. Co., New Delhi, 1996.

## AR 2.2 ARCHITECTURAL DRAWING AND GRAPHICS – II

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*L/s: 4/Wk      Int: 50      End Exam: 50      Total: 100      End Exam: 5hrs      Cr: 4*

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### Course Overview:

The course is intended to develop the techniques of architectural drawing pertaining simple and complex solid geometrical forms of Building geometry Sciography and Documentation .

### Objectives of the Course:

To impart the skills of three dimensional visualization and presentation.

### Course Contents:

## Unit – I

Building Geometry: Study of points, lines, and planes leading to simple and complex solid geometrical forms; Orthographic Projections-Representation of 3D elements in Plan and Elevations, use of circle in mouldings- Ovolo Covetta, Ogee, Lancet, Horse shoe, Moorish, Stilted and Rampant, Tudor, three centered and drop. Exercises on Ionic volute, Entasis of column etc., working with models to facilitate visualization.

## Unit –II

### Sciography:

Simple and composite forms, shadows on horizontal, vertical planes and on their own surfaces. Study of shade and shadows of simple geometrical solids of various forms and groups of forms.

Shade and shadow techniques leading to advanced practical examples: shades and shadows on buildings or parts of buildings. Relative changes in building shades and shadows with sun angle, time, building height . Introduction to sciography in perspective.

## Unit-III

### Architectural Documentation:

Detailed measured drawing and documentation of any interesting building – preparation of maps, plans, elevations, sections, views etc.

### Reference books:

**Thoms, E. French.** Graphic Science and Design, New York: MC Graw Hill.

**Nichols, T.B. and Keep, Norman.** Geometry of Construction, 3rd ed. Cleaver – Hume Press Ltd., London, 1959.

**Bhatt, N.D. and Panchal V.M.** Engineering Drawing: Plane and Solid Geometry, 42nd ed. Charotar Pub., Anand, 2000.

**Gill, P.S. T.B.** of Geometrical Drawing, 3rd ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986

**Shah, M.G., Kale, C.M. and Patki, S.Y.** Building Drawing: with an integrated approach to built environment, 7th ed. Tata McGraw Hill Pub., Delhi, 2000.

Claude Batley -Design Development of Indian Architecture

Ernest Burden -Architectural Delineation

## AR 2.3 BUILDING CONSTRUCTION- II

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 4*

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### Course Overview:

The course introduces to the methods and techniques of construction of doors and



windows, stairs and partitions of a building using different materials.

### **Objectives of the Course:**

To understand the elementary and simple construction methods like joinery details in wood ,fixing of hardware.

### **Expected Skills / Knowledge Transferred:**

To understand the techniques of constructing doors and windows, staircase and partitions using different materials

#### **Unit – I**

Carpentry and joinery: Terms defined; mitring, ploughing, grooving, rebating, veneering. Various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon etc;

#### **Unit – II**

Doors: Definition of terms, types of doors: wooden, ledged, ledged and braced, paneled, flush door. Hinged, single and double shutters, sliding, folding, revolving, pivoted.

#### **Unit – III**

Windows: Casement, top and bottom hung, pivoted and sliding sash.  
Hardware: fixtures, locks, hinges, fastenings for doors and windows.

#### **Unit – IV**

Steel: windows, rolling shutters and grills. Aluminium doors and windows.

#### **Unit – V**

Wooden ground and upper floors: Terms defined, bridging joists, binding joists, binders, beams and girders, solid and herring bone strutting, floor boards, ceiling joists, trimming floors to accommodate fire place. Details of fire place.

#### **Unit – VI**

Partition Walls: Brick partition, reinforced brick partition, brick nogged partition, lath and plaster partition, pre-cast concrete partition, glass block and glass create partition, common wooden partition, trussed partition.

#### **Unit – VII**

Staircases: Terms defined, Tread, riser, stringer, nosing, flight, landing, head room, handrail, balusters, newel post etc., types of stairs i.e., straight, doglegged, open well, geometrical, circular, spiral, bifurcated, wooden stairs, stone stairs, metal stairs and elementary knowledge of R.C.C. stairs.

## Reference Books

**Barry, R.** The Construction of Buildings Vol. 2, 5th ed. East-West Press. New Delhi, 1999.

**Bindra, S P. and Arora, S P.** Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub. New Delhi, 2000.

**Hailey and Hancork, D.W.** Brick Work and Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R. Mitchell's** Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.

**Sushil Kumar. T.B.** of Building Construction, 19th ed. Standard Pub, Delhi, 2003.

## AR 2.4 BUILDING MATERIALS – II

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 3*

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### Course Overview:

The course is intended to provide information on the properties, uses, installation and costs of building materials. The course highlights on Mechanical and physical properties of various materials. Influence of various factors on these properties. Causes of defects, their prevention and remedies. Testing of materials.

### Objectives of the Course:

To provide knowledge on the various types of building materials used while highlighting the current innovations and trends.

### Expected Skills / Knowledge Transferred:

Knowledge required for specifying appropriate materials for various spaces in buildings.

### Course Contents:

#### Unit – I

**Laminates and Veneers:** Resin bonded ply wood, types of laminates, laminated wood, insulating boards and other miscellaneous boards, veneers from different varieties of timber, their characteristics and uses MDF& HDF Boards.

#### Unit – II

**Paints and Varnishes:** Protective coating, paints, constituents of paints, their functions, water paints, distempers, and cement based paints, emulsion paints, selection of paints, and storage of paints.

**Types varnishes** (oil and spirit): characteristics and uses of varnishes. French polish, anti-corrosive paint, damp proofing finishes.

### **Unit – III**

**Glass and glass products:** Composition and fabrication of glass, types of glass, wired glass, fiber glass, rock wool, laminated glass, glass-crete blocks, structural glass, their properties and uses in buildings.

### **Unit – IV**

**Plastics:** Polymer types, thermo setting and thermo plastics, resins, common types of moldings, fabrication of plastics, polymerization and condensation, plastic coatings.

Composite materials, classification, properties and uses - linoleum, plastic coated paper, polythene sheets, reinforced plastic, plastic laminates and PVC.

### **Unit – V**

**Floorings** :Introduction, essential requirements of a floor, factors affecting selection of flooring material, Various natural as well as artificial flooring materials like brick, flag stone, tiled ,cement concrete, granolithic, terrazzo, marble, shahbad stones timber flooring, timber floor supported on RSJ ,flag stone floor resting on RSJ,, vitrified tiles, ceramic tiles, , Mosaic, rubber, Linoleum, and PVC and PVA flooring

### **Unit – VI**

**Roof Coverings:** Introduction, requirements of good roof technical terms, classification, types of roof coverings for pitched roof. : Roofing tiles and roofing with cement products like A.C. sheet roofs, G.I. Sheets roofs, slates,

### **Unit – VIII**

**Miscellaneous Materials and treatments:** Properties and uses of Asbestos, cork, felt, mica, adhesive, Bakelite, china clay, fiber glass, leather, canvass, jute, rubber, Asphalt and Bitumen

**Materials for Special Treatments:** Fire resistant, waterproofing, thermal insulation, acoustical treatment and anti-termite treatment.

### **Reference books:**

**Chowdary, K.P.** Engineering Materials are used in India, 7th ed. Oxford and IBH Pub. Ltd., New Delhi, 1990.

**Moxley, R. Mitchell**"s Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction: Materials and types of Construction, 3rd ed. John Wiley and Sons, Inc., New York, 1963.

## AR 2. 5 STRUCTURAL MECHANICS –II

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3hrs Cr: 3*

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### **Course Overview:**

Gives an in-depth understanding of the concepts associated with different Elements of Structures.

### **Objectives of the Course:**

To provide knowledge of behavior beams, columns stress behavior due to applied forces.

**Expected Skills / Knowledge Transferred:** Basic principles of mechanics and behavior of elements of structures.

### **Unit-I**

Theory of simple bending Introduction, pure bending & ordinary bending, Assumptions derivation of flexure formula section modulus Numericals on flexure equation.

### **Unit-II**

Shear stresses in beams Introduction, derivation of shear stress formula, shear stress distribution for standard shapes like rectangle circle triangle I, T L, C Section Numericals.

### **Unit-III**

Direct & bending Stresses Introduction, stress distribution of eccentrically loaded column, middle third rule, core or Kernal of Section, stress distribution for column with one axis eccentricity, two axis eccentricity, Numericals.

### **Unit IV**

Deflection-I-Introduction of slope & deflection, slopes & deflections for cantilever beams with point load & udl's using double integration method & moment area methods

### **Unit V**

Deflection-II- Introduction of Macaulay's method, slopes & deflections simply supported beams with point load & udl's double integration & Macaulay's methods

### **Unit-VI**

Fixed beams Introduction Advantages and disadvantages of fixed beams over simply supported beams, SFD & BMD for fixed beams with combination of point loads & udl's (No formula derivations)

### **Unit-VII**

Propped Cantilevers Introduction, Reaction of a prop, Cantilevers with Udl's, point loads, prop at end & at intermediate positions, slope & deflection

### **Unit-VIII**

Welded joints: Introduction, Advantages and disadvantages of welded joints, types, strength of fillet weld, design of welded joint for plates and unsymmetrical sections for axial loading

### **Reference Books:**

**Khurmi. R.S.** Engineering Mechanics, S. Chand and Co.Ltd., New Delhi, 1999.

**Ramamrutham. S.** Engineering Mechanics, 7th ed. Dhanpat Rai Pub. Co. Ltd., Delhi, 2004.

**Timoshenko. S. and Young, D.H.** Engineering Mechanics, McGraw-Hill International Editions

## **AR 2. 6 HISTORY OF ARCHITECTURE- I**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr: 3*

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### **Course Overview:**

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and not on specific examples of buildings.

### **Objectives of the Course:**

- To expose the students to a wide spectrum of architectural styles ranging from pre-historic to modern times.
- To explain the students the evolution of architecture in relation to time with special emphasis to social, religious and environmental factors.
- To make the students understand the developments in the construction technology in different periods.

### **Expected Skills / Knowledge Transferred:**

- 1) Acquire knowledge to identify the common characteristics among the monuments of a particular style.
- 2) Acquire graphic skills to present a building, analyze its elements and explain the composition.
- 3) Acquire knowledge on good practices of architecture in the past.

### **Course Contents:**

#### **Unit – I**

Architectural development in the ancient civilizations in Indus valley, Egypt and Mesopotamia, Study of Pyramids, Temples, Mastabas, Ziggurats.

#### **Unit – II**

Architecture in the Classic Greek periods, different orders, optical correction and appreciation of perfection.

#### **Unit – III**

Architecture in Roman period; Grand scale, application of Greek orders; Construction of vaults; study of different typologies of buildings; development of roads and aqueducts;

#### **Unit – IV**

Architecture in the early Christian, Byzantine, Romanesque, Gothic periods in Europe and rest of the world excluding Asia.

#### **Unit – V**

Architecture in Renaissance and Baroque: revival in architecture, study of building typologies.

#### **Unit-VI**

The other architecture styles preceding the advent of Industrial revolution in Europe - Mannerist architecture, Jacobean architecture, Elizabethan architecture, Victorian architecture and Moorish architecture.

### **Reference books:**

**Fletcher, Sir Banister.** A History of Architecture, 19th ed. CBS Pub., Delhi, 1992.

**Yarwood, Doreen.** A Chronology of Western Architecture. B.T. Batsford Ltd., London, 1987.

**Schulz, Christian Norberg.** Meaning in Western Architecture, 2nd ed. Rizzoli Intl. Pub., New York, 1981.

**Copplistone, Trewin and Others.** World Architecture: An Illustrated History, 11th ed. Hamlyn, London, 1979.

**Bindoo. D.D,** History of Architecture, Milind P Lakshana, Hyderabad – 2006.

Wittkaner R Architectural Principles in the Age of Humanism, Chichester :Academy Editions 1998

## **AR 2.7 SURVEYING AND LEVELING**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 4*

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### **Course over view**

To explain the different techniques and instruments used in survey of land tracts

### **Objectives of the Course:**

To explain the techniques and instruments used in survey of land tracts.

### **Expected Skills / Knowledge Transferred:**

Surveying skills and related theory.

### **Course Contents:**

#### **Unit – I**

Introduction – Definitions – Basic Principles of Surveying; Classification of Survey; Uses of Survey - Scales and Symbols-Sources of errors in Survey – Linear Measurement: accurate and approximate methods, duties of Surveyor.

#### **Unit – II**

Chain Surveying – Introduction – Types of chains and tapes. Instruments for chaining and taping – ranging-cross staffs – offsets – obstacles in chain surveying – errors and corrections (standardization, temperature and pull) composition of Areas ( Trapezoidal rule – Average ordinate-Simpson rule).

#### **Unit – III**

Compass Surveying: Introduction – Prismatic Compass and Surveyors Compass – Types of Bearings-Designation of bearings – Fore bearing and back bearing – Types of Traverse – Temporary adjustments of prismatic compass, local attraction, Corrections, precautions, errors.

#### **Unit – VI**

Plane Table Survey: Introduction – Types of Plane Tables and their Accessories – Setting up the plane table – traversing – Radiation Method – Intersection Method – Resection Method (two point problem). Three point problem

## **Unit – V**

Leveling – Introduction –Definitions of terms used in leveling – Principle of leveling – Classifications temporary adjustments of dumpy level, RL's by height of Instrument and rise and fall method, Contouring and their characteristics, uses, – errors in leveling.

## **Unit – VI**

Theodolite – Introduction – vernier Theodolite – uses of Theodolite - Temporary adjustments – Traversing.

## **Unit – VII**

Automated Surveying – Introduction to use of Digital Surveying – Instruments such as distomat – total station, Electronic Theodolite, G.P.S.

## **Unit – VIII**

Site Studies – Plot, site, land and regions, size and shape of site, Analysis of accessibility, Topography, Climate, land forms, Surface Drainage, Soil, Water, Vegetation, Ecology and Visual aspects.

## **Reference books:**

**Arora, K.R. Surveying Vol. I, 6<sup>th</sup> ed.** Standard Book House, Delhi, 2000.

**Lynch, Kevin.** Site Planning. MIT Press, Massachusetts, 1962.

**Punmia, B.C.** Surveying Vol. 1, 13<sup>th</sup> ed. Laxmi Publications Pvt. Ltd., New Delhi, 1996.



## THIRD SEMESTER

### AR 3.1 ARCHITECTURAL DESIGN – II

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr: 9*

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#### **Course Overview:**

This course is intended to provide skills for designing a single use, small span and single-storey buildings.

#### **Objectives of the Course:**

To develop abilities in design in the context of user requirements.

**Expected Skills / Knowledge Transferred:** Use of standards, handling of space, and application of knowledge gained from other subjects in design.

#### **Course Contents:**

The design issues to be addressed:

Various functions and their spatial implications.

Formulations of concept.

Anthropometry and furniture layout

Horizontal circulation

Interior volumes and space articulation through different materials.

Integration of form and function.

The list of suggested topics to be covered as design problems:

Balwadi, Kindergarten School, Primary Health Centre, Doctor's Clinic, small Cafeteria, Highway Restaurant, Village Post Office, Bank extension counter, Police Station, Architect's Office, Departmental Store, School Gymkhana and Youth Club etc.

Necessary theoretical inputs to be given highlighting the norms and design issues.

The topics not covered as design problems

will have to be covered by the Studio faculty members through lecture/slide show sessions and site visits.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Note: In end exam which is a viva-voce the students have to present the entire semester work for assessment.

### **Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1980.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors Offices and Clinics, 2nd ed. Reinhold Pub., USA, 1960.

**Neufert, Ernst. Ernst Neufert Architects Data,** Granada Pub. Ltd., London, 1970.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Shah, S. Charanjit.** Architects Hand Book Ready Reckoner. Galogotia Pub. Co., New Delhi, 1996.

## **AR 3.2 ARCHITECTURAL DRAWING AND GRAPHICS – III**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 5hrs Cr: 4*

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### **Course Overview:**

The course is intended to develop the techniques of architectural rendering, graphic skills required for effective presentations and documentation techniques.

### **Objectives of the Course:**

To impart the skills of composition, rendering and documentation

### **Course Contents:**

#### **Introduction to Pictorial Views:**

Isometric, Dimetric and Trimetric Views, Oblique View etc.

### **Unit –I**

#### **Perspective:**

Characteristics of perspective drawings: perspectives of simple geometric solids and spaces and complex geometries. Advanced examples in one point or parallel perspective, two point or angular perspective, introduction to three point perspective.

### **Unit-II**

#### **Rendering techniques:**

Introduction to surfaces and media, observation, recording and basic representation techniques in different media through drawing pencil, pen, brush,

charcoal, crayons etc.

Introduction of rules of composition, color study, values, tones and general approach to rendering, Entourage, Treatment of sky, clouds, landscape elements, human figures, foreground and surroundings, shadow projections in renderings.

### **Unit-III**

#### **Graphic skills and Presentation Techniques:**

Page layout and Composition grids; Illustration techniques; Portfolio design and formats; Digital techniques in graphics

#### **Reference books:**

**David E. Carter, The Big Book of Design**, David E. Carter Books

Joyce Rutter Kaye, **Design Basics**, Rockport.

**Graphics Book**, Rotovision

**Ellen Lopton and Jennefer Cole Phillips**, Graphic Design The New Basics, Princeton Architectural Press

**Atkin, William W, Corbelletti, Raniero and Fiore, R. Vincent.** Pencil Techniques in Modern Design, 4<sup>th</sup> ed. Reinhold Pub. Corporation, New York, 1962.

**Bellings, Lance Bowen.** Perspective-Space and design.

**Burden, Ernest.** Architectural Delineation: A photographic approach to presentation, 2<sup>nd</sup> ed. McGraw-Hill, Inc., New York, 1982.

**Conli, Claudius.** Drawings by Architects.

**Hagarth, Paul.** Drawing Architecture.

**Pranchlay, H.** Perspective

### **AR 3.3 BUILDING CONSTRUCTION-III**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr:4*

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#### **Course Overview:**

The course focuses on understanding the potentials as well as shortcomings of RCC as a building material.

#### **Objectives of the Course:**

To introduce and expose the students to various ways in which RCC is used in building construction. The course intends to impart the theory of reinforced concrete construction (in conjunction with the Theory of Structures which is a separate course), and practical knowledge through site visits to the construction sites.

#### **Course Contents:**

## **Unit - I**

**Introduction to RCC:** Understanding the properties and characteristics of RCC. Its advantages and disadvantages. Cast-in-situ and pre-cast constructional methods in RCC.

## **Unit - II**

Understanding the structural components of a typical RCC frame structure with reference to their location, junctions, load transfer and design.

## **Unit III**

**Substructure:** RCC foundations – isolated footing (rectangular and trapezoidal footings), pile foundation, combined footing, raft foundation.

## **Unit – IV**

**Superstructure:** RCC columns – different shapes, different combinations and loading conditions (axial, bending, non axial), slenderness factor. RCC beams - Single and doubly reinforced beams, T and L beams, continuous beams, lintels and brackets. RCC slabs – One way and two way slabs.

## **Unit - V**

**Miscellaneous:** RCC staircases and ramp – Waist slab and folded plate staircases. RCC Balconies, chajjas etc.

## **Unit VI**

**Advanced concepts:** Flat slab, coffered slab, diaphragms, retaining walls and water tanks.

**Note:** This is a studio subject and students should be made to prepare construction drawings as studio exercises along with the theoretical inputs. The studio work should be supplemented with appropriate side visits.

## **References:**

**Bindra and Arora.** Building Construction: Planning Techniques and Methods of Construction, 19<sup>th</sup> ed. Dhanpat Rai Pub., New Delhi, 2000.

**Foster, J. Stroud.** Mitchell Building Construction: Elementary and Advanced, 17<sup>th</sup> ed. B.T. Batsford Ltd, London, 1963.

**McKay, W.B.** Building Construction Metric Vol. 1 – IV, 4th ed. Orient Longman, Mumbai, 2005.

**Sushil Kumar.** T.B. of Building Construction, 19<sup>th</sup> ed. Standard Pub. Distributors, Delhi, 2003.

## AR 3. 4 STRUCTURAL MECHANICS –III

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*L/s: 3/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3hrs Cr: 3*

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### **Objectives of the Course:**

To impart sound knowledge of strength, behavior of various materials and techniques in the analysis of structures.

### **Expected Skills / Knowledge Transferred:**

Ability to analyze the standard members in structures.

### **Course Contents:**

#### **Unit – I**

**Continuous beams:** Shear Force and Bending Moment diagrams for continuous beams using theorem of three moments (excluding derivation and sinking of supports).

#### **Unit – II**

**Moment Distribution Method:** Introduction, carryover, relative stiffness, application of Moment Distribution Method to Continuous beams, single bay frame without sway (excluding sinking of supports)

#### **Unit – III**

**Kani's method / Rotation Contribution Method:** Introduction, rotational factors, application of Kani's method for beams and frames (single bay with out sinking of supports).

#### **Unit – IV**

**Columns and Struts:** Buckling and crushing failures, types of end conditions, Euler's theory of long columns for different end conditions and equivalent length derivations, Rankine's equation, Derivation and application of the basic formula.

#### **Unit-V**

wind pressure on chimneys ,Maximum & Minimum intensities of stress at bottom of chimneys Retaining walls subjected to earth pressure.

#### **Unit – VI**

**Torsion of Shafts:** Assumptions, Derivation of basic equation  $T/J = G\theta/l = fs/R$ , Power Transmitted by shafts, application of basic equation to shafts.

#### **Unit – VII**

**Arches:** Determination of horizontal thrust, bending moment and radial shear for three-hinged parabolic and segmental arches with supports at same level and different levels.

**Reference books:**

**A.K.Jain and Punmia.** Strength of Materials

**Ramamrutham, S.** Theory of Structures, 17th ed. Danpat Rai Pub. Co. Ltd., New Delhi, 2005.

**Reddy, C.S.** Basic Structural Analysis, 18th ed. Tata McGraw Hill Pub.Co.Ltd., New Delhi, 1991.

**AR 3. 5 HISTORY OF ARCHITECTURE– II**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 3*

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**Course Overview:**

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and not on specific examples of buildings.

**Objectives of the Course:**

- To expose the students to a wide spectrum of architectural styles ranging from pre historic to pre independence period in India.
- To explain the students the evolution of architecture in relation to time with special emphasis to social, religious and environmental factors.
- To make the students understand the developments in the construction technology in different periods.

**Expected Skills / Knowledge Transferred:**

- 1) Acquire knowledge to identify the common characteristics among the monuments of a particular style.
- 2) Acquire graphic skills to present a building, analyze its elements and explain the composition.
- 3) Acquire knowledge on good practices of architecture in the past.

**Course Contents:**

**Unit – I**

Development of Vedic Architecture, Development of architecture in India and rest of Asia in Buddhist Architecture

## **Unit – II**

Evolution of Hindu temple form, early rock cut examples; Early Chalukyans.

## **Unit – III**

Development of Hindu Architecture: Nagara style in Orissa, KahjuraHo, Gujarat etc.

## **Unit – IV**

Development of Hindu Architecture: Dravidian style in Pallava, Chola, Pandya periods.

## **Unit – V**

Development of Hindu Architecture under late Chalukyans, Development of Jain Architecture.

## **Unit-VI**

Islamic Architecture in India: Early Saracenic School in India: Imperial school at Delhi

## **Unit-VII**

Islamic Architecture in India: Provincial styles at Gujarat, Deccan, Bengal, Moghul Architecture in India.

## **Reference books:**

**Brown, Percy.** Indian Architecture: Buddhist and Hindu Periods. D.B. Taraporevala Sons and Co., Mumbai, 2003.

**Grover, Satish.** The Architecture of India. Vikas Pub. House Pvt. Ltd., Ghaziabad, 1980.

**Rowl, Benjamin.** Art and Architecture of India.

**Tadgell, Christopher.** The History of Architecture in India: from the Dawn of Civilization to the End of the Raj. Om Book Service, New Delhi, 1990.

**Vistara.** The Architecture of India

## **AR 3.6 BUILDING SERVICES – I**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr:4*

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### **Course Overview:**

Understanding the significance, design and functioning of water and sewerage systems as essential components in building design and site planning.

### **Objectives of the Course:**

To introduce and expose the students to various ways to provide information on the principles and appurtenance of water supply and sanitation systems.

**Expected skills and knowledge transferred:** To enable students to design sanitary and water supply systems for buildings, and prepare water supply and drainage plans for building sites.

**Course Contents:**

**Water Supply**

**Unit- I**

Introduction to water supply and sanitation. Traditional sources of water supply and sanitation. Classification of water based on its usage.

**Unit – II**

Elements of public / private water supply system, Different sources of water supply such as wells, reservoirs, etc. Water and its qualities, pumping and Distribution

**Unit – III**

Types of fittings like taps, bathtubs, showers, jets, cocks, valves, electrical fixtures, etc. Faucets for kitchens, bathrooms and toilets. Check valves, foot valves, sump pump check valves, and pressure test gauges.

**Unit – IV**

Building service connections, cold and hot water distribution systems in buildings and their design, materials, joints, fittings and valves (gate, flap, ball, flush valves etc.). Direct and indirect systems, individual water supply, special installation in multistoried buildings. Special emphasis on city level distribution of water.

**Sanitation**

**Unit – V**

Conventional water treatment – sedimentation, coagulation, filtration and disinfection. Distribution system, sanitary, storm and combined sewerage system. Design of sewerage systems, Location of sewage systems, conventional wastewater treatment, activated sludge, trickling filters etc.

**Unit – VI**

Design of drainage and vent pipes, system for low-rise and high-rise buildings, building drains, sewers, gullies, inspection chambers, manholes, connection to public sewer, cross connections, ferrule, water meters, stopcocks, bib cocks etc.

**Unit VII**

Types of fixtures and materials- wash basins, water closets, urinals, bidets, sinks etc. Conditions of flow in building drainage pipes, traps, vents and their material



specifications. Over-head and under-ground reservoirs. Details study of Independent House and Apartment

### **Unit –VIII**

Waste -water disposal systems, septic tank and its design, soil absorption system, alternatives, solid wastes collection and removal from buildings. On-site processing and disposal methods. Aerobic and Anaerobic decomposition, purifying capacity of water bodies. Biochemical Oxygen Demand

### **Unit – IX**

Roads and Pavements – Different types, water bound macadam, tar bitumen, asphalt and Cement concrete roads, soil stabilization, types of paving-murram, brick, and stone paving. Drainage of roads, sub-drains, culverts, ditches and gutters.

### **References:**

**Husain, S.K.** T.B. of Water Supply and Sanitary Engineering, 3<sup>rd</sup> ed. Oxford and IBH Pub. Ltd., New Delhi, 1994.

**Kshirsagar, S.R.** Water Supply Engineering, 6<sup>th</sup> ed. Roorkee Pub., Roorkee, 1980.

**Rangwala, S.C.** Water Supply and Sanitary Engineering: Environmental Engineering, 19<sup>th</sup> ed. Charotar Pub. House, Anand, 2004.

## **AR 3.7 CLIMATOLOGY**

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|                  |                |                     |                   |                       |             |
|------------------|----------------|---------------------|-------------------|-----------------------|-------------|
| <i>L/s: 3/Wk</i> | <i>Int: 50</i> | <i>End Exam: 50</i> | <i>Total: 100</i> | <i>End Exam: 3hrs</i> | <i>Cr:3</i> |
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### **Course Overview:**

Science (tools, data, standards, methods and principles) of building design and site planning as related to climate, particularly to tropical climates as found in India.

### **Objectives of the Course:**

To equip the student with the basic understanding of climatic types in India, and the impact on requirements of building design and site planning; to introduce them to the basic science of building design and site planning for thermal comfort, daylighting and natural ventilation; familiarize them with the data, methods, principles, standards and tools for planning and designing for climatic comfort

### **Expected Skills / Knowledge Transferred:**

The student should be able to 'predict' climatic conditions in a given building (simple residence) and undertake redesign for given parameters

### **Course Contents:**

Note: The topics here to be dealt with keeping in mind Indian climatic conditions.

NBC and BIS guidelines / standards have to be introduced at all relevant contexts.

## **Unit – I**

### **Introduction to Building Climatology:**

Climate and built form interaction. Global Climatic factors, elements of climate, graphic representation of climatic data, Mahoneys Tables, macro and micro climate; challenge of rapid, extreme environmental change

## **Unit – II**

### **Tropical Climates:**

Definition, classification of tropical climates, characteristics of different climatic zones, Design considerations for warm-humid, hot-dry, composite and upland climates.

## **Unit – III**

### **Thermal Comfort:**

Thermal comfort factors, Physiological aspects, Body heat balance, comfort range, comfort charts.

## **Unit – IV**

### **Heat flow through Buildings:**

Basic principles of heat transfer through buildings, performance of different materials, Periodic heat flow.

## **Unit – V**

### **Sun and the Design process:**

Solar geometry, Solar charts, Sun angles and shadow angles, orientation for sun, sun control, design of shading devices, building form and heat gain, basic principles of daylighting, sunlight and glare.

## **Unit – VI**

### **Natural Ventilation:**

Air movement around and through buildings, Orientation for wind, stack effect, Induced ventilation.

## **Unit – VII**

### **Passive Cooling:**

Passive methods of Cooling, roof pond, desiccant cooling, evaporative Cooling, and earth sheltered buildings etc.

Site Planning (including landscaping) and building planning and design considering climate factors

Detailed appraisal/analysis of climatological performance of an existing residence and or a workplace; followed by redesigning or the same to improve climatological performance.

**Reference books:**

**Koenigsberger, O.H. and Others.** Manual of Tropical Housing and Building. Orient Longman, Chennai, 2003.

**Konya, Allan.** Design for Hot Climates.

**Kukreja, C.P.** Tropical Architecture. Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 1978.

**Markus, T.A. and Morris.** E.N. Buildings, Climate and Energy. Pitman Pub. Ltd., London, 1980.

**Olgay and Olgay.** Solar Control and Shading Devices.

**FOURTH SEMESTER****AR 4.1 ARCHITECTURAL DESIGN- III**

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total:400    End Exam: Viva-voce    Cr: 9*

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**Course Overview:**

This course focuses on buildings for residential use.

**Objectives of the Course:**

To enhance the understanding of the complexities of architectural design for residential needs and develop creative design solutions for good living environments.

**Course Contents:****The design issues to be addressed:**

Organization of functional activities in relation to user requirements and the site.  
Relating the system of horizontal and vertical circulation, open spaces, parking etc.

Responding to socio-economic factors such as income levels, privacy, territoriality, interaction etc.

Considering materials, structure and services in relation to the design proposal.

Integration of plan forms and three dimensional compositions.

Detailing for the physically handicapped and the elderly.

The list of suggested topics to be covered as design problems:

Large guest house, students hostel, small hotel, holiday resort, motel, row houses, block of flats and residential complexes at a small scale, housing for specific communities in urban and rural areas such as home for the aged,

fishermen's housing etc.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems will have to be covered by the Studio faculty members through lecture/slide show sessions and site visits.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Note: In end exam which is a viva-voce the students are to present the entire semester work for assessment.

### **Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1990.

**Neufert, Ernst. Ernst Neufert Architects Data,** Granada Pub. Ltd., London, 2000.

**Peloquin, Albert.** Barrier-Free Residential Design. McGraw-Hill, Inc., New York, 1994.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Shah, S. Charanjit.** Architects Hand Book Ready Reckoner. Galogotia Pub., New Delhi, 1996.

**Untermann, Richard and Snall, Robert.** Site Planning for Cluster Housing.

### **AR 4.2 BUILDING CONSTRUCTION-IV**

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|------------------|---------------|---------------------|-------------------|------------------------|-------------|
| <i>L/s: 4/Wk</i> | <i>Int:50</i> | <i>End Exam: 50</i> | <i>Total: 100</i> | <i>End Exam: 5 hrs</i> | <i>Cr:4</i> |
|------------------|---------------|---------------------|-------------------|------------------------|-------------|

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#### **Course Overview:**

The course work deals with principles, methods and construction practices of structural steel work.

#### **Objectives of the Course:**

To introduce and expose students to various aspects involving use of steel for construction activity of buildings and structures.

#### **Course Contents:**

##### **Unit - I**

**Structural Steel Work:** General principles and terms defined, standard sections i.e. beams joints, angles, channels, tees, bolts, rivets and welding.

##### **Unit – II**

## **Steel Work Connections**

Bolt Connections, Riveting and welding methods.

## **Unit – III**

### **Steel Members**

Columns and stanchions, stanchions or column bases, beam and girders, column and beam connections plate girders, lattice or warren girder.

## **Unit - IV**

### **Steel Roof Trusses**

Steel trusses, types for various spans, tubular steel roofs, monitor roof, north light roof truss, details of steel –roof trusses.

## **Unit – V**

Lantern light, dome light, structural steel practice and drawings as per IS Code.

## **Unit – VI**

Portal frame, Geodesic principles, cable net and tensile structures.

**Note:** This is a studio subject and students should be made to prepare construction drawings as studio exercises along with the theoretical inputs. The studio work should be supplemented with appropriate site visits.

### **Reference books:**

**Bindera and Arora.** Building Construction: Planning Techniques and Methods of Construction, 19<sup>th</sup> ed. Dhanpat Rai Pub., New Delhi, 2000.

**McKay J.K.** Building Construction Metric Vol. 4, 4<sup>th</sup> ed. Orient Longman Pvt. Ltd., Mumbai, 2002.

**Mitchell.** Advanced Structures.

**Rangwala, S.C.** Engineering Materials: Material Science, 31<sup>st</sup> ed. Charotar Pub. House, Anand, 2004.

## **AR 4.3 DESIGN OF STRUCTURES - I**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr:3*

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### **Course Overview:**

This course focuses on structural design of different elements of building in RCC.

### **Objectives of the Course:**

To develop the structural design skills in RCC elements

### **Course Contents:**

### **Unit – I**

Introduction to RCC design, Design Philosophies: Working stress and limit state method, singly reinforced beam, Analysis and Design using both working stress and limit state methods.

### **Unit – II**

Situations where doubly reinforced beams are used, analysis and design of doubly reinforced beam using limit state method only.

### **Unit – III**

T-beams: introduction, analysis and design of T-beam using Limit State method only. Design of shear reinforcement for all types of beams with and without cranking (Limit State method only)

### **Unit – IV**

Slabs: Introduction, Design of One way and two way reinforced slabs (simply supported, Restrained, continuous) by limit state method only.

### **Unit-V**

Design of axially loaded RCC columns and columns subjected to BM about one and two axis using limit state method only.

### **Unit-VI**

Design of stair case (Dog-legged only) using working stress method.  
Design of lintels and cantilever beams and slabs using limit state method only

### **Unit-VII**

Design of RCC Isolated footings for columns (Square and Rectangle) - working stress method only.

### **Unit-VIII**

Introduction, to prestressed concrete, Pretensioning & Post tensioning methods, Problems of beams.

### **Reference books:**

**A.K.Jain.** Reinforced Concrete: Limit State Design, 5<sup>th</sup> ed. New Chand and Bros., Roorkee, 1999.

**Ramamrutham. S. and Narayan, R.** Design of RCC Structures, 12th ed. Dhanpat Rai Pub. Co. Pvt. Ltd., Delhi, 1998.

### **AR 4.4 HISTORY AND THEORY OF ARCHITECTURE-I**

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*L/s: 3/Wk    Int: 50    EndExam:50    Total: 100    End Exam: 3hrs    Cr:3*

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**Course Overview:**

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and theories and not on specific examples of buildings.

**Objectives of the Course:**

To expose the students to a wide spectrum of architectural styles and theory.

To explain the students how architecture evolved in relation to time with special emphasis to social, religious and environmental factors.

To make the students understand the developments in the construction technology in different periods.

**Expected Skills / Knowledge Transferred:**

1. Acquire knowledge to identify the common characteristics among the monuments of a particular Style.
2. Acquire graphic skills to present a building, analyze its elements and explain the composition.
3. Acquire knowledge on good practices of architecture in the past.

**Course Contents:****Unit – I**

Influence of Industrial Revolution on building materials, Construction Technology, evolution of new building types and increasing user requirements.

**Unit – II**

Characteristic styles of modern architecture up to First World War. Steel structures, Arts and crafts movement, Art Nouveau, Vienna School, Chicago School,

Monumentalism, Expressionism and beginning of RCC. Theories of John Ruskin, William Morris, Henry Vande velde, Otto Wagner, Peter Behrens and Louis Sullivan.

**Unit – III**

Contributions to Architecture and Theory made by pioneers-Le-Corbusier, Frank Lloyd Wright, Walter Gropius, Mies Van der Rohe in the periods between the World Wars.

**Unit – IV**

Characteristics of modern architecture after the Second World War. Study of Alvar Aalto, Eero Saarinen, Richard Neutra, Louis I Kahn, Phillip Johnson, etc.

## Unit – V

Design theories and contributions of Engineer- architects like Pier Luigi Nervi, Felix Candela, Buckminster Fuller, and Frei Otto.

## Unit – VI

Pre-independence architecture in India: Development of secular architecture from the end of the 18th Century to the middle of the 20th Century.

### Reference books:

**Benevolo, Leonardo.** History of Modern Architecture: the tradition of modern architecture Vol.1. Routledge and Kegan Paul, London, 1971.

**Frampton Kenneth Modern Architecture: A Critical History**  
**London: Thomes & Hudson,1980**

**Benevolo, Leonardo.** History of Modern Architecture: the modern movement Vol.2. Routledge and Kegan Paul, London, 1971.

**Curtis, J.R. William.** Modern Architecture since 1900. Prentice-Hall, Inc., New Jersey, 2002.

**Giedion, Sigfried,** Space, Time and Architecture: the growth of a new tradition, 4th ed. Harvard Universtiy Press, Cambridge, 1962.

**Hilberseimer, L.** Contemporary Architecture: Its roots and trends. Paul theobald, Chicago, 1964.

**Pevsner,Nicolaus Oersonem:** Pioneers of Modern Design from William Morris to Walter Gropius-

**Sharp, Dennis.** Twentieth Century Architecture: A Visual History, Facts On File. New York, 1991

Norberg schul C., Principles of Modern Architecture, London Andreas papadakes,2000.

## AR 4. 5 BUILDING SERVICES-II

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|                  |               |                     |                   |                      |              |
|------------------|---------------|---------------------|-------------------|----------------------|--------------|
| <i>L/s: 3/Wk</i> | <i>Int:50</i> | <i>End Exam: 50</i> | <i>Total: 100</i> | <i>EndExam:3 hrs</i> | <i>Cr: 3</i> |
|------------------|---------------|---------------------|-------------------|----------------------|--------------|

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### Course Overview:

Study of Building Services and Utilities generally installed in buildings and their role in enhancing utilitarian value of the buildings. The study to focus on understanding basic working, principles, terms and definitions, as well as practical aspects and solutions utilized in architecture.

### Objectives of the Course:

To gain knowledge regarding layout of utilities and services in the building envelope, functioning of service and their applications in building.



## **Course Contents:**

### **Unit – I**

Fundamental principles of Electricity: Voltage, Amperage, wattage, generation, and transmission of power, distribution in cities, HT and LT consumers, Transformers and load calculations, Single and three phase connections, Indian Electricity rules., Types of Generators, UPS

### **Unit – II**

Building Wiring System: Service wires, metering, light and power circuits. electrical safety devices, MCB, ELCB, distribution boards, wiring methods, ISI Codes and standard materials, Conductors, switch boards, electrical points in general building, pipe earthing, plate earthing.

### **Unit – III**

Electric layouts: Electrical symbols, NBC, preparation of layouts for residences, offices, construction and working of at least six domestic appliances, location in buildings, Types of electric motors and pumps.

### **Unit – IV**

Building lighting system: artificial illumination, various types of lamps, advantages and disadvantages, method of lighting, direct, semi direct, indirect, concealed lighting, spot lighting, task lighting, decorative lighting, rope lights, neon lights, flood lighting, yard lighting, under water lighting.

### **Unit – V**

Lighting Calculation: NBC standards, nominal illumination levels in building interiors, lux, lumen, intensity, lighting schemes.

### **Unit – VI**

Principles of air-conditioning: IAQ, comfort conditions, gas laws, refrigeration cycle, a/c equipment, compressor heat exchangers, condenser, evaporators,

### **Unit – VII**

Types of Air-conditioning: single zone, multi zone, window air conditioners, split air conditioners, ductable air conditioners, package system and central air conditioning,  
all air systems and chilled water systems.  
a/c plant room, AHU's  
Building ducting, diffusers and grills, FC units.

### **Reference books:**

**Electrical wiring and Contracting (Vol.1 to Vol.4)**, London The New era Publishing Company.

**Dr. Frith Abnwas and others**, Electrical Engineering hand Book

**William. J. Guinness**, Mechanical and electrical Equipment for Buildings, New York: Willey

**Bovay. H.E.**, Handbook of Mechanical and Electrical Systems for Buildings New York: MC Graw Hill

## **AR 4.6 LANDSCAPE DESIGN AND SITE PLANNING**

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*L/s: 4/Wk    Int: 50    EndExam: 50    Total: 100    End Exam: 3 hrs    Cr: 4*

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### **Course Overview:**

This course introduces students to landscape design and site planning and relate it to design and planning of built environments. It provides an overview of development of landscape design, site studies, plant studies and application of the knowledge at various levels of design.

### **Objectives of the Course:**

1. To develop a conceptual understanding of landscape design and site planning principles.
2. To develop skills in integrating landscape design with built environments.

### **Course Contents:**

#### **Unit – I**

Introduction and History of Landscape Architecture. Introduction to landscape Architecture and Role of Landscape design in built environment.

A brief review of Landscape Design and garden design in history in various regions Persian, Spanish, Italian, French, Moghul, English, Japanese Garden styles.

Changing perception of mans relationship with nature in various phases of history and its influence on environment.

Evolution of concepts in landscape design after the industrial revolution leading to new theories in integrating built spaces to open spaces. Increasing awareness of ecological variables in landscape design.

#### **Unit - II**

Site Studies and Site Planning

Principles of site Planning and land use; review of definition applied in typical landscape development situations.

Site survey and appraisal – understanding different site characteristics – topography, vegetation, Hydrology, Access, Surroundings etc. documents, site characteristics and establishing relationship with design / Architecture Programme requirements.

Philosophical and design issues related to site development – siting of buildings,

spatial and contextual relationships of built and outdoor space and circulation, site and its relationship to surroundings. Importance of climate and social factors in development of site.

Process of design development. Identifying functional requirements of site.

Development of site by mutual exploitation of forms and use of grading principles.

### **Unit -III**

#### **Plants and Design**

Introduction to study of plants in relation to landscape design and architecture. An overview of use of plants in history.

Study of Plant material – Botanical Nomenclature anatomy and physiology of plant growth study of trees, shrubs, ground cover, indoor plants in Indian context.

Design with plants – Basic principles of designs. The physical attribute of plants and relation to design. Appearance, functional and visual effects of plants in landscape design and built environment.

Selection and management of plant material in relation to built environment.

### **Unit -IV**

#### **Elements in Landscape Design**

Use of landform, water and vegetation in landscape design.

Hard landscapes: design of paths, roadways streets, terraces etc and use of land form effectively.

Soft landscapes: design of lawns, shrubs, hedges, trees – in relation to buildings and other landscape elements.

Design concepts related to use of sculpture, outdoor lightings, Architectural feature, street furniture and grouping them into meaningful compositions for visual and functional effects.

### **Unit -V**

#### **Landscape Construction and Services**

Study of landform its technical expression through grading plan, sections and earthwork computations.

Irrigation systems – sprinkler trickle irrigation, drip irrigation and laying irrigation networks.

Construction of structure in landscape circulation roads, parking, paths, level changes – walls, steps lamps, construction of screens, trellis, wall fences gales decks, pools etc.

### **Unit -VI**

#### **Contemporary concepts and concerns**

Contemporary attitude to development and design of open spaces – Urban landscape, Parks, Rural landscape etc.

Introduction to concepts of green architecture and micro climate planning. The

role of landscape components in modifying micro climate with respect to temperature, humidity, precipitation and percolation.

### Assignments

Simple exercises in using plants and landscape elements

Studio exercise emphasizing relationship between built form and outdoor areas and site planning issues.

### Reference books:

**Blake, Alan.** Landscape Construction and Detailing. B.T. Batsford Ltd., London, 1996.

**Colvin, Brenda.** Land and Landscape.

**Hacheat, Brian.** Planting Design.

**Harris, C.W. and Dines, T. Nicholas.** T.S.S for Landscape Architecture. McGraw Hill, New York, 1995.

**Laurie, Michael.** An Introduction to Landscape, 2nd ed. Prentice Hall, New Jersey, 1986.

**Lynch, Kevin.** Site Planning. MIT Press, Massachusetts, 1962.

John I.Mutloch. Introduction to Landscape Design, ,2nd ed.John Wiley & Sons,Inc,New york,2001

**Santapau. H.** Common Trees. National Book Trust, New Delhi, 1981.

**Trivedi, P. Pratibha.** Beautiful Shrubs. Indian Council of Agricultural Research, New Delhi, 1990.

### AR 4.7 COMPUTER APPLICATIONS-II

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|------------------|----------------|---------------------|-------------------|--|-------------|
| <i>L/s: 4/Wk</i> | <i>Int: 50</i> | <i>End Exam: 50</i> | <i>Total: 100</i> | <i>End Exam: 3 hrs</i><br><i>Practical</i> | <i>Cr:4</i> |
|------------------|----------------|---------------------|-------------------|--|-------------|

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#### Course Overview:

To orient the student to create two and three-dimensional objects in space with special emphasis on presentation and visualization of interiors and exteriors of building using different rendering techniques using CAD.

**Objectives of the Course:** To explore computer modeling techniques using CAD

#### Expected Skills / Knowledge Transferred:

To learn basic skills of modeling, scripting (rendering) in CAD, and to exercise methods of interface within CAD.

#### Course Contents:

#### Unit - I

Starting Auto CAD: Introduction to the menu, starting drawings from scratch, Creating and using templates-starting drawings with setup wizards. Saving and closing a file.

### **Unit - II**

Using co-ordinate system: The UCS, Working with Cartesian and polar co-ordinate systems, using displays with key shortcuts.

### **Unit – III**

Setting up the drawing environment: Setting the paper size, Setting units, setting grid limits, drawing limits, Snap controls, Use of paper space and model space.

### **Unit - IV**

Basic commands dealing with drawing properties: Layer control, change properties, line weight control, etc.

### **Unit - V**

Inquiry methods: Using database information for objects, calculating distance and angle, areas etc.

### **Unit - V1**

Dimensioning commands and Blocks: Dimensioning the objects in linear, angular fashions along with quick time dimensioning etc. Creating and working with blocks, creating symbols, use of blocks in creating a layout of a residential area-one exercise to be done as lab assignment.

### **Reference books:**

**Teyapoovan, T.** Engineering Drawing with Auto CAD 2000. Vikas Pub. House Pvt. Ltd., New Delhi, 2000.

**Parker, Daniel and Rice, Habert.** Inside Auto CAD Daniel. 1987.

**Georgemura,** Auto CAD Release 2000.

**AutoCAD 2010** Textbook-AutoCAD 2010: A Problem-Solving Approach-Customizing AutoCAD 2010

**Beginning AutoCAD 2007-** By Bob McFarlane, Robert McFarlane

## FIFTH SEMESTER

### AR 5.1 ARCHITECTURAL DESIGN – IV

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total:400    End Exam: Viva-voce    Cr: 9*

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#### **Course Overview:**

This course focuses on institutional design - facilities required and detailing design for institutions in urban context.

#### **Objectives of the Course:**

To enable the student to design institutions within the given conditions.

#### **Expected Skills / Knowledge Transferred:**

Detailing skills required for the design of institutions in urban contexts.

#### **Course Contents:**

The following issues relating to institutional design will be addressed to:

- Nature of contemporary institutions, correlation to urban structure.
- Development control and urban infrastructure affecting design.
- Various attitudes to building in urban context.
- Integration of function: movement, climate, acoustics, structure and services into the group of buildings.
- Landscaping and site planning
- Institutional character from abstract to detail.
- User behavior and requirement pertaining to the physically handicapped.

Necessary theoretical inputs to be given highlighting the norms and design issues.

The topics not covered as design problems may be covered by the studio faculty members through lecture/slide shows. And site visits.

The topics to be covered as design problems may include:

- Institution of learning –colleges with its various departments such as medical, engineering. Law, business, music and dance colleges, vocational training institutions etc.
- Institutions of health such as hospitals, reformatories and rehabilitation institutes for the disabled.
- Institutions of research in various disciplines.

- Administrative and Legal institutions such as high courts, secretariat, development authorities, directorates etc.

At least two major exercise (one problem should be pertinent to the urban fabric) and two minor design/time problems should be given and the final submission shall necessarily include a model for at least one of the two main problems.

**Note:** In end exam which is a viva-voce the students have to present the entire semester work for assessment.

**Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1990.

Hand Book of Planning and Design Data.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors Offices and Clinics, 2<sup>nd</sup> ed. Reinhold Pub., USA, 1960.

**Konya, Allan.** Libraries: A Briefing and Design Guide. The Architectural Press, London, 1986.

**Neufert, Ernst.** Ernst Neufert Architects Data. Granada Pub. Ltd., London, 2000.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Rosenfield, Isadore.** Hospital Architecture and Beyond. Van Nostrand Reinhold, New York, 1969.

**Stone, G. Louis.** Institutional Buildings Architecture of Controlled Environment.

**Tergsone, W.R.** Practical Laboratory Planning.

**Wild, Friedemann,** Libraries for Schools and Universities. Van Nostrand Reinhold, New York, 1972.

**AR 5. 2 BUILDING CONSTRUCTION – V**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5 hrs    Cr:4*

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**Course Overview:**

Course focuses on issues related to failures in buildings, decay and damage, approaches for maintenance, repairs and renovation of buildings.

**Objectives of the Course:**

To create awareness among the students regarding problems related to old buildings and methods to mitigate their problems.

**Course Contents:**

## **Unit - I**

### **Failures:**

Introduction to building failures: causes of decay and damage in old buildings, issues of maintenance and repair. Preliminary inspection and general observation, decayed elements difference between decay and damage.

## **Unit - II**

### **Timber:**

Moisture content, treatment prior to installation, factors reducing strength of timber, approach to repair and to the timber roofing system.

## **Unit - III**

### **Bricks:**

Strength reducing factors in brick work, effect of ageing, weathering, temperature variation of brick-work, joints and cracks, construction defects, repair and maintenance.

## **Unit - IV**

### **R.C. Concrete:**

Mixing methods at site, structural design for repairs, causes of failure in concrete structures, pressure-grouting.

## **Unit - V**

### **Methodical approach to Repairs:**

Cracks over openings, sinking and sagging balconies, repairs to decayed floors and floor joints, example: Jack arch., madras roof terrace, foundation sinking, repairs to walls. Propping, strutting and under pinning.

## **Unit - VI**

### **Unusual problems:**

Repairs to large span rooms, water proofing the roof terraces, leakages from toilets, case studies and site visits.

**Note:** This is a studio subject and students should be made to document the problems in old buildings through inspections and propose remedial measures by preparing construction drawings as studio exercise with the theoretical inputs given through lectures.

### **Reference books:**

**Feilden, M. Bernard.** Conservation of Historic Buildings. Butterworth Scientific, London, 1992.

**McKay, W.B.** Failures and Repair of Concrete Structures Vol. IV.

**Raikar, R.N.** Learning From Failures: Deficiencies in Design. Construction and Service, R and D Centre, New Bombay, 1987.



## AR 5.3 DESIGN OF STRUCTURES-II

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*L/s: 3/Wk    Int:50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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### **Course Overview:**

Course focus is on Structural Design of elements of Industrial Building in Steel.

### **Objectives of the Course:**

To develop the structural design skills of the student in steel.

**Expected Skills / Knowledge Transferred:** Develop capability to design Steel structures.

### **Course Contents:**

#### **Unit – I**

Design of simple beams including check for shear and deflection for laterally supported and unsupported conditions, analysis of simple beam from strength and stiffness considerations.

#### **Unit – II**

Design of built up beams with flange plates only, Introduction to plate girders (No Design calculations)

#### **Unit – III**

Axially loaded tension members: introduction, net effective areas, analysis and design of tension members including rivet and welded connections, (L-Angle and T-section only)

#### **Unit – IV**

Columns: Analysis and design of axially loaded steel columns using single I-section, 2 channels placed back to back and toe to toe, 4-angles etc., including lacing system.

#### **Unit-V**

Design of slab base and gusseted base for axial loads (with out moments) for different columns.

#### **Unit-VI**

Design of grillage foundation for isolated columns only

#### **Unit-VII**

Purlins: Introduction, Dead load, live load and wind loads, design of angle purlin and I-section purlin.

## Unit-VIII

Bracket Connections, Riveted & Welded Connections design of Joints.

### Reference books:

**Ram Chandra.** Design of Steel Structures Vol. I, 10<sup>th</sup> ed. Standard Book House, Delhi, 1999.

**Dayaratnam, P.** Design of Steel Structures. Wheeler Pub., Allahabad, 1992.

**Ramamrutham, S. and Narayanan, R.** Design of Steel Structures, 4<sup>th</sup> ed. Dhanpat Rai and Sons, Delhi, 1995.

## AR 5.4 HISTORY AND THEORY OF ARCHITECTURE-II

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*L/s: 3/Wk    Int:50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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### Course Overview:

The course is designed to study the contemporary developments in Architecture and its impact on built form, structure, construction methods etc.

### Objectives of the Course:

To orient the students to various developments in the field of architecture for a greater understanding of trends in contemporary architecture.

### Course Contents:

#### Unit – I

Contemporary trends in architecture of India after Independence. Influence of Le Corbusier and. Louis.I.Khan.

#### Unit – II

Theory and works of Achyut Kanvinde, J.A. Stein, Habib Rehman etc.,

#### Unit - III

Contributions made by Pioneers - Charles Correa and B.V. Doshi. Anant Raje, Raj Rewal

#### Unit – IV

Design Theories and works of contemporary architects - Uttam Jain, Hasmukh Patel, including Chandravarkar and Thacker, Jaisim, Anil Laul, Shirish Beri, Romi Khosla, Ranjit Sabiki, Shashi Bhooshan and Sanjay Mohe.

## Unit – V

Familiarisation of architecture at Auroville and Laurie Baker's work in Kerala.

## Unit – VI

Contemporary trends in the rest of the world architecture. Theory of Post Modernism.

## Unit – VII

Design Theories and works of Charles Moore, Michael Graves, Richard Meyer, Aldo Rossi, Cesar Pelli, I.M. Pei, Yamasaki, Peter Eisenmann etc.

## Unit – VIII

Design Theories and works of Hassan Fathy, Geoffery Bawa, Norman Foster, Renzo Piano, Richard Rogers, Frank Gehry, Zaha Hadid, Santiago Calatrava, Tadao Ando etc.

## Reference Books:

**Bahga, S.S:** Post Independent Architecture.

**Bhatt, Vikram and Scriver, Peter.** Contemporary Indian Architecture After the Masters. Mapin Pub. Pvt. Ltd., Ahmedabad, 1990.

**Curtis, J.R. William.** Modern Architecture since 1900. Prentice-Hall, Inc., New Jersey, 2002.

**Jencks, Charles.** The Language of Post-Modern Architecture, 4<sup>th</sup> ed. Academy Editions, London, 1984.

Frampton, K Tad Ando- buildings, Projects Writings, New York Rizzoli, 1984.

## AR.5.5 BUILDING ESTIMATING COSTING AND SPECIFICATIONS

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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### Course Overview:

The course deals with various methods of quantity surveying, rate analysis of building and valuation and specifications for different materials used.

### Expected Skills / Knowledge Transferred:

Techniques of estimating and costing and writing specification related to building construction.

### Course Contents:

#### Unit - I

Quantity Surveying: Introduction - Definitions and terms used, principles, units of measurements. Methods of preparing approximate estimates (plinth area and cubic

content method), basic differences and advantages.

### **Unit - II**

Detailed Building Estimation: Method of obtaining detailed quantities of building items (center line method, long wall and short wall method) PWD System to be followed.

### **Unit - III**

Detailed estimation for load bearing structures framed structure (ground floor only)

### **Unit - IV**

Example and exercise in obtaining all items from excavation to finishes.

### **Unit - V**

Preparing approximate estimates for services like water supply, plumbing, electrical work, mechanical equipment and air conditioning. (for residential building).

### **Unit - VI**

Rate analysis: Cost of materials and labour for various works, data sheet for different items of works, different methods of execution i.e. piece work, daily basis, lump sum, labour rates and percentage etc

### **Unit - VII**

Valuation – Introduction – state the purposes of valuation of building explain the terms, market value, book value, capital cost, capitalized cost, year's of purchase, list out various methods of estimating the depreciation of building properties, calculate the value of the property by different methods.

### **Unit-VIII**

**Specifications:** Definition, purpose and importance of specifications, General or brief specifications, Detailed specifications, writing of specifications, for items like earthwork excavations, foundation, CRS masonry, DPC, PCC, RCC, brickwork, doors and windows (wooden), mortars, plaster, painting, flooring like terrazzo flooring and tiles, ceramic tiles, marble, granite, distemper, snowem, glazing, specification, writing to include materials, tests pre and post installation, modes of measurements.

### **Reference books:**

**Datta, B.N.** Estimating and Costing in Civil Engineering: Theory and Practice, 23rd ed. UBS Pub. Distributors Ltd., New Delhi, 1993.

**Bride, G.S. Estimating and Costing**, 2<sup>nd</sup> ed. Dhanpat Rai and Sons, Delhi, 1982.

**Rangwala, S.C.** Valuation of real Properties, 6<sup>th</sup> ed. Charotar Pub.

6 House, Anand, 2003.

**Standard Specification and rates**, Government of Andhra Pradesh, Government Press, Hyderabad

**Indian Standards Institution**. National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

**Lerrs, Jack**. Engineering Construction Specification.

**Macey, W. Frank**. Specification in Detail, 5th ed. Technical Press Ltd, London, 1955.

**Lewis, R. Jack**. Building Construction Specifications. Prentice-Hall, Inc., New Jersey, 1975.

**Govt. of Maharashtra**. Standard Specifications, Government Press, Nagpur, 1972.

## AR 5.6 ENVIRONMENTAL STUDIES

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*L/s: 3/Wk    Int:50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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### Course Overview:

A compulsory subject for all the undergraduate students of various discipline highlights significance of maintaining balance and sustainability of various components of the environment.

### Objectives of the Course:

To sensitize the students towards sustainable environment.

### Course Contents:

#### Unit – I

**Environmental studies – Introduction:** - Definition, scope and importance, Measuring and defining environmental development indicators.

#### Unit - II

**Environmental and Natural Resources:** Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation, case studies - Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water - Floods, drought, conflicts over water, dams - benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

### Unit - III

**Basic Principles of Ecosystems Functioning:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem Ecological succession. - Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

### Unit - IV

**Biodiversity and its conservation:** Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - *Biodiversity* at global, National and local levels. - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### Unit - V

**Environmental Pollution:** Definition, Cause, effects and control measures of:

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

### Unit - VI

Social Issues and the Environment: From unsustainable to sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. - Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

### Unit - VII

Human Population and the Environment: Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. -Case

Studies.

### **Unit - VIII**

Field work: Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems - pond, river, hill slopes, etc.

TEXT BOOK:

**Erach Bharucha**, A Text Book of Environmental Studies for Undergraduate Courses, University Grants Commission.

### **AR 5.7 COMPUTER APPLICATIONS-III**

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*L/s: 4/Wk    Int:50    End Exam: 50    Total: 100    End Exam: 5 hrs    Cr:4*

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Course Overview:

This subject aims to further architectural design skills through advanced computer applications. The subject focus is in the area of computational media techniques and technologies and their impact on architectural design and production. This digital studio critically explores the impact of existing and emerging digital media and software, for advanced digital visualization, simulation and communication as well as associated theories and methods on the conceptualization and development of architecture. Computational media is broadly defined across three categories: digital techniques for visualization; data collection and analysis, building information modeling (BIM) and introduction to physical model making using computer technologies.

#### **Unit –I**

Introduction to digital theory and this unit equips students with an understanding of the territory of computational design through its theoretical vocabulary and relevant histories.

Making of Architectural vector diagrams to explore design and for digital communication using vector applications like coreldraw, illustrator etc.

#### **Unit –II**

**3d modeling** and different types of methods in 3 modeling like polygonal modeling , NURBS modeling ,subdivision surface modeling and building information modeling etc to design and test Architectural built environments virtually.

#### **Unit –III**

**Scene setup** involves arranging virtual objects, lights, cameras and other entities on a scene which will later be used to produce a still image or an animation. Image

processing and video editing to create Architectural walkthroughs.  
Digital solar studies

#### **Unit –IV**

**Building information modeling; using** 3 dimensional, real-time, dynamic building modeling software to increase productivity in building design and construction. The process produces the Building Information Model (also abbreviated BIM), which encompasses building geometry, spatial relationships, geographic information, and quantities and properties of building components.

Design and documentation using building information modeling application like Revit Architecture, ArchiCAD, Bentley Architecture etc

#### **Unit –V**

Introduction to Organic modeling and 3d printing to explore biomimetics and emergent concepts in the field of architecture and design by using advanced computational technologies

#### **References:**

Catalytic Formations: Architecture and Digital Design. Ali Rahim

BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors- Chuck Eastman

Building Information Modeling – Willem Kymmell

## **SIXTH SEMESTER**

### **AR 6.1 ARCHITECTURAL DESIGN –V**

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr: 9*

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#### **Course Overview:**

Course aims at teaching the design of buildings for passive recreation and large span buildings for public uses.

#### **Expected Skills / Knowledge Transferred:**

Design vocabulary, enhancement and sensitization of student in design preparation and its relation to structural systems

#### **Course Contents:**

Design issues should address the following:

- Environmental and micro climate.
- User behavior and requirements.
- Utility and space enhancement.



- Form and function.
- Circulation: horizontal and vertical.
- Site Planning and Landscape detailing.
- Structural details such as beam framing, Building Services / HVAC etc.
- Design detailing considering the barrier free environment.
- Socio-economic profile of user group.
- Parking details and standards.

**Topics considered for design are:**

Passive Recreation buildings such as:

- Infotainment center.
- Civic Centre
- Convention Centre.
- Cultural Centre.
- Community Centre.

Public Buildings - Large Span structures:

- Bus terminals.
- Multiplex.
- Auditorium Complex.
- Museum and Art Gallery.
- Kalyana Mandapam.

At least two major exercises and one minor design / time problem need to be covered. Design proposal along with a scale model / digital model must be submitted for the two main problems.

Sufficient theoretical inputs need to be given highlighting the norms and standards of design parameters.

**Note:** In end exam which is a viva-voce the students have to present the entire semester work for assessment.

**Reference books:**

**Chiara Joseph de and Others. Time Savers Standards of Building Types. McGraw – Hill, 1980.**

**Dawes, John.** Design and Planning for Swimming Pools. The Architectural Press, London, 1979.

**Ruknitein, M. Harvey.** Central City Malls.

**AR 6.2 WORKING DRAWINGS & DETAILS**

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*L/s: 6/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: Viva-voce    Cr:6*

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**Course Overview:**

The focus of the course is to impart skills related to the preparation of drawings meant for construction work on the site and to improve the students' ability of detailing.

**Objectives of the Course:**

To impart training in the preparation of working drawings for buildings with specific reference to code of practice as per IS Code No. 962 of 1969 and incorporating specifications as complementary to the working drawings.

To sensitize the students in preparing finer design details required for buildings.

**Expected Skills / Knowledge Transferred:**

To prepare working drawings for a project and resolve complex aspects in the buildings with appropriate materials and design details.

**Course Contents:****Unit - I**

Preparation of working drawings: Suitable scales of drawings, methods of giving dimensions: on plans, sections, elevations and other standards.

**Unit – II**

Preparation of Plans Building marking plan, centerline plan, foundation plan, column centerlines drawings, floor plans, terrace floor plan.

**Unit - III**

Elevation and Sections

Detailed elevations, detailed sections – at least one through staircase and one through toilet, typical wall profile sections and elevations.

**Unit - IV**

Details

Layout for Sanitation: and detailed plans, Electrical layout: plans and details, details of staircases, toilets and kitchens.

**UNIT – V**

Detailing for walls, floors, ceilings through detail drawings to large scale in the form of plans, sections, elevations. Surface Treatment; Cladding, texture treatment.

**UNIT – VI**

Detailing of architectural elements such as staircase, balcony, verandah, shading devices vertical and horizontal components of the building.

## UNIT – VII

Detailing of Doors, windows, storage shelves for frames, shutters, joinery of frame to shutter, shutter to panelling etc. and other fixing details.

## UNIT – VIII

Design details appropriate for creating Barrier Free Environment.

\*Note: - Students shall prepare at least two working drawing sets, one for a small residence and one for a large building.

### Reference books:

**Lerris, Jack.** Engineering Construction Specification.

**Liebing, W. Ralph and Raul, Ford Mimi.** Architectural Working Drawings, 2nd ed. John Wiley and Sons, New York, 1983.

**Macey, W. Frank.** Specification in Detail, 5th ed. Technical Press Ltd, London, 1955.

**Shah, M.G., and Others.** Building Drawing: with an integrated approach to build environment, 3rd ed. Tata McGraw Hill Pub., co. Ltd, New Delhi, 1996.

**Standard Specification of Government of Andhra Pradesh State.**

**Lewis, R. Jack.** Building Construction Specifications. Prentice-Hall, Inc., New Jersey, 1975.

**Govt. of Maharashtra.** Standard Specifications, Government Press, Nagpur, 1972.

**Datta, B.N.** Estimating and Costing in Civil Engineering: Theory and Practice, 23rd ed. UBS Pub. New Delhi, 1993.

**Wakita, Osamu A. & Linde, Richard M.** The professional practice of architectural detailing, 2nd ed. New York: Wiley, 1987.

**Robert, C. Mc Hugh.** Working Drawing Hand Book, New York: VNR, 1977.

## AR 6.3 ARCHITECTURAL ACOUSTICS

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|                  |                |                     |                   |                        |             |
|------------------|----------------|---------------------|-------------------|------------------------|-------------|
| <i>L/s: 3/Wk</i> | <i>Int: 50</i> | <i>End Exam: 50</i> | <i>Total: 100</i> | <i>End Exam: 3 hrs</i> | <i>Cr:3</i> |
|------------------|----------------|---------------------|-------------------|------------------------|-------------|

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### Course Overview:

Acoustics to be studied as a determinant of built form with emphasis on the application to architecture.

### Objectives of the Course:

To give an over view of acoustics as a deterrent of built from.

To equip the students with tools for application of acoustical design in architecture.

### Expected Skills / Knowledge Transferred:

The knowledge of specific acoustic requirements of different spaces

Skills to deal with acoustic problems within buildings

Knowledge that enables to deal effectively with specialists and consultants in

acoustics

## **Course Contents:**

### **Unit – I**

Need to study acoustics; pioneers and their works. Acoustics examples from the past: methods used for good acoustics.

### **Unit – II**

Basic theory: Generation, propagation, transmission; reception of sound; Frequency, wavelength and velocity of sound; sound intensity; inverse-square law; decibel scale, decibel addition, small numerical examples in intensity of sound.

### **Unit – III**

Human ear, Loudness perception, subjective effects, characteristics of sound in speech and music, A-weighted sound levels.

### **Unit – IV**

Room acoustics: Behavior of sound in enclosed spaces. Ray-diagrams, sound paths, effect of geometry and shapes, sound adsorption, sound absorption coefficients, Sabine's formula, and resonant panels.

### **Unit – V**

Acoustic design process and different types of buildings, Auditoriums, concert halls, cinema halls, Seminar rooms, lecture halls, class rooms and open offices. Case study of an auditorium with a report containing drawings and calculations of reverberation time etc. Detailed acoustic design for any one type of building.

### **Unit-VI**

Noise reduction: Sound isolation, transmission loss TL, TL for walls, sound leaks in doors, noise reduction between rooms, Construction details for noise reduction. Noise reduction and built form, Noise reduction through landscapes elements, land use planning for noise control.

### **Unit-VII**

Noise reduction from mechanical equipment, Rubber mounts, vibration isolation guidelines, characteristics of duct system, noise in AC ducts, vibration isolation of pumps and generators.

### **Unit-VIII**

Speech privacy, annoyance, background noise. Communication in open plans, electronic sound systems, loud speaker's layout.

## **Reference books:**

**Poella, L. Lestie.** Environmental Acoustics.

**Moore, J.E.** Design of Good Acoustics, The Architectural press, London, 1961.

**Burris, Harlod.** Acoustics for the Architect.

**Lord, Peter and Templeton, Duncan.** The Architecture of Sound: Designing Places of Assembly. Architectural Press Ltd., London, 1986.

**Egan, David.** Architectural Acoustics, MC Graw-Hill Book Ccompany, New York, 1988

## **AR 6.4 BUILDING CODES AND BYELAWS**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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**Course Over View:** Deals with codes and regulations to be applied to building Projects.

**Objectives of the Course:** To provide an introduction to the codes and bye laws applicable to building projects

### **Unit-I**

#### **Introduction to building codes and norms**

Need and nature of building codes, standards and regulations, overview of basic terminologies, nature of building codes in special regions like heritage zones, air funnels, environmentally sensitive zones, disaster prone regions, coastal zones, hilly areas, etc.

### **Unit-II**

#### **Study of building regulations**

Overview of administrative processes for obtaining building permits at various stages; General Land-use, building classifications and permissible uses; Norms for exterior and interior open spaces, Setbacks and margins, norms for building projections in open spaces, considerations in FAR, guidelines for open green areas.

### **Unit – III**

#### **Norms for Vehicular Areas**

Means of access, norms for access widths for various types of buildings, requirements of parking spaces, standards for turning radius, access to service areas.

### **Unit-IV**

#### **Norms for Fire Protection**

Overview of fire protection norms for various building classifications, norms for fire-exit ways and building materials, concept of fire zoning, doorways, stairways, passages and corridors, fire escapes etc.

## **Unit-V**

### **Norms for building services**

Norms for lighting and ventilation, introduction to basic terminologies, components of daylight factor, general principles of opening for good lighting, considerations in artificial lighting; general principles for natural and mechanical ventilation, overview of norms for acoustical and electrical installations.

## **Unit – VI**

### **Requirements for parts of buildings**

Plinth, Habitable rooms, kitchen, wet areas, mezzanine, store rooms, elevated parts like chimneys, parapets etc.

## **Unit - VII**

### **Introduction to local building byelaws**

Study of local administrative provisions for obtaining building permits, architectural control and provision of building services, regulations for super structures, building height regulations, regulations for multi-storied buildings etc.

### **Reference books:**

**Bhagiratha Rao, E.L.** Land Acquisition Manual in Andhra Pradesh.

**Buch, N. Mahesh.** Planning the Indian city.

**Chand, Mahesh and Puri, Vinay Kumar.** Regional Planning in India. Allied Pub. Ltd., Bombay, 1990.

**Gallion, B. Arthur and Eisner, Simon.** Urban Pattern: City Planning and Design, 5<sup>th</sup> ed. Van Nostrand Reinhold, New York, 1986.

**Hyderabad Urban Development Authority.** Hyderabad Urban Development Authority, HUDA, 1981.

**Khosla, R.K.** Urban and Rural Development in India, Delhi: Indian Publishers & Distributors.

**Patterson, T. William.** Land-use Planning Techniques of Implementation.

**Rama Reddy, Padala and Srinivas Reddy, Padala.** Commentates on Land Reforms Laws in Andhra Pradesh.

**Rame Gowda, K.S.** Urban and Regional Planning. Univ. of Mysore, Mysore, 1972.

**Rangwala, S.C. and Others.** Town Planning, 18<sup>th</sup> ed. Charotar Pub. House, Anand, 2003.

**Singh, Alok Kumar, and Others (ed).** Strategies in Development Planning.

**Durga Prasad, M.V.** Law of Flats, Apartments and Buildings, 4<sup>th</sup> ed. Asia Law House, Hyderabad, 1997.

**Hyderabad Municipal Bye laws.**

**Indian Standards Institution.** National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

**Scott, G. James.** Architectural Building Codes, New York: Vanstrand Reinhold.

## AR 6.5 BUILDING ECONOMICS AND SOCIOLOGY

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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### **Course Overview:**

To introduce the economics and sociological aspects in architecture.

### **Course Contents:**

#### **Unit – I**

Brief introduction of general economics through an introductory survey of concepts in micro and macro economics as applicable to building industry as follows.

Micro Economics: The market, budget constraint, choice, demand and supply, uncertainties, equilibrium, technological constraints, profit maximization and cost minimization, monopoly and oligopoly, production welfare and public good.

Macro Economics: GNP, NNP, demand and supply, inflation, interest rate, employment, saving and investment, monetary and fiscal systems and policies.

#### **Unit – II**

General discussions on various economic issues such as public versus private participation, equity, labour intensive versus capital intensive projects.

#### **Unit – III**

General economics of the basic inputs into building construction- land, labour, capital and materials.

#### **Unit – IV**

Financing for projects, sources costs and utility in financing. Agencies and institutions directly and indirectly influencing economic aspects of project.

### **SOCIOLOGY:**

#### **Unit – V**

Family as the basic unit of 'Society'. Differences in lifestyles due to regional background, religion, caste, income group, etc. and their implication in Architectural design of the housing units.

Sociological aspects in the history of the evolution of housing / shelter forms.

#### **Unit – VI**

Sociological problems of interaction, isolation, privacy, accessibility, conflict, alienation related to the planning and design of different buildings with the references to the people of different age group/population groups.

#### **Unit – VII**

Power structures in society – local self government, administrative structures – structure of decision making processes related to building projects at various government and private organizations levels.

**Reference books:**

**Amos Rappoport**, House Form and Culture

**Wallis, Wilson D and Willey, M.M.**, Text book of Sociology, 1st ed., Khel Sahitaya Kendra, New Delhi, 2001.

**Charon, Joel M.** The Meaning of Sociology, 6th ed., Prentice Hall, New Jersey, 1999.

**Thio, Alex.** Sociology: a brief introduction, 4th ed. Allyn and Bacon, Boston, 2000.

**Schaefer, Richard T.** Sociology: a brief introduction, 4th ed. McGraw Hill, Boston, 2002.

**Bilton, Tony and Oth.** Introductory Sociology, 3rd ed. Palgrave, New York, 1997.

**Stone, P.A.** Building Economy: Design Production and Organisation a synoptic view, 2nd ed., Pergamon Press, Oxford, 1976.

**Koutsoyiannis, A.** Modern Microeconomics, 2nd ed., ELBS with MacMillan Press, 1994.

**Nobbs, Jack and Hopkins, Ian.** Economics: a core text, 4th ed. McGraw-Hill, London, 1995.

**Teck, Hoon Hian and Oth.** Economics: theory and applications, McGraw-Hill, Taiwan, 1998.

**Dewett, K.K.** Modern Economic Theory, Shyam Lal Charitable trust, New Delhi, 2005.

## **AR 6.6 HUMAN SETTLEMENTS AND TOWN PLANNING**

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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### **Course Overview:**

This course focuses on the review of origin of Human Settlements to the level of understanding the various Town Planning problems.

### **Objectives of the Course:**

To make the student understand about various planning related issues.

### **Expected Skills / Knowledge Transferred:**

Should be in a position to make a neighbourhood plan for 5000 people.

### **Course Contents:**

#### **Unit - I**

Historic Evaluation: Brief review of the origin of early human settlements, factors responsible. Development of various settlement forms. Types of settlements



(urban and rural) classification of areas within the urban settlements in terms of types of land uses, densities, administrative division, building types etc. Land use and factors influencing it in urban and rural settlements.

### **Unit - II**

Sociological aspects: Essential elements of society Rural and Urban Communities, Growth of Socio-cultural thought through the ages.

Influence of religion and culture on domestic and civil architecture.

### **Unit - III**

Urbanization: Facts, Theories. Socio-spatial problems of migrants, slums, high and low density housing; high rise living such as isolation, alienation, accessibility, conflicts etc as related to planning and design of buildings in different areas of the city. Social Survey and social research.

### **Unit - IV**

Transportation and communication: potential and limitations of roadways, railways, airways and waterways in the development of a settlement.

### **Unit - V**

Principles of Ekistics: Brief introduction to the theory of "Ekistics". Introduction to the concepts of green belts, satellite towns, neighbourhood, roads in solving some of the problems in urban development. Indian context: Growth pattern of urban and rural settlements; problems and potentials.

## **TOWN PLANNING**

### **Unit - VI**

A brief introduction to the implication of town forms in urban planning and development processes. National, regional, urban, rural, local etc. emphasizing the difference and relationships among them.

### **Unit - VII**

A general and introductory study of inputs, objectives, preparation and outputs of Master plan for a city; land-use classification, features and relationships with transportation. Meaning and use or implication of O-D surveys, desire line diagrams trip generation, attraction, distribution and modal split.

### **Unit - VIII**

Introduction to housing and community facilities; role of F.S.I, densities in housing.

## Unit - IX

Basic methodology for planning of industrial areas and recreation areas.

## Unit - X

Brief introduction to redevelopment schemes and urban renewal, problem of slum and shanty areas and a review of the concepts regarding solutions: clearance, rehabilitation and improvement.

At least one exercise related to the preparation of a layout for a residential neighbourhood of about 5000 populations.

### Reference books:

**Bhagiratha Rao, E.L.** Land Acquisition Manual in Andhra Pradesh.

**Buch, N. Mahesh.** Planning the Indian city.

**Chand, Mahesh & Puri, Vinay Kumar.** Regional Planning in India. Allied Pub. Ltd., Bombay, 1990.

**Doxiadis, C.L.** Ekistics: Introduction to the science of Human Settlement.

**Gallion, B. Arthur & Eisner, Simon.** Urban Pattern: City Planning & Design, 5<sup>th</sup> ed. Van Nostrand Reinhold, New York, 1986.

**Hyderabad Urban Development Authority.** Hyderabad Urban Development Authority, HUDA, 1981.

**Khosla, R.K.** Urban and Rural Development in India.

**Patterson, T. William.** Land-use Planning Techniques of Implementation.

**Rama Reddy, Padala & Srinivas Reddy, Padala.** Commentates on Hand Reforms Laws in Andhra Pradesh.

**Rame Gowda, K.S.** Urban and Regional Planning. Univ. of Mysore, Mysore, 1972.

**Rangwala, S.C. & Others.** Town Planning, 18<sup>th</sup> ed. Charotar Pub. House, Anand, 2003.

**Rappoport, Amos.** House, Form and Culture.

**Singh, Alok Kumar, & Others (ed).** Strategies in Development Planning.

### AR 6.7 BARRIER FREE BUILT ENVIRONMENT

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*L/s: 2/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:2*

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**Course Overview:** Indian Disabilities Act, is promulgated in 1995 for the purpose of ensuring equal opportunities to persons with disabilities in society for their development through education, training and rehabilitation services. The principle objective is to ensure their full participation by preventing discrimination and integrating them into the mainstream of society. An Architect plays a very crucial role in this endeavor by designing the needed barrier free environment. The

objective of this course is to acquaint the students of architecture regarding the various provisions and design issues.

**Knowledge Transfer /Expected Skills:**

Multi sectoral collaborative approaches in design for persons with disabilities and elderly persons / Inculcate skills required for designing for barrier free built environments for physically challenged persons. techniques involved in making such provisions.

**Course Contents:**

**Unit – I**

Introduction to Provisions of persons with Disabilities (Equal opportunities, Protection of Rights and Full Participation) Act, 1995, Type of disabilities - Orthopedic, Hearing, Visual Impairments, National Policy for provisions for elderly persons, Concept of equal opportunity, human rights, social justice and empowerment of physically challenged persons.

**Unit-II**

Introduction to similar efforts in other countries. Initiatives at global and International level for protection of rights of disabled and also elderly person. American disabilities Act 1990 etc.

**Unit-III**

Information on various types of national Institutes, agencies and professional bodies involved in disabled welfare, associated norms and standards there of. The role of NGO's, professional and outreach.

**Unit-IV**

Design principles in Architecture for creating environments friendly for various types of physically challenged persons. Educational Institutions, Hospitals, Transportation terminals such as bus, railway stations and airports for barrier free spaces. Study of Standards as given in TSS, TCPO, CPWD, ADA etc., and others.

**Unit-V**

Provisions in public spaces and site planning – parks, play grounds, public transportation, parking lots, Details of side walks, road intersections, access to public toilets, in, ,.

**Unit-VI**

Provisions in design of public buildings - Details in, ramps, guide rails, lifts, dimensions of wheel chairs, accessibility in public buildings, Signage, audio visual facilities etc. Design of Toilets and interiors spaces for use of physically challenged.

Exercises in design of user friendly spaces for physically challenged persons. Term paper on certain type of disability and requirements there of for making environs barrier free or any other exercise appropriately framed by the subject faculty.

#### **Reference books:**

**Micheal J. Bednar. “Barrier Free Environments”, Dowden, Hutchinson and Ross, Ive 1977.**

**Ministry of Urban Affairs and Employment. Central Public Works Department, India, “Guidelines and Space Standards for Barrier Free Environment for Disabled and Elderly Person, 1998.**

**Unnati. “Design Manual for a Barrier – Free Built Environment”, Handicap International, December, 2004,**

## **SEVENTH SEMESTER**

### **AR 7.1ADVANCE DESIGN STUDIO**

#### **AR 7.1.1 ADVANCE ARCHITECTURAL DESIGN [DESIGN STUDIO]**

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*L/s: 12/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr:12*

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#### **Course Overview:**

This Course deals with the design of large scale, multistorey, complex projects and aims to develop skills for a comprehensive design approach in the areas of, Urban Design Housing Design and Campus Design.

#### **Objectives of the Course:**

To develop skills for a comprehensive design in areas of urban design, housing and campus design for making a complete design portfolio from the brief to tender drawings.

**Expected Skills / Knowledge Transferred:** To develop skills for comprehensive understanding and dealing with Architecture of a group of buildings, inter connected with elements of urban design.

#### **Course Contents:**

##### **I. Urban Design:** issues to be addressed:

- Issues of urban structure, urban space and form.
- Issues of conservation.
- Issues in zoning, land use, density, development control.
- Issues of building in context, urban infill

Design exercise related integration of diverse functional needs, access systems, parking, services etc. Design detail shall comprise of (at least one example each) using

1. 'Hi-tech' materials / construction.
2. Conservation related materials / construction.

**II Housing Design:** Issues to be addressed for the design project pertaining to housing design:

- Density, mixed land use, ground coverage, development controls.
- Urban systems, services and their integration with the project.
- User requirements (derived from surveys)
- Issues in appropriate technology and costs.
- Issues of hierarchy, identity of space, public and private scales of space. Integration of community institutions etc.
- Detailing for the disabled and the elderly.
- Indian / local architectural responses to climate, culture, traditional values, building elements, symbols motifs and special character.

Design exercise related to housing design for specific target groups.

**III. Campus Design:** Issues to be addressed for the design project pertaining to campus design:

- Issue in preparation of Master Plan for Institutions: academic, administrative, staff housing, student hostels etc.
- Environmental considerations.
- Phases of development.
- Scope for expansion for future developments
- Safe and comfortable vehicular and pedestrian movement.
- Issues of character and landscaping.
- Details pertaining to the disabled.

Students would need to undertake one of the design subjects for the studio exercise. Students may be required to develop a brief, translate it into requirements and design.

One Major design exercise and one Time problem/minor design exercise should be given

The evaluation shall be through periodic internal reviews. The final submission will include a brief report of about 1000 words explaining the concept and design proposals for main portfolio. It will also include a model.

Note: In end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

**Reference books:**

**Alexander, Christopher.** Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.

**Richard. D. Dober.** Campus Architecture: Building in the Groves of Academy. McGraw Hill, New York, 1996.

**Chiara, De Joseph and Others.** Timesavers standard for Housing and Residential development, 2nd ed. McGraw Hill, Inc, New York.

**Newman, Oscar and Others.** Defensible space: People and Design in the Violent City. Architectural Press, London, 1972.

**AR 7.1.2 BUILDING CONSTRUCTION MANAGEMENT  
(DESIGN STUDIO)**

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*L/s: 12/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr:12*

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Note: Students of Building *Construction Management* major are required to take this subject under *Design Studio*.

**Course Overview:**

Major studio work, focusing on construction management of large scale projects for effective and efficient implementations.

**Objectives of the Course:**

To equip students of Construction Management specialization with various techniques of project implementation.

**Expected Skills / Knowledge Transferred:** The skills related to construction management of large building projects.

**Course Contents:**

Preparation of working drawings in detail for large building project (building more than 5000 sq. mtrs.) covering the following aspects Implementation scheduling – Resource planning-time, labour, material, equipment and personnel requirements, estimation-scheduling, control and procurement.

Preparation of network charts and flow charts with control mechanism in place, including quality and cost control – sticking to budgetary estimates and foreseeing any disturbances in scheduling, devise resilience and adaptive measures.

Report of Construction Management: Preparation of Project report on any live, ongoing or completed-large scale project.

## Reference books:

**Gupta, B.L. and Gupta, Amit.** Construction Management, Machinery and Accounts, 3<sup>rd</sup> ed. Standard Pub, 2005.

**Loraine, R.K.** Construction Management in Developing Countries. Thomas Telford, London, 1993.

**Srinath, L.S.** PERT and CPM Principles and Applications, 3<sup>rd</sup> ed. Affiliated East-West Press, New Delhi, 2003.

**Singh, Harpal.** Construction Management and Accounts 14<sup>th</sup> ed. Tata McGraw-Hill Pub., New Delhi, 1981.

**Gould, E. Frederick and Joyce, E. Nancy.** Construction Project Management. Prentice Hall, New Jersey, 2000.

**Shrivastava, U.K.** Construction Planning and Management, 3<sup>rd</sup> ed. Galgotia Pub., New Delhi, 2004.

**Chitkara, K.K.** Construction Project Management: Planning, Scheduling and Controlling. Tata McGraw-Hill Pub., New Delhi, 1999.

**Sharma, S.C.** Construction Equipment and its Management, 4<sup>th</sup> ed. Khanna Pub., New Delhi, 2004.

### AR 7.1.3 LANDSCAPE ARCHITECTURE (DESIGN STUDIO)

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*L/s: 12/Wk Int: 200 End Exam: 200 Total: 400 End Exam: Viva-voce Cr:12*

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Note: Students of *Landscape Architecture Major* are required to take this subject under *Design Studio*.

#### Course Overview:

This course will focus on design and development of small to medium scale projects and aims to develop skills for design of comprehensive landscape proposal for simple residential landscape, community level open spaces and campus design.

#### Objectives of the Course:

To expose students to issues concerned with landscape design and site planning.

To expose students to wide range of design alternatives and preparation comprehensive designs for landscape projects.

#### Expected Skills / Knowledge Transferred:

Basic skills in design and orientation in landscape design are prerequisites for the students. The student is expected to obtain skills in development of concepts based on perceptual evaluation of site and propose design alternatives. Solutions to small and medium scale landscape design projects

#### Course Contents:

- Emphasis on form and spatial relationships leading to open space order and frame work.
- Concerns for Social, Psychological considerations of the individual and large groups of people, their interaction and resultant forms of environment.
- Issues related to functional requirement and design strategies.
- Microclimate and environmental consideration.
- Issues related to health, welfare, safety and enjoyment.
- Issues related to zoning, density and develop controls.
- Issues related to services and site development.
- Issues related to visual and aesthetic and contextual consideration.

Students would need to undertake one small and one medium scale designs in site planning.

The exercises taken up shall deal the issues comprehensively from general understanding to providing complete landscape design solutions. The exercise can be split into different stages such as Data collection, Case studies, Synthesis and Design development.

**Reference books:**

**Southerland**, Designing the new landscape.

**Hacket, Brian**. Planting Design.

**Laurie, Michael**. An Introduction to Landscape, 2<sup>nd</sup> ed. Prentice Hall, New Jersey, 1986.

**Lynch, Kevin**. Site Planning. MIT Press, Massachusetts, 1962.

**Jellico**, Man and Landscape.

**AR 7.1.4 INTERIOR DESIGN (DESIGN STUDIO)**

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*L/s: 12/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr:12*

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Note: Students of *Interior Design Major* are required to take this subject under *Design Studio*.

**Objectives of the Course:**

To enable the students to demonstrate design ideologies in the field of interior design

**Course Contents:**

Interior requires that students have a full understanding of the interior design field and have mastery of the design process, presentations, project administration and



business skills.

Two interior schemes of different functional types: Residential / commercial at different scales will form the major design assignments.

Focus is on Portfolio creation by producing a complete and correct set of working drawings, from plans through details and specifications and sample boards

Portfolio preparation

The student will create a portfolio that clearly expresses his/her ability to design by using detailed drawing, rendering and Model Making. Usage photography and graphic design in preparing a professional portfolio is also encouraged.

### **Reference books:**

**Archi World.** Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.

**Friedmann, Arnold and Others.** Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.

**Miller, E. William.** Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.

**Kurtich, John and Eakin, Garret.** Interior Architecture, Van Nostrand Reinhold, New York, 1993.

**Rao, M. Pratap.** Interior Design: Principles and Practice, 3<sup>rd</sup> ed. Standard Pub., 2004.

## **AR 7.2 ADVANCED CONSTRUCTION & MATERIALS**

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*L/s: 6/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs Viva-voce    Cr:6*

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### **Course overview:**

The course supplements the previous theory of construction and to introduce the advanced developments in Building Construction. The students are expected to understand the theory and Practical nuance of Advanced Construction Practices.

### **Objectives of course:**

To introduce the students to the latest developments in construction and building materials. Students should be able to grasp the construction Techniques and their adoptability to architectural forms.

### **Course contents**

## Unit I

Advanced construction methods in RCC , pre-stressed concrete beams slabs frames, lift slab construction post tensioning, multi-storied building frames, circular slabs and beams. uses of rapid-hardening cement, ready mix concrete [ RMC} , light weight concrete surface finishes of cement

## Unit II

Folded plates like prismatic, V-type, trough type, pyramidal, prismatic and RCC folded plate and geometrical staircases, Shell structures, cyclonical shells, hyperbolic paraboloids,

## Unit III

Construction techniques for erection of space frames, suspended roofs, membrane structures, cable structures.

## Unit IV

Curtain walls: types of curtain walls, components, structural solutions, construction and erection. glass wall system-glass; sheet metal wall systems sheet metal cladding.

## Unit V

Advanced Building Materials plastic, PVC, metals, synthetic boards, fire proof/resistant boards/tiles, acoustic materials, glass, composite panels and their applications, non- load bearing gypsum blocks

## Reference books:

**James Ambrose**, Building Construction Enclosure System  
1990

**Andrea deplazes (ED)**, Constructing Architecture: Materials processes structures-A hand Book Second Extended edition

**Robert E Fischer**, Engineering for Architecture 1989

**R Barry**, The construction of Buildings Volume 4 4<sup>th</sup> Edition

**Schall, Rolf**. Curtain Walls: Design Manual. Reinhold Pub., New York, 1962.

## AR 7.3 ADVANCED STRUCTURAL SYSTEMS

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*L/s: 2/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:2*

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## Course Overview:

The course supplements the previous courses on theory of structures, while introducing the advanced development in structural form. The students are expected to understand the theory behind these structural forms and not expected to solve numerical problems.

**Objectives of the Course:**

- To inform the students about the recent developments in structural forms.
- To increase the student's ability to identify the structural forms suitable for architectural expression.

**Expected Skills / Knowledge Transferred:**

- The students are expected to gain knowledge about the recent developments and advanced concepts in the structural forms.
- The students are expected to analyse and understand the nature of stresses that are developed in the major elements of advanced types of structures.

**Course Contents:****Unit – I**

Construction and form, Structure and Form Equilibrium under simple tension or compression, the catenary and the arch, the simply supported beam, the domical shell.

**Unit – II**

Structural elements: Beams and slabs Arches and catenaries; vaults, domes and curved membranes; Trusses, Portal frames and space frames.

**Unit – III**

Relation between structure and architecture, Geometry of form and structural function, Aesthetic theories of the expression of structural function in architectural form.

**Unit – IV**

Structural Systems: single and double layer grids; braced domes, ribbed domes, plate type domes, Network domes, Lamella domes, Geodesic domes, Grid domes. Braced and folded structures.

**Unit – V**

Space frames: Folded plates, shells, cyclonical shells, Hyperbolic paraboloids, free forms.

Cable structures: Simply curved suspended roofs, combination of cables and struts.

**Unit –VI**

Curtain Walls: Types of Curtain Walls and their Components Structural problems, construction and erection.

**Reference books:**

**Candela, Felix.** Architecture and Structuralism. 1963.

**Lane, Allen.** Developments in Structural Form. Penguin Books Ltd, London, 1975.  
**Macdonald, J. Angus.** Structure and Architecture, 2nd ed. Architectural Press, Oxford, 2003.  
**Michaels, Leonard.** Contemporary Structures in Architecture. 1950.  
**Schall, Rolf.** Curtain Walls: Design Manual. Reinhold Pub., New York, 1962.  
**Siegel, Curt.** Structure and Form in Modern Architecture. Crosby Lockwood and son Ltd., London, 1962.  
**Subramanian, N.** Principles of Space structures. Wheeler and Co., Allahabad, 1983.  
**Zannos, Alexander.** Form and Structure in Architecture: The role of statical function. Van Nostrand Reinhold Co., New York, 1987.

## **AR 7.4 GREEN BUILDING AND INFRASTRUCTURE**

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*L/s: 2/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:2*

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### **Course Overview:**

The course focuses on developing an understanding regarding environmental sustainability and environmentally responsible green buildings. It address the design concerns in architecture to develop resource-efficient buildings that have minimum adverse impact on the natural environment.

The emphasis is to gain an understand regarding the existing concepts, ideas and processes in Architecture and built environment and also recognize rapidly emerging building solutions and technological initiatives that complement current practices in order to attain human health and environmental goals.

### **Objectives of the Course:**

Develop skills to promote eco friendly characteristics in the area of architecture and buildings and identify crucial technologies, facilities and applications that help in developing green buildings.

Course Contents:

### **Unit - I**

Introduction to Macro Environment: Elements of climate, weather, Water cycle, Carbon cycle, Environmental quality, Deforestation, climatic change, Ozone depletion and implications.

### **Unit - II**

Micro-environment: Natural environment Vis a vis built environment. living environment Characteristics and components of Urban Ecosystem solar radiation, heat flow, air-movement, Land use, drainage and sanitation.

### **Unit - III**

Concepts of green field development: Brown field development, environmental impact and ecological balance, FAR, layouts, sustainable Site development, vegetation, landscape elements, alternative services and technologies, rain water harvesting, on site sewerage retention, treatment, recycle and reuse

### **Unit - IV**

Building Resources: Passive energy system Design, Building envelope, orientation and components of building fabric and Shading, High rise buildings, modular building Construction, curtain walls, Sourcing and recycling of building materials, alternative Calcareous, metallic and non metallic, materials

### **Unit - V**

Building Infrastructure: Active Energy Systems in buildings, Utilities and services, building automation. electro-mechanical systems, lifts and transportation, captive power plant and equipment, operation & maintenance

### **Unit - VI**

Indoor air quality: fresh air requirements standards, Sick Building Syndrome, VOC and pollutants.

### **Unit - VII**

Introduction to building rating systems: building auditing, points system, components, and weight age, agencies and institutions, GBC, TERI etc, green buildings in the contexts of Indian sub continent,

### **Reference books:**

**Green Building Technologies** - Godrej Centre CII a Madhapur, Hyderabad.

**Greening Building** – Green Congress, US.(web).

**HSMI. Sustainable Building Technology** – HUDCO, HSMI (Human Settlement Management Institution, New Delhi.

**Koenigsberger, O.H. and Others.** Manual of Tropical Housing and Building. Orient Longman, Chennai, 2003.

**Odum, P. Eugene.** Ecology and Environments, 2nd ed. Oxford and IBH Pub., New Delhi.

**TERI, The Building Energy Audit** – TERI (Tata Energy Research Institute).

**HMDA Hyderabad-** Green building guidelines

### **AR 7.5 ADVANCED SERVICES**

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*L/s: 2/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:2*

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### **Course Overview:**

Study of services and facilities used in special type of buildings. The emphasis is laid on operation of services, working of different equipment employed for carrying out building function in specific different building types

**Objectives of the Course:**

To develop understanding of special services, definitions and terms used, working of equipment, installation of facility, special provisions to be made in building design.

**Expected Skills / Knowledge Transferred:** Principles and installations of specialized services in buildings and building complexes and NBC standards.

**Course Contents:**

**Unit - I**

Special services in High rise buildings: Types of lifts, Passenger, Capsule, Hospital bed lift; goods lift etc. Working and operation of lifts, parts of lifts; industry standards and capacity calculations. Provision to be made in buildings for installation, Introduction to working and design of escalator.

**Unit - II**

Electronic Systems in Buildings: Telephone and communication, networks in buildings EPABX, Security systems, Burglar alarms, video surveillance, access control, design of computer labs, access flooring, server rooms.

**Unit - III**

Fire safety in buildings: portable fire fighting equipment, NBC standards, built in wet riser system, sprinkler system, fire hydrant, class of fire and occupancy, cooking gas distribution in buildings, piped gas supply, bottled gas supply, kitchen Stoves, burners

**Unit - IV**

Swimming Pools: Pool tank design, patio, finishes, Water circulation, cascades, channels, filtration and water treatment, Water quality and disinfection, balancing tank.

**Unit - V**

Hotel services: Specialty services required for hospitality industry, Laundry services, Kitchen services, Channeled Music, Internet,

**Unit – VI**

Environmental services: waste generation in Industrial buildings, various types of waste, solid, liquid, gas, treatment and disposal facilities, waste generation in hospital buildings, design provision for its disposal,

## Unit - VII

Alternative energy sources for buildings:, hot water solar energy system, applications of photo voltaic cells, biomass digesters, wind energy.

### Reference books:

**Faber, Oscar and Kell, J.R.** Heating and Air-Conditioning of Building. Architectural Press, Surrey, 1945.

**Prasad, Manohar.** Refrigeration and air-conditioning, 5<sup>th</sup> ed. New Age Intl. Pub., New Delhi, 1996.

**Tiwari, Satish.** Water and Energy resources.

## AR 7.6 PRE THESIS SEMINAR

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*L/s: 2/Wk    Int: 100    End Exam: 0    Total: 100    End Exam: NIL    Cr:2*

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### Course Overview:

The course provides students with a framework to understand some emerging concepts in architecture and projects of design complexity and equip the student with adequate architectural design research methods for the realization of thesis concept. During the course of study, the subject of the thesis is developed and the project articulated.

**Objectives of the Course:** To impart knowledge to students, on the tools and methods needed to handle a design project of reasonable complexity individually,

**Expected Skills / Knowledge Transferred:** The skills required to collect, assimilate and synthesis data relevant to handle a design thesis project independently.

### Course Contents:

#### UNIT - I

Introduction to architectural thesis Project, Difference between design thesis and design studio, selection of topics for architectural design thesis, design thesis topics based on building typologies, preparation of synopsis, Methodology of design thesis

#### UNIT - II

Emerging concepts in architecture due changes in social, economic, technological variables. Review of design projects related to real world instances and relevant to community at large. Review of projects of design complexity, involving themes, sub themes and architectural expression.

#### UNIT - III

Research in architecture: Tools and Methods required to handle a design project. Scientific methods of research with special emphasis on architectural research methods. Architectural enquiry visual, observations, questionnaire formats of enquiry, Literature Review and case studies. Data analysis techniques interpretation of data.

#### **Unit IV**

Thesis report writing and presentation:

- Formats for presentation of data, case studies and analysis.
- Formats for presentation of thesis design- media appropriate in the architectural profession such as two dimensional drawing, physical models, three dimensional computer models.
- Report Writing: Techniques in report writing, presentation of contextual information relevant to interpretation of the data collected and design; reporting the design development from concept to design solution, explain the relation of the design to existing knowledge on the topic in the form of coherently written thesis report.

The inputs to the students on various design thesis topics would be in the form of Expert /Guest Lectures

Each student in consultation with the faculty shall choose a thesis topic, collect necessary data, review literature on the chosen topic and present a written paper and seminar at the end of the semester.

#### **Reference books:**

**Mukhi, H.R.** Technical Report Writing: Specially prepared for Technical and Competitive Examinations, New Delhi: Satya Prakashan, 2000.

**Barrass, Robert.** Writing At Work \b a guide to better writing in administration, business and management, London: Routledge, 2003.

**Seely, John.** The Oxford guide to effective writing and speaking, 2<sup>nd</sup> ed., Oxford ; New York : Oxford University Press, 2005.

**Jo Ray McCuen, Anthony Winkler.** Readings for writers, 9<sup>th</sup> ed., Fort Worth : Harcourt Brace College Publishers, 1998.

**Treece, Malra.** Effective reports, 2<sup>nd</sup> ed., Boston: Allyn and Bacon, 1985.

#### **AR 7.7 ELECTIVE – I (For General Architecture)**

##### **AR 7.7.1 URBAN DESIGN (Elective – I)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Course Overview:**

The course focuses on creating awareness in students in the subject 'Urban



Design' as a specialization in the area of architecture and urban planning.

**Objectives of the Course:**

To give an overview of urban design as an interface between the fields of architecture and urban planning.

To impart the knowledge about various developments in the field of urban design.

**Course Contents:**

**Unit - I**

Discussion on Architecture, Urban design, Town Planning Interface. Urban Morphology and Elements of Urban Design. Nature of urban design projects in public and private developments.

**Unit - II**

Classical cities, medieval towns, neoclassic cities, and industrial towns. Characteristics of towns built by Hindu and Muslim rulers in India. Colonial inheritance, growth of post towns, civil lines, cantonments, railway and resort towns and Design in New Delhi.

**Unit - III**

Modern movements in city design such as 'city- beautiful' and 'Garden city' movements, utopian model Towns in the west. Changing structure of cities: sectors, blocks, streets, squares, buildings and open spaces.

**Unit – IV**

Role of planning agencies such as development authorities, Urban Arts Commission in the design of cities. Influence of city development policies namely Master plans, zoning regulations, on Urban Design. Built-form and space requirement in residential, commercial industrial and recreational land uses, activities. Patterns of subdivision and land-development.

**Unit – V**

Elements of urban spaces: squares and streets. Use of landscape in urban design, such as tree avenues, street fencing, side walks etc.

Lighting and illumination of cities, methods of lighting, signage and elements of utility services in the city.

**Unit – VI**

Urban conservation and its role in urban design. Past and present trends in urban conservation. Role of architectural control in urban conservation and city character and style.

## Reference books:

- Bacon, N. Edmund.** Design of Cities. Penguin Books, New York, 1976.
- Benevolo , Leonard.** History of the City.
- Krier, Rob.** Urban Space, 3<sup>rd</sup> ed. Academy Editions, London, 1984.
- Moughtin, Cliff and Others.** Urban Design: Ornament and Decoration. Butterworth-Heinemann, London, 1995.
- Moughtin, Cliff.** Urban Design Street and Square.
- Mumford, Lewis.** City in History: Its origin transformation and its prospects.
- Sprelregen, Paul.** Urban Design: The Architecture of Towns and Cities.
- Lynch, Kwin,** the Image of the city Cambridge mass: MIT press, 1965

### 7.7.2 HOUSING (Elective – I)

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Course Overview:**

The course introduces the basic concepts and issues related to urban and rural housing.

#### **Objectives of the Course:**

To give an understanding and appreciation of housing in terms of issues, problems and directions.

#### **Course Contents:**

##### **Unit – I**

##### **Evolution of Housing:**

Brief review of the historical development of housing in various contexts.

##### **Unit – II**

##### **Housing situation in India**

Housing need and Demand: Housing and Habitat policy and perspective at the national level. Problems and Issues in urban & Rural Housing, Housing Agencies and their role in housing development.

##### **Unit – III**

##### **Housing Standards**

Issues involved in formulating housing standards for rural and urban areas, desirable and minimum standards. Residential Densities

##### **Unit – IV**

##### **Housing Strategies**

Review of different forms of housing globally – particularly with reference to the third world countries.

Brief acquaintance with some strategies such as sites and services upgrading existing shelter, stimulating private – sector production, developing building materials and alternative technologies, improving architectural design., protecting inner-city renters, land sharing, resettlement etc.

### **Unit – V**

#### **Housing Layouts and Design**

Traditional pattern of housing design, Row Housing, Cluster Housing Apartment housing, low rise versus high rise housing, Incremental housing, neighborhood unit. Case studies of housing Projects

### **Unit – VI**

#### **Housing Process**

Managing and financing of housing projects. People's participation, Technology Transfer, development control rules and environmental aspects

#### **Reference books:**

**Alexander, Christopher.** Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.

**Chiara, De Joseph and Others.** Timesavers standard for Housing and Residential development, 2<sup>nd</sup> ed. McGraw Hill, Inc, New York.

**Desai, A.R. and Pillai, Devadas.** Slums and Urbanization, Popular Prakashan Pvt. Ltd.

**HUDCO.** Housing for the Low Income. HUDCO.

**Poulose, K. Thomas.** Reading Material on Housing. Institute of Town Planners, New Delhi.

Cedric Prgh (1990) Housing and Urbanisation, Sage Publication New Delhi

### **AR. 7.7.3 BUILDING CONSTRUCTION MANAGEMENT (Elective – I)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Course Overview:**

To introduce the importance of construction management in the field of architecture.

#### **Course Contents:**

### **Unit – I**

#### **Introduction**

Construction in India; its role in development, importance of Management in Construction, role of Construction Manager, Construction team, responsibilities and authorities of Construction Manager Organization.

## **Unit - II**

### **Management Techniques:**

Planning for Construction Projects: Principles, objectives, advantages of planning, stages of planning.

Scheduling: Definition, advantages

Methods of Scheduling: Bar chart, Milestone chart, Controlling, Life cycle curves. Job layout, work break down structure

### **Project Management through Networks**

Introduction, objectives, advantages, terms and definitions, types of networks, rules for drawing a network, Fulker son's Rate of numbering the events.

Introduction to PERT, CPM, difference between PERT and CPM, finding critical path.

## **Unit – III**

Introduction to construction equipments, performance, characteristics and usage of equipment used in large scale projects.

Human Resource management: manpower estimation at various stages, recruitment, training, under and over manning.

Materials Management: Materials of construction, classification codification, ABC analysis, estimation of materials procurement, inventory / stock control, purchase procedure, stores management.

Quality control in Construction: Importance of quality, elements of quality, organization for quality control, quality assurance techniques.

## **Unit – IV**

Labour Legislations pertaining to construction industry, payment of wages act, migration Act, Factories Act, Contract Labour Act, Labour Welfare Fund Act, Workmen's Compensation Act.

Construction Safety Management: Importance of safety causes of accidents, safety measures, safety benefits to employees, employees and customers.

## **Unit – V**

**Economics of Project Management:** Economic analysis of projects, economic studies, sensitivity analysis. Cost estimating principles, parameter estimation, detailed estimates, cost concepts, classification of costs, elements of costs, and cost analysis for control.

## Unit – VI

Budgetary Control Systems: Types of budgets, new approaches for budgeting, responsibility of accounting, profit centre approach.

Financial Management: Meaning and scope, financial statement analysis, ratio analysis, funds flow analysis.

Working Capital Management: Meaning, policy for working capital, estimating working capital needs. Capital investment decision, long term financing working of financial institutions in India and abroad, self-financing, financing mechanisms.

Value engineering: Definition, value engineering job plan, life cycle costing, value engineering applications.

## Unit – VII

Introduction to Linear programming, Transportation problem, Sensitive analysis.

### Reference books:

**Gupta, B.L. and Gupta, Amit.** Construction Management, Machinery and Accounts, 3<sup>rd</sup> ed. Standard Pub, 2005.

**Loraine, R.K.** Construction Management in Developing Countries. Thomas Telford, London, 1993.

**Srinath, L.S.** PERT and CPM Principles and Applications, 3<sup>rd</sup> ed. Affiliated East-West Press, New Delhi, 2003.

**Singh, Harpal.** Construction Management and Accounts 14<sup>th</sup> ed. Tata McGraw-Hill Pub., New Delhi, 1981.

**Gould, E. Frederick and Joyce, E. Nancy.** Construction Project Management. Prentice Hall, New Jersey, 2000.

**Shrivastava, U.K.** Construction Planning and Management, 3<sup>rd</sup> ed. Galgotia Pub., New Delhi, 2004.

## AR 7.7.4 INTERIOR DESIGN (Elective – I)

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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*Note: This course is intended for students of Architecture and specific to students of Interior Design Major.*

### Course Overview:

The course provides a frame work of the discipline by addressing to the theoretical, social, historical, technological, professional aspects of Interior Design.

### Course Contents:

### **Unit – I**

The profession of Interior Design; Role of an Interior Designer- past and present; Scope of services; Interior Design Process. Interior Design and Concepts: Elements and Principles of design- an overview and their applications in interior designing.

### **Unit - II**

Interior Space planning and human dimensions. Focuses on physical, psychological Behavioural and human factors, study of Proxemics, Behavioural settings.

### **Unit - III**

Introduction to the fundamentals of Interior Design such as Lighting, Furniture, Space, Materials, Furnishings, Art etc.

### **Unit – IV**

Colours in interiors – Colour Theory, Effect of light on colour, various colour schemes like analogues, complementary, triadic etc. Colour symbolism. Psychology of colour, Industrial colour codes. International standards.

### **Unit – V**

Introduction to Furniture and Accessories: An overview of historical perspective of furniture and styles, accent pieces and accessories from Egyptian period to the present. Basic Furniture vocabulary. Styles of Interiors – Italian, English, French, Japanese styles etc.

### **Unit – VI**

Interior lighting – direct and indirect lighting, location and light grid systems, types of luminaries, quality of lighting. Ambient, task and accent lighting. Exposure to eminent interior designers' works- Indian and international

### **Unit – VII**

Business perspectives of Interior design – an overview of practice of interior design in India.

### **Reference books:**

Archi World. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.

Friedmann, Arnold and Others. Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.

Miller, E. William. Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.

Kurtich, John and Eakin, Garret. Interior Architecture, Van Nostrand Reinhold, New York, 1993.

Rao, M. Pratap. Interior Design: Principles and Practice, 3<sup>rd</sup> ed. Standard Pub., 2004.

### **AR. 7.7.5 LANDSCAPE ARCHITECTURE (Elective – I)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Course Contents:**

##### **Unit - I**

Study of landform its technical expression through grading plan, section, profiles layout plans and earthwork computations.

Principles of soil mechanics and landscape drainage and their application to surface and subsurface drainage of small scale projects.

##### **Unit –II**

Basic principles of outdoor lighting, types of fixtures and their use in varying situations.

Introduction to irrigation systems – sprinkler trickle irrigation, drip irrigation and laying irrigation networks.

##### **Unit -III**

Factors related to construction; of structures and systems.

Materials and techniques of landscape construction with emphasis on appropriateness for intended use.

Construction of structure in landscape

Circulation roads, parking, paths; Level changes – walls, steps, ramps;

Construction of Garden, landscape feature Such as screens, trellis, wall fences gates decks; fountains and pool construction.

##### **Unit -IV**

Planting and establishment of woody plants, installing time, covers and herbaceous plants.

Planting principles – Bed preparation, mounding, application of fertilizers, roll preparation, pruning and maintenance.

#### **Reference books:**

**Landphair, C. Harlow.** Landscape Architecture Construction, 2<sup>nd</sup> ed. Elsevier, New York, 1988.

**Motloch, L. John.** Int. to Landscape Design, 2<sup>nd</sup> ed. John Wiley and Sons, Inc., New York, 2001.

**Moorhead, Steven (Ed.).** Landscape Architecture. Rockport Pub, Massachusetts, 1997.

Pregill, Philip and Volkman, Nancy. **Landscapes in History: Design and Planning in the western Tradition.** Van Nostrand Reinhold, New York, 1993

## **EIGHTH SEMESTER**

### **AR 8.1 DESIGN THESIS**

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*L/s: 22/Wk    Int: 300    End Exam: 300    Total: 600    End Exam: Viva-voce    Cr: 22*

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#### **Course Overview:**

Thesis should reflect the knowledge gained from all the courses undertaken by the student in all the previous semesters.

#### **Objectives of the Course:**

To develop assimilation, synthesis and application of research in Architecture

#### **Expected Skills / Knowledge Transferred:**

Student should be in a position to comprehend the design philosophy, theories, data analysis and application in a chosen area of study.

#### **Course Contents:**

Each student is expected to prepare a design thesis based on the preliminary work undertaken in the Pre Thesis Seminar, under an approved guide/adviser by the department.

The design Thesis shall comprise of Architectural Design proposals, Structural design for a component of architectural design proposal. The Component of Design for which structural design is to be provided will be chosen with the help of faculty in charge of structural design subject. The student will also be required to produce a project feasibility report for the specific design undertaken for the design thesis.

Thesis should reflect the knowledge gained from the course learnt in the previous semesters

The particulars of schedule, content, presentation, format etc., is to be decided by the department, from time to time and shall be strictly followed.

At the end of the semester, each student is expected to submit all original drawings prepared as per the department's specifications. Three copies of the report in the specified format along with a model submitted to the department, after obtaining the approval of the respective guides / advisers.

The department shall schedule the final viva-voce, at its convenience, only after the receipt of the thesis submission by a student. The performance sheet submitted by



the advisor and the thesis committee should be the basis for allowing the student to appear for the final viva-voce.

For End exam, viva-voce is to be conducted by a jury comprising of an external examiner, one internal examiner and head of the department or his nominee.

For the structural design project and Project Feasibility report a separate External Viva voce will be conducted. A total of 50 internal Marks (30 and 20 respectively) and 50 external marks (30 and 20 respectively) shall be allotted for the same out of total 300 marks.

### References:

**Mukhi, H.R.** Technical Report Writing: Specially prepared for Technical and Competitive Examinations, New Delhi: Satya Prakashan, 2000.

**Barrass, Robert.** Writing At Work \b a guide to better writing in administration, business and management, London: Routledge, 2003.

**Seely, John.** The Oxford guide to effective writing and speaking, 2<sup>nd</sup> ed., Oxford ; New York : Oxford University Press, 2005.

**Jo Ray McCuen, Anthony Winkler.** Readings for writers, 9<sup>th</sup> ed., Fort Worth : Harcourt Brace College Publishers, 1998.

**Treece, Malra.** Effective reports, 2<sup>nd</sup> ed., Boston: Allyn and Bacon, 1985.

## AR 8.2 PROFESSIONAL PRACTICE

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*L/s: 4/Wk Int: 50 End Exam: 50 Total: 100 End Exam: 3 hrs Cr:4*

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### Course Overview:

The course provides overview and specific conditions of COA regulations, Architects Act 1972 in Architectural practice.

### Objectives of the Course:

To impart awareness and technicalities of code of conduct, and the significance of Architects Act 1972 in Professional Practice.

**Expected Skills / Knowledge Transferred:** Legal, Technical and Financial aspects of Architectural practices and management skills for professional practice.

### Course Contents:

#### Unit - I

Role and responsibility of architect in society; architectural profession as compared to others professions; difference between profession and business; architect's registration, COA, IIA and other organizations related to architectural profession.

Architects approach to works; ways of getting works; types of works, works partly

executed by other architect; various precautions to be taken before taking up the work; conditions of engagement between the architect and client; commencement of work.

## **Unit - II**

Architect's duties; drawings to be prepared; Architects relation with other parties connected with works such as client, contractor, sub-contractors, consultants, municipal and public authorities.

IIA Code professional conduct; COA Architects Professional conduct Regulations 1989  
Scale of charges; units and mode of measurements - clerk of work and his duties; Inspection of work: during 'construction; certificate of payment to contractor; bill of quantities; Schedule of rates, tenders; public, limited and negotiated tender documents and allied formalities.

## **Unit – III**

Contracts; types of contracts such as item rate, lumpsum, cost plus percentage etc. General principles of Indian contract Act; Building contracts, conditions and forms of contract, study of standard contract of the Indian Institute of Architects. Administration of contract. Principle of Arbitration, Indian Arbitration act 1940, Powers and duties of arbitrators, revoking authority; umpire, award cost fixedfee, cost with penalty, labour day work, piece work Daily  
Easement: definition; various types of easements; Dominant, and servient owners; essential conditions for enjoyment of easement; Fire insurance's definition, cover note; insurance for new work and additions; insurable value of property, claim for damage due to fire. Insurance of completed and pied building

## **Unit - IV**

Preliminary knowledge of transfer of property Act; registration, stamp duty under registration and Govt. Power. Income tax, wealth, land acquisition Acts; general information about land acquisition procedures.

Accidents during progress of work and after completion, damage to persons and properties affected; workmen's compensation Act with regards to the affected persons and properties.

Consumer protection Act and related acts on Architects.

(Atc 20 of 1942) Architects Act 1972; Professional Practice Regulation and architectural education regulations under the Architects Act.

## **Unit - V**

Types of offices for architectural practice; staff structure; filing of records; correspondence and drawings; maintenance of accounts; presentations in meetings, recording minutes of meeting. A small report to be prepared by each student after visiting an architect's office.

Role of consultants and Co-ordination between different convctants on a big project.

Study of building byelaws to enable to design and prepare drawings for submission to concerned bodies.

National building code, Fire prevention and safety measures.

### **Reference books:**

**Banerjee, D.N.** Principles and Practice of Valuation, 5<sup>th</sup> ed. Eastern Law House, Calcutta, 1998.

**Dalton, J. Patrick.** Land Law, 4<sup>th</sup> ed. Pitman Pub., London, 1996.

**Indian Institute of Architects.** H.B. Professional Practice. The Architects Pub. Bombay.

**Indian Standards Institution.** National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

**Namavati, H. Roshan.** Professional Practice, 8<sup>th</sup> ed. Lakshani Book Depot, Bombay, 2001.

**Namavati, H. Roshan.** Theory and Practice of Valuation, 2<sup>nd</sup> ed. Lakshani Book Depot, Bombay, 1991.

**M.Dedbhkth** Architectural practice in India by Prof.M.Deobhkta

**V.SApte:**Arch Practice Procedures

### **AR 8.3 ELECTIVE – II (For General Architecture)**

#### **AR 8.3.1 ARCHITECTURAL ILLUMINATION (Elective II)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Objectives of the Course:**

The course is intended to give an in depth understanding of the scientific and design aspects of lighting in Architecture

#### **Course Contents:**

##### **Unit – I**

Light and vision, basic units, photometry and measurement, quality and quantity of light of different sources of light. Daylight, incandescent lamps, halogen lamps, electric gas discharge lamps, fluorescent lamps, high discharge lamps. A market survey of lamps with cost and technical specifications.

##### **Unit – II**

Design of lighting; lumen method, point by print method, design tools, design

documentation, simple numerical.

### **Unit – III**

Specific lighting design requirement of different buildings such as homes, offices, industrial, hospital, art galleries, museums and exhibitions, case study of at least one type of the building by each student.

### **Unit – IV**

Out door lighting: road lighting, high-mast lighting, tunnel lighting, landscape lighting, decorative lighting, facade lighting, spot lighting.

### **Unit – V**

Lighting as determinant of form for architecture with graphic examples.

### **Unit – VI**

Daylighting, advantages of daylighting; design tools in daylighting. Case studies and various examples, behaviour of daylighting in an interior spaces. Potentials of daylighting as an energy resource.

### **Unit – VII**

Integration of daylighting with artificial lighting; lighting controls, intelligent building systems for lighting.

### **Unit – VIII**

Conservation of energy in lighting use of daylight, optical fiber lighting, LED in lighting and the emerging trends in lighting.

### **Reference books:**

**Moore, Fuller.** Concepts and practice of Architectural Day Lighting. Van Nostrand Reinhold co., New York, 1985.

**Valia, Anil.** Designing with light: A Lighting H.B. International Lightning Academy, Mumbai, 2002, Architectural Physics: Lighting.

**Hopkinson R.G,** Her Majestrip stationery office, London.

**David Egan. M,** concepts in Architectural lighting Mc Grew Hill Book company, New York, 1983

### **AR.8.3.2. ARCHITECTURAL JOURNALISM (Elective II)**

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|           |         |              |            |                 |      |
|-----------|---------|--------------|------------|-----------------|------|
| L/s: 4/Wk | Int: 50 | End Exam: 50 | Total: 100 | End Exam: 3 hrs | Cr:4 |
|-----------|---------|--------------|------------|-----------------|------|

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### **Course Overview:**

The Course prepares ground for the students to gain an understanding into the

fundamental issues in architectural Photography and develop the skill to create Articles/presentation capturing the essence through the photographs.

### **Course Contents:**

#### **Unit – I**

Definition of Photo Journalism - Brief History - Photographs as social Documentaries - Birth of modern Photo Journalism since 1950s - visual awareness – visual survey - EDFAT methods in using the camera - Equipment required for Photo Journalism.

#### **Unit - II**

Development of writing skills: Usage of language and Vocabulary and grammar-introduction to methodology of writing essays, news writing, precis writing, writing in architectural blogs; listening comprehension, analyze talks and information gathered and to edit gathered information to build an article. Originality of topic. Collecting clippings from articles, blogs and books.

#### **Unit -III**

Photo Journalism in perspective - Snap shots - Advance amateur Photography - Art Photography - Photo Journalism - Approach to Photo Journalism - News Papers and Magazine Design elements: Page make -up - Layout - color scheme - Font - Blurb - Pictures - Ads etc- Other magazines - Documenting of Places - Rural- Urban - Public relations.

#### **Unit - IV**

Key texts concerning architectural journalism and journalists; to critically contrast their outputs in terms of production, content and/or presentation; to develop an ability to critically appraise selected individual pieces of journalism. Awards for Architectural Journalism and some of the important recipients  
People journalism and law-legal boundaries-issues libel and invasions of privacy-ethics-the photo journalist on scene

#### **Unit - V**

Production of contemporary architectural journalism; Building pictures - Instant, Report - Editing - Editorial thinking – the picture Editor - Editing practices, creating drama - Photo editing -Documentary-evolution of the word document-methods and techniques.

Assignments should include an article based on ability to originate, plan, research, present and produce a piece of architectural journalism. The techniques and processes used in the production should be identified by the student.

## Reference books:

**Kopelow, Gerry.** How to photograph buildings and interiors, 3<sup>rd</sup> ed. New York: Princeton Architectural Press, 2002.

**De Mare, Eric Samuel.** Architectural photography, London: Batsford, 1975.

**Busch, Akiko.** The photography of architecture: twelve views, New York: Van Nostrand Reinhold Co., 1987.

**Mehta, Ashvin.** Happenings: \b a journal of luminous moments, Vapi, Gujarat: Hindustan Inks, 2003.

**Mohd, Al Asad.** Architectural Criticism and Journalism

**Sommer, Robert.** Tom Wolfe on Modern Architecture

### AR 8.3.3 FURNITURE AND PRODUCT DESIGN (Elective II)

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|           |         |              |            |                 |      |
|-----------|---------|--------------|------------|-----------------|------|
| L/s: 4/Wk | Int: 50 | End Exam: 50 | Total: 100 | End Exam: 3 hrs | Cr:4 |
|-----------|---------|--------------|------------|-----------------|------|

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#### Course Overview:

The course provides a framework in understanding the Theoretical, historical functional and human issues of the subject.

#### Objectives of the Course:

To impart a comprehensive understanding of the general theory and practice of the subject.

To inculcate in student a natural curiosity in allied discipline of design

#### Course Contents:

##### Unit – I

Understanding of the functional and formal issues in design – study and evaluation of popular dictums such as “Form follows function”, form and function are one”, “Less is more”, “God is in details” etc.

Evaluation of visual design for functional objects.

Gestalt theory of design: Law of closure, law of proximity, law of continuity etc.

##### Unit – II

Evolution of furniture through ages till present day

##### Unit – III

Human factors engineering and Ergonomic considerations; Principles of Universal Design and their application in furniture and product design.

##### Unit – IV

An introduction of various manufacturing processes most frequently adopted in furniture and product design such as, Injection Moulding; investment casting, sheet metal work, die-casting, blow-moulding , vaccum – forming etc.

## **Unit – V**

Signage and Graphics – Environmental graphics: signage categories and materials.

## **Unit – VI**

A detailed study involving the design aspects of any one of the following: Lifestyle accessories, Luminaire design, a piece of furniture, Point of Purchase design, Signage.

### **References:**

**Héctor Roqueta.** Product design, London: te Neues, 2002.

**Morley, John.** The history of furniture: twenty-five centuries of style and design in the Western tradition, Boston: Little, Brown and Company, 1999.

**Aronson, Joseph.** The Encyclopedia of Furniture, 6<sup>th</sup> printing, New York: Crown Pub. 1944.

**Saville, Laurel.** Design secrets: furniture, Gloucester, Mass. : Rockport Publishers, 2006.

**Datschefski, Edwin.** The total beauty of sustainable products, Hove: Rotovision, 2001.

**Papanek, Victor J.** The green imperative: natural design for the real world, New York: Thames and Hudson, 1995.

### **AR 8.3.4 DISASTER RESISTANT ARCHITECTURE (Elective II)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Course Overview:**

This course introduces and explains disaster resistant methods of construction

#### **Objectives of the Course:**

To develop understanding about the nature of disasters and their effects on built environment.

To develop understanding about the ways of building that would resist disasters.

#### **Course Contents:**

##### **Unit - I**

##### **Building safety from Natural Hazards:**

Earthquake, Fire safety in buildings, Cyclone effects: High winds, storm surge and safety aspects in buildings, related to Cyclones, Floods, Landslides.

##### **Elementary Seismology:**

Occurrence of earthquake in the world, plate tectonics, faults, earthquake hazard maps of India and the states.

Causes of earthquake, seismic waves; magnitude, intensity, epicenter and energy release, characteristics of strong earthquake ground motions. Seismological Instruments: Seismograph, Accelerograph, Seismoscope / Multi SAR.

## **Unit - II**

### **Introduction to Theory of Vibrations:**

Single degree undamped and damped systems, resonance, response to earthquakes, elastic response, concepts of response spectrum. Flexibility of long and short period structures.

## **Unit - III**

Site Planning, Building Forms and Architectural Design Concepts for Earthquake Resistance:

Historical experiences, Site Selection, Site Development.

**Building forms:** - Horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration.

Plan and vertical irregularities, redundancy and setbacks, Special Aspects:- Torsion, appendages, staircases, adjacency, pounding; Contemporary international approaches.

## **Unit – IV**

### **Performances of Ground and Buildings in Past Earthquakes:**

Earthquake Effects:- On ground, soil rupture, liquefaction, landslides; Behavior of various types of buildings, structures, power plants, switch yards, equipments, lifelines and collapse patterns; Behavior of Non Structural Elements like services, fixtures, mountings. Social and Economic Consequences of earthquakes, Lab simulations of models.

### **Seismic Design Principles:**

Concept of seismic design, stiffness, strength, period, ductility, damping, hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities; Ductility based design: Design of energy absorbing devices, Seismic base isolation and seismic active control.

## **Unit – V**

### **Structural Detailing:**

Innovations and Selection of appropriate materials; IS Code provisions for the buildings:-IS:1893-2002, IS:4326-1993; Horizontal and Vertical seismic coefficients, valuation of base shear, distribution of shear forces in multi-storey building; Seismic Detailing Provisions: Masonry and Wooden Buildings (IS: 4326, IS: 13828), Adobe houses (IS: 13827); Seismic Designs and Detailing of RC and Steel Buildings:IS: 1893 – 2002; IS: 13920 – 1993; IS: 456 – 2000; IS: 800 – 2004; Special reinforcing and connection details in structural drawings.

## **Unit – VI**

### **Earthquake Resistance Construction Details:**



Various Types and Construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, under ground and overhead tanks, staircases and isolation of structures; Local practices: traditional regional responses.

## **Unit – VII**

### **Construction Quality Control:**

Sequences of Construction: Good supervision practices, Critical check points and certification at certain stages, reporting, maintenance of records, testing.

### **Vulnerability Assessments and Seismic Strengthening of Buildings:**

Seismic vulnerability evaluation of existing buildings; Weakness in existing buildings, aging, weathering development of cracks; Concepts in repair, restoration and seismic strengthening, materials and equipments for restoration of masonry and concrete structures. Methodologies for seismic retrofitting.

### **Reference books:**

**Abbott, L. Patidc.** Natural disasters.

**Arhold, Christopher and others.** Building configuration and Seismic Design.

**Disasters and Development -**

**National Geographic.** Restless Earth: Disaster of nature.

**Singh, P.P. and Sharma, Sandhir.** Modern dictionary of natural disasters.

## FINAL YEAR (NINETH & TENTH SEMESTER)

### AR 9.1 PRACTICAL TRAINING

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|          |             |            |                   |       |
|----------|-------------|------------|-------------------|-------|
| Int: 200 | EndExam:200 | Total: 400 | EndExam:Viva-Voce | Cr:60 |
|----------|-------------|------------|-------------------|-------|

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#### **Course Overview:**

Internship for a period of not less than 40 weeks in both the semesters put together in one year.

#### **Objectives of the Course:**

To provide experience in Architectural Practice.

**Expected Skills / Knowledge Transferred:** The skills required for an architect to grow into a complete professional.

#### **Course Contents:**

Every student must work in an Architect's Office as a full-time trainee for a period of 40 calendar weeks in one year (excluding Viva-voce) from the date of commencement of training. The Chief Architect in the firm should be registered with the Council of Architecture and have a minimum of five years of practical/professional experience after her/his graduation. The student should involve herself/himself in various aspects of work in an office like working drawings, presentation drawings, quantity and cost estimation, site supervision, municipal drawings, etc.

**Note:** Detailed instructions given by the University regarding the training, the frequency of reporting to the department, etc. will be issued at the end of the Eighth Semester, which the student must strictly follow.

After completion of training, every student will have to submit a detailed report with a set of drawings on at least four projects on which she/he has worked during the forty calendar weeks of the practical training period.

#### **Evaluation:**

- The internal assessment shall be evaluated at the end of 40 weeks (Tenth Semester) and shall be conducted by the faculty deputed by the department in the institute.
- The detailed report and drawings prepared during practical Training by students will be evaluated at a viva-voce by a jury consisting of one external, one internal and head of the department or his nominee.

After submission of the report the department at its convenience will arrange for the conduct of the viva-voce examination.





**JAWAHARLAL NEHRU ARCHITECTURE AND FINE ARTS UNIVERSITY  
HYDERABAD.  
(SYLLABUS – 2017)  
MASTER OF ARCHITECTURE in Environmental Design 2017-18**

| M.Arch. (Environmental Design)                        |
|---|
| ED 1.1 Environmental Design Studio-I                  |
| ED 1.2 Energy Simulations E.C.B.C – I                 |
| ED 1.3 Building Physics                               |
| ED 1.4 Resources Management and Ecology               |
| ED 1.5 Sustainable Development and Planning           |
| ED 1.6 Seminar  |
| ED 2.1 Environmental Design Studio – II               |
| ED 2.2 Energy Simulations E.C.B.C – II                |
| ED 2.3 Research Methods-I                             |
| ED 2.4 Building Energy Management                     |
| ED 2.5 Environmental laws                             |
| ED 2.6 Sustainable Site planning and landscape design |
| ED 3.1 Advanced Environmental Design lab/Studio       |
| ED 3.2 Environmental Impact Assessment                |
| ED 3.3 Environmental Rating Systems                   |
| ED 3.4 Sustainable practices in Waste Management      |
| ED 3.5 Environmental Infrastructure                   |
| ED 3.6 Research Methods-II                            |
| ED 4.1 Environmental Economic feasibility             |
| ED 4.2 Environmental Design Thesis                    |

## FIRST SEMESTER

### **ED 1.1 ENVIRONMENTAL DESIGN STUDIO-I**

L/s : 12/Wk Int : 150 End Exam : 150 Total : 300 End Exam : Viva – voice Cr : 12

#### **Objective**

To understand and analyze, climate and its elements at both micro and macro level and design projects of varied scales with passive strategies.

#### **Course contents**

##### **Macro level**

Climatic Design of Neighborhood which includes designing group of buildings, clusters with total understanding of interaction of Built Environment and ambient environment.

Application of site level strategies to create built mass to achieve positive influence on micro climate.

##### **Micro level**

Climatic design of unit with understanding of thermal behavior of walls, facade roof etc., and fenestration design.

Design demonstration shall necessarily include the optimization of shadow mask to harness the advantages of mutual shading and to understand the wind pattern generated.

A report to be prepared on the Thermal calculations and qualitative and quantitative passive cooling/heating techniques used .

Sessional/Term Work Design outcome for both projects will be assessed as per the project brief

#### **References**

1. G.K.Brown and Mark DeKay ; Sun,Wind and Light, John Wiley and Sons, INC
2. O.H.Koenigsberger; Manual of Tropical Housing & Building, University Press
3. Arvind Krishnan: Climate Responsive Architecture
4. Bansal. N; Passive building design, London
5. Givoni; Man, Climate and Architecture

## **ED 1.2 ENERGY SIMULATIONS E.C.B.C – I**

L/s : 6/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 06

**ECBC objective** Compliance and approach: Energy efficiency performance levels, building systems, precedence, building classifications, energy performance index, compliance approaches and requirements, approved analytical tools, administrative requirements, compliance documents, Benchmarking and StarLabelling.

### **Course Content**

ECBC Building Envelope: Mandatory requirements-fenestration, opaque construction, day lighting, building envelope sealing, Prescriptive requirements-roof, opaque external walls, vertical fenestration, skylights.

Shading Equivalent Factor (SEF), Building Envelope trade- off method ,Understanding refrigeration cycle, and overview of HVAC components - Pumps, Chiller, Piping, Ducting, Air Handling Units (AHU), Cooling tower ,Packaged and Central HVAC systems ,Comfort Systems and Controls: Mandatory requirements-ventilation, minimum space conditioning equipment efficiencies, controls, additional controls for ECBC + and super ECBC, additional controls for super ECBC buildings, piping and duct work, system balancing, condensers, service water heating ,Prescriptive requirements-pumps, cooling towers, conomisers, variable flow hydronic systems, boilers, energy recovery. Total system efficiency-alternate compliance approach. Low energy comfort systems. Lighting and Controls: Mandatory requirements-lighting controls.

Exit signs, Prescriptive requirements- interior lighting power, building area method, space function method, Installed interior lighting power, Exterior lighting power, Electrical and renewable systems.

Mandatory Requirements-Transformers, energy efficient motors, Diesel generators sets, check metering and monitoring, power factor correction, power distribution systems, uninterruptible power supply, renewable energy systems.

Whole building performance method -General, Scope, compliance, annual energy use, trade-off limited to building permit, documentation requirements, Mandatory requirements, Simulation requirements-energy simulation program, climate data, compliance calculations, Calculating energy consumption of proposed design and standard design-energy simulation model, HVAC systems, compliance thresholds for ECBC Compliant, ECBC+ and super ECBC Buildings, Maximum allowed EPI ratios, Schedules.

### **Practical Sessions**

How simulation software works, geometry of buildings, Material and construction, Openings and shading, lighting and controls. Daylight Simulation, Heating and cooling design, Unitary HVAC Systems, Central HVAC System, Building energy code compliance, project: small office, Building energy code compliance, project large office.

### **References**

1. Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable

Design. Architectural Press, Second Edition. 2010.

2. Vishal Garg, Jyothirmay Mathur, Surekha Tetali, Aviruch Bhatia. Building Energy Simulation: A workbook using DesignBuilder. CRC Press. 2017

3. Energy Conservation Building Code 2017. Bureau of Energy Efficiency. New Delhi. 2017

4. American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.1-Energy Standards for Buildings except Low-rise residential buildings. 2016

5. American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.2-Energy Standards for Low-rise residential buildings. 2016

6. Jens Lausts. Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings. International Energy Agency (IEA) Information paper. March 2008

7. Reddy T.A., et al. Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, Third Edition, CRC Press.

## **ED. 1.3 BUILDING PHYSICS**

L/s : 3/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 03

### **Objective**

The aim of the course is to introduce climatic parameters and to understand in depth the factors affecting comfort and strategies that lead to around/outside and inside the built space.

### **Course contents**

#### **Climate Analysis**

Earth-Sun relationship, Global Climate, Elements of Climate, Climatic zones in India, Analysis of macro & micro climate. Interpretation of climatic data through Climate Data, Solar Path Charts, Psycho metric Charts, Bioclimatic charts.

Principles of Thermal Design Thermal quantities, Heat exchange in buildings, balance point temperature and periodic heat flow , in terms of live examples and calculations of heating/cooling loads based on the building materials typologies, calculation of U value for various combination of building materials and contemporary construction methods.

Vernacular and Contemporary Case Studies & Appraisal to be done with the analytical studies made pertaining to the above mentioned calculations.

Design Strategies (Outdoor and Indoor) Modifications of Architectural elements for thermal comfort-orientation, Open spaces, built spaces, building envelope, fenestrations, shading devices, roofs, walls etc. Natural ventilation, Cross ventilation, stack ventilation etc.

#### **Acoustics**

Terminologies, measurement and transmission, noise, reverberation time, passive and active noise control, design strategies for classroom, auditorium and amphitheatre acoustics.

#### **Instruments:**

Use of instruments like data loggers/ anemometer for thermal/ wind data recording and carrying out related studies/exercises.

#### **Sessional/Term Work**

Journal with exercises to elaborate the above mentioned theories and concepts.

#### **References**

1. G.K.Brown and Mark DeKay ; Sun,Wind and Light, John Wiley and Sons, INC
2. O.H.Koenigsberger; Manual of Tropical Housing & Building, University Press
3. Arvind Krishnan: Climate Responsive Architecture
4. Bansal. N; Passive building design, London
5. Givoni; Man, Climate and Architecture



## **ED 1.4 RESOURCE MANAGEMENT AND ECOLOGY**

L/s : 3/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 03

### **Objective**

Evaluation of Ecology, Man and Ecosphere, Components of nature and some basic concepts, process of ecology, flow of material, water, energy, invasion, succession, predictim, regulatory forces, adoption, tropic levels, food chain, food web, ecological pyramids.

Eco-system and their relevance to environment, causes and consequences. Impact of advance architectural methods, urbanization and industrialization on nature. Pollution: Types, sources, remedies.

Urban eco-system approach, evolution and significance .

Introduction to quantitative ecology:

Identification of ecological parameters for planning at different levels, site planning, settlement planning, regional planning.

Data needs, formats for data collection. Types of analyses required to evolve ecological parameters.

Environmentally compatible regional development ; An approach.

Ecological awareness in India; traditional, indigenous methods, contemporary trends.

Endowments and resources, definition and classification according to different criteria, renewable, non-renewable energy sources, etc.

Human welfare and development as functions of resurces in terms of physical environment, way of living and technology. Space bound and flow resources. Preparation and analysis of inventories and resource materials. Finiteness of resources, examples of transfer from one resources to another in history at different parts of the world, development, utilization and conservation of resources planning, integrated planning approach to resources development management, traditional and contemporary approaches to resource development in India, some selected case studies.

### **Physical Environment**

Air Environment – Air resources, Atmospheric systems, climate, Emission standards, global warming, ozone depletion, nuclear wars, problems, Water Environment – Water resources – types, water resources- renewal, use, Drinking water standard, Health Aspects, water pollution, sanitation, disposal standards of Treated wastewater.

Soil environment – soil types, soil yield, soil pollution.

### **References**

1. Ecology and natural resource management , William E Grant.

## **ED 1.5 SUSTAINABLE DEVELOPMENT AND PLANNING**

L/s : 3/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 03

### **Objective**

To introduce the scale of macro planning and its relationship with micro level planning (site planning). To develop an understanding to mitigate climate change issues at neighbourhood level and to expose to the steps involved in sustainable urban design projects.

To expose the students with the cross sectoral relationship between various components of urban planning, viz. transportation planning, land suitability analysis, infrastructure planning and socioeconomic planning. Introduce the concept of environmental planning and expose to the emerging concepts in sustainable planning like, smart city concept, eco-city concept, etc.

### **Course contents**

Introduction to the theory of social planning and study various examples of socially inclusive planning projects, community participation in planning process, etc.

Study examples / case studies of social infrastructure planning (Chandigarh, Gandhinagar, Naya Raipur, Navi Mumbai, etc.) Principles of urban planning, classifications of human settlements (Indian context) and study national planning standards like UDPI guidelines, Broad Theory of transportation planning and road network theory and principles,

Environmental policies and initiatives – national and international, Housing theory and policies in India, Theory and principles of sustainable planning, Issues and tools of sustainable urban design and neighbourhood planning, Case study analysis of smart cities, eco-cities (national and international) , Formulating sustainable strategies for an existing city at macro level (city level) and at micro level (neighborhood level).

Group submission based on above exercise, Seminar / presentation of various aspects, issues of sustainable development (individual assignment).

### **References**

1. Stephen Wheeler; *Planning for Sustainability*,
2. Simon Presner, *Principles for Sustainability*
3. Cecilia Tacoli; *Urban Linkages*
4. Monto & Ganesh; *Sustainability by human settlements*
5. Sampson; *The WTO and sustainable development*
6. *Achieving sustainable cities in SE Asia region*
7. Antonio Layards; *Planning for Sustainable future*
8. D Farr; *Sustainable Urbanism*
9. Tifiin J; *Transport communications*
10. Brain; *Transport in Cities*
11. K.Lynch; *The Image of the City*, MIT Press
12. Edington John; *Ecology and Environmental Planning*
13. Alexander Christopher; *A pattern Language The Environment ,Public Health and Human Ecology consideration for Economic Development.*

**ED 1.6 SEMINAR:**

L/s : 3/Wk    Int : 100    Total : 100    End Exam : Viva – voice    Cr : 03

**Objective :**

To understand the basics of technical paper presentation, investigation and research.

**Course Contents:**

Due to changes in the social, economic and technological variables, areas of interest and concerns keep emerging in the field of environmental design. Individually every student should present a seminar and a term paper at the end of the semester, for the final assessment. This should be based on extensive literature reviews, site visits, and interviews with experts. Topics shall be green architecture multistoried development, intelligent architecture, sustainable development, sustainable urban design and conservation strategies, sustainable housing etc.

## SECOND SEMESTER

### **ED 2.1 ENVIRONMENTAL DESIGN STUDIO–II**

L/s : 12/Wk Int : 150 End Exam : 150 Total : 300 End Exam : Viva – voice Cr : 12

#### **Objective**

The purpose of this Studio is to engage students with environmental issues and concerns at urban scale (5 hectares) and context and apply the theoretical knowledge of these and sustainable design principles to specific projects affected by these issues.

#### **Course contents**

Urban Environmental Studies, Environmental Status Reporting and identification of environmental issues in urban areas. Conceptual design strategies for Sustainable Development of public realm at urban scale & context.etc.

These may include River front development, ecological restoration projects, sustainable urban blocks, Heritage conservation for sustainability, Sustainable City Development Strategies etc.

#### **Sessional/Term Work**

Identification of Environmental issues and areas of design intervention, presentation of concepts and design strategies for the same, technical drawing portfolio and a report to elaborate the sustainable design scheme.

#### **References:**

1. Kevin Lynch, Image of the CityED

## **ED 2.2 ENERGY SIMULATIONS ECBC – II**

L/s : 3/Wk    Int : 50    End Exam : 50    Total : 100    End Exam : 3Hrs    Cr : 03

**Course Overview:** This course will give understanding of advance concepts in building energy efficiency and how to model them.

**Objective of the course:** To enable students to design and evaluate high performance buildings leading to net zero building design. Understand advance electrical and mechanical systems and how to integrate them in design.

**Expected Skills/Knowledge Transferred:** Modeling and simulating various aspects of low energy building design.

### **Course Content:**

Simulation in early design stage – Orientation, Window to Wall (WWR) ratio, Overhang and fins, Glass type, Overhang, Roof and wall insulation. Daylighting design and controls - Electro chromic glazing, Dynamic facades, Glare analysis and control, Annual solar exposure, Spatial daylight autonomy. Introduction to Heating Ventilation and Air Conditioning (HVAC) system selection, Concept of thermal storage, radiant cooling systems, and Under Floor Air Distribution (UFAD). Introduction to HVAC controls, Overview of Demand Control Ventilation (DCV), VAV Control, VFD controls on AHU, VFD control on pumps, Energy recovery controls, and Economiser controls. Interior lighting design and performance evaluation using steady state simulation. Exterior lighting design and performance evaluation. Designing for reducing light pollution and trespass. Natural ventilation and mixed mode ventilation Passive features – Earth air tunnel, Stack ventilation, Cool roof. Renewable energy systems, Sizing Photovoltaics and Wind energy systems. Advance simulation parameters, Weather data, Life Cycle Costing Analysis (LCCA).

### **Practical Sessions**

Parametric simulation for envelop design optimization, Designing and evaluating daylighting strategies. Simulating mixed mode building. Designing and evaluating passive features. Simulation of interior and exterior lighting design. Designing roof top photovoltaic system. Design a Net Zero small office

### **References**

1. Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable Design. Architectural Press, Second Edition. 2010.
2. Vishal Garg, Jyothirmay Mathur, Surekha Tetali, Aviruch Bhatia. Building Energy Simulation: A workbook using DesignBuilder. CRC Press. 2017
3. Reddy T.A., et al. Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, Third Edition, CRC Press
4. ISHRAE IEQ Standard. 2017

## **ED. 2.3 RESEARCH METHODS**

L/s : 6/Wk    Int : 50    End Exam : 50    Total : 100    End Exam : 3Hrs    Cr : 06

### **Objective**

To introduce methods and processes of research in order to understand their significance in general and with reference to environmental design context in particular.

### **Course contents**

Methods and types of Research: Documentary or Historical Research, Normative or descriptive survey. Experimental survey Research. Casual Comparative Research, Correlation method. Case study method. Generic and other methods, Methods of conducting various types of surveys and presenting survey data sampling, Post occupancy evaluation, etc.

Tools of Research: Questionnaires, Schedule, Check list, Rating Scale, score card, Attitude Scale, Observation, Interview, Social distance scale, Guess who technique, Sociometry. Technical Report and dissertation/writing, Bibliography & references.

### **Sessional/Term Work**

To undertake a focused study based upon a research question and to present it in the form of a research paper, compilation of study material, along with brief assignments demonstrating the steps in the research process.

Examples of Research works of different methods to be analyzed as part of the course assignment.

### **Recommended Readings**

1. Creswell, J. W. *Research Design: Qualitative, quantitative and mixed methods approaches*, 2<sup>nd</sup> Ed., Thousand Oaks: Sage. 2003.
2. De Vaus, D. A. *Surveys in Social Research*, Jaipur :Rawat Publications. 2003
3. Groat, L. & Wang, D. *Architectural Research Methods*, NY: John Wiley and Sons Inc. 2002.
4. Kothari, C.R. *Research Methodology: Methods and Techniques*, New Delhi: WishwaPrakashan. 2005.
5. Sanoff, H. *Methods of Architectural Programming*, Dowden Hutchinson and Ross, Inc. Vol. 29, Community Development Series. 1977.

## **ED. 2.4 BUILDING ENERGY MANAGEMENT**

L/s : 3/Wk    Int : 50    End Exam : 50    Total : 100    End Exam : 3Hrs    Cr : 03

### **Objective:**

To introduce aspects of sources and supply of energy and its integration with planning and design of built environment ; global energy scenario, introducing the various types of renewable resources and appropriate technologies & harnessing strategies and policy of energy security and environmental protection.

### **Course contents**

Energy Scenario: Current global scenario, Global Summits , Energy needs at global, country, state and city level. Identification of resources at country and state level .

Conventional Source – limitations; comparative advantages of Renewable resources.

Large scale production of renewable energies like Solar Energy /Wind Energy / Bio Mass.

Scope and potential of renewable resources, the technological limitations and application at general level and building integration level.

Other resources: Geothermal , Tidal , Mechanical Nuclear energy, Cogeneration.

Built form and energy , physical form and building geometry, Building Envelope, Fenestration, implication of urban built form on Energy.

### **Bio fuels**

Alternative Fuels, CNG & LPG. Introduction to Energy Efficient HVAC Systems

Plumbing for Green Buildings. Energy Efficient Electrical Utilities,Electrical Energy basics, Electricity billing, Electrical load management and maximum demand control, Power factor improvement and its benefit.

### **Sessional/Term Work**

Case studies on Energy management / Alternate sources of Energy, to be submitted and presented as seminar / discussions.

### **References**

1. Energy and Urban Built Form ; Dean Hawkes,Janet Owens,Peter Rickaby, Philip Steadman.
2. VV Kishore ;Renewable energy, engineering and technology,TERI
3. Sophia and Stefen Behling; Solar Power
4. Martin Kalstchmitt; Renewable Energy
5. Ursula Eicher; Solar technology and buildings
6. Falk Antony; Photovoltaic for Professionals
7. Paul Gipe; Wind Power

8. Renewable energy and Environment, CEE Publication
9. Renewable energy technology development and implications, TERI
10. Sustainable building Manual, Vol 1 and 2, TERI
11. Turner and Doty; Energy Management Handbook.
12. Martin Greenwald; Residential energy systems and climate control technology.
13. Jan Kreider; Solar heating design.
14. Hegger and Fuchsen;. Energy Manual
15. Green awareness, Ferris State University.
16. R.K. Narang; Cleaner is cheaper, TERI



## **ED 2.5 ENVIRONMENTAL LAWS**

L/s : 3/Wk    Int : 50    End Exam : 50    Total : 100    End Exam : 3Hrs    Cr : 03

### **Objective**

The aim is to introduce the students to the international developments and trends in environmental laws and legislations in India.

### **Course contents**

Public Health and Safety: Remedies under law of torts, law of crimes and other common law remedies.

**The Constitution of India:** Salient features, Fundamental Rights and Directive Principles of State Policy, Writ petitions, Public Interest Litigations. Environmental laws and legislations: Water Act, 1974, Air Act, 1981, Environment Protection Act, 1986, Energy Conservation Act, 2001, Public Liability Insurance Act, 1991 and Biodiversity Act 2002. Environmental Notifications and Rules: Coastal Regulation Zones, Examples of Eco-Fragile Area, Environment Impact Assessment of Development Projects, Eco-Sensitive Zones, Bio-Medical Waste (M&H) Rules, 1998, Hazardous Waste (M&H) Rules, 1989, Municipal Solid Waste (M&H) Rules, 2000.

**International Practices-**Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings, General status in , North America, Japan, New Zealand, Australia, Energy Codes in Singapore, Malaysia, Dubai and Middle east, ASHRAE 90.1, ASHRAE 90.2, IECC, Title 24.

### **References**

1. Leela Krishnan; Environmental Law in India
2. Mehta M ; Commentary on water and air pollution with environmental protection law
3. Sarkar S; Legal aspects of regulations in South Asia
4. Chalifour N; Land use law for sustainable development
5. Birnie PW and Boyle; International law and the Environment
6. Saksena K.D ; Environmental policies and programs in India

## **ED 2.6 SUSTAINABLE SITE PLANNING AND LANDSCAPE DESIGN**

L/s : 3/Wk      Int : 100      Total : 100      End Exam : 3Hrs      Cr : 03

Introduction to Sustainable Site Planning Principles. Climate and site planning, defining microclimatic presentation from macro climatic data, Analysis & integration of climatic data.

Land as a resource – Geophysical, Hydrological, Built form, Potentialities/limitations, Principles of climate responsive Landscape Design.

Application and techniques in using water as a resource for sustainable site planning and landscape, phyto-remedification of waste water. Case of shamshabad airport.

Sustainable planning design and management.

Advanced techniques in plantation, tree transplantation, tree banks, green houses, vertical green walls, terrace gardening techniques in urban areas, special plants to improve air quality and technological innovations.

Sustainable landscape design approaches for water fronts in urban areas.

Integrating soil into the design process. Soils in the site assessment, managing soil for sustainable site planning.

Materials and resources, environment impact of materials and products, evaluating environmental and human health impacts of material, materials to minimize heat island.

### **References**

- 1.The Sustainable Sites Handbook – Meg Calkins
- 2.The Living Landscape, Second Edition: An Ecological Approach to Landscape Planning
- 3.Site Planning and Design Handbook, Second Edition – Thomas H.Russ

## THIRD SEMESTER

### **ED 3.1: ENVIRONMENT DESIGN LAB/STUDIO-III:**

L/s : 12/Wk Int : 150 End Exam : 150 Total : 300 End Exam : Viva – voice Cr : 12

#### **Objective**

To develop creative skills, abilities, judgment and control in the design of built environment. The student should be able to have a comprehensive design approach to achieve energy efficiency in built environmental design.

#### **Course contents**

Design/Retrofitting of buildings/campuses for energy efficiency. Focus should be on buildings/campuses which are conventionally energy guzzlers.

To study and document, understand and analyze the energy consumption levels & patterns of any IT campuses, commercial complexes/malls, health campuses etc.

#### **Sessional/Term Work**

The student needs to prepare a detailed report on how to make the selected study area or campus ready for ratings, like Green certification, LEED etc.

Preparation of portfolio to apply the energy efficient principles & design inputs using appropriate technical software's eg. Grass hopper, Eco-tech etc to fulfill the requirements mentioned in the above prepared report.

## **ED 3.2 ENVIRONMENTAL IMPACT ASSESSMENT**

L/s : 3/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 06

Introduction to Environmental Impact Assessment: Defining the role of impact assessment --- Rational for EIA --- Phases of impact assessment.

Impact Identification Techniques: Various methods used in impact identification --- detailed techniques of using these techniques --- strengths and weaknesses of the various techniques used as impact identification process.

Impact Evaluation Techniques: Techniques used in impact evaluation --- Weighting-Scaling techniques, ecological rating systems --- Goals-achievement matrix, priority-trade-off-scanning matrix.

Predicting Impact on the Physical Environment: Land --- indicators for land suitability and vulnerability --- Landscape characteristics and indicators of landscape process --- Mapping landscape characteristics --- Techniques for evaluating alternative land use plans.

Air --- calculating pollutant emission --- predicting ambient concentration --- predicting ecological response to air pollutant --- predicting human health risks.

Water --- categorisation of pollutants --- pollution dispersion --- water quality.

Predicting Impact on Biota: Ecosystem process and impact assessment --- energy fixation and flow.

### **References**

1. **ENVIRONMENTAL IMPACT ASSESSMENT** : A Guide to Best Professional Practices, Charles H. Eccleston , March 29, 2017 by CRC Press.

### **ED 3.3 ENVIRONMENTAL RATING SYSTEMS**

L/s : 6/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 03

#### **Objective**

To introduce the various tools and methods associated with the field of environment and to prepare students for new skills and upcoming trends in the field of environment.

#### **Course contents**

1. Energy Audit
2. Life Cycle Assessment
3. Carbon Footprint and Mapping
4. Green Building Rating Systems
5. GRIHA
6. LEED Ratings

\* Any other Rating systems which are suitable.

#### **Sessional/Term Work**

Assignment will be in the form of notes/ assignments covering all the topics mentioned above with suitable examples, sketches and supportive material, case studies of Green certification buildings, leed certified buildings.

#### **References**

GRIHA; Griha Manual, Vol 1 to 5, TERI Publication

IGBC Manuals, CII Publication

LEED Manuals

ECBC Manual

ECBC User Manual

### **ED 3.4. SUSTAINABLE PRACTICES IN WASTE MANAGEMENT**

L/s : 3/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 03

The primary goal is to provide a comprehensive understanding of waste management from an environmental public health perspective. Identify and discuss the public health, regulatory, planning, technical and economic principles that influence the solid waste management system. Describe appropriate methods to minimize the impact on the public's health from solid waste related activities.

Introduction, Segregation, Sorting, Composting, Vermi composting, Home composting, Recycling and Reuse. Incineration method, Scientific Land filling, Energy development and Management of urban waste services.

Develop a more informed opinion on a variety of waste related issues such as electronic waste, industrial waste, medical waste and C&D (construction and demolition) waste etc.

Sustainable techniques in municipal solid waste management.

Analysis of an integrated solid waste handling system including source reduction, recycling and reuse, composting, land filling and combustion by way of case-studies.

#### **Solid waste disposal and management:**

Resource recovery, technology options and determination of type and choice of systems as related to land use, density, economic levels and location of urban industrial and commercial activity areas.

Quantity of sewage, quantity of storm water, run off, time of concentration, design of sewers, flow diagrams, laying of sewers, sewer appurtenances. Design and layout of sewerage system.

Project Management (Need Assessment, Structure, MIS, Project Management Packages (Brief Introduction to MSPROJ/WINPROJ).

#### **Reference Books:**

1. Integrated Waste Management, A Sustainable Approach – Dave Whittaker.
2. Sustainable Solid Waste Management – Syeda Azeem Unnisa, S.Bhupathi Rav.
3. Advances in Solid and Hazardous Waste Management – S. Goel.
4. Municipal Solid Waste Management, Strategies and Technologies for Sustainable Solutions.  
- Christian Ludwig, Stefanie Hellweg, Samuel Stucki.
5. Sustainable Practices for Landfill Design and Operation – Debra Reinhart, Jon Powell, Pradeep Jain, Qiyong Xu, Thabet Tolaymat, Timothy. G.
6. DEWATS, Auroville.
7. Publications by Vastu Shilpa Foundation, Environmental Sanitation Institute, Ahmedabad.

## **ED 3.5 ENVIRONMENTAL INFRASTRUCTURE:**

L/s : 3/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 03

### **Objectives**

This course is designed to provide a general understanding of various issues and approaches to planning, designing, and maintenance of Infrastructure. The major emphasis in this course will be on water supply, sewerage, storm water drainage, roads and soil water management.

### **Introduction:**

Concepts of basic needs, formation of objectives and standards. Data requirements for programme planning of urban networks and service; feasibility planning studies for structure the infrastructure systems  
General Introduction to Infrastructure and its components and overview of the course contents.

### **Water Supply:**

Planning water supply; resource analysis quality of water system design; technological choices of alternatives – Issues related to the choice of centralized city water supply versus decentralized systems.

Water demand (Context, Need Assessment and Planning requirements ) - data to be collected, rate of demand, variations in rate of demand and effects of variations on design. Measurements of water qualities, forecasting demand. Conveyance and distribution system - General considerations, methods of distribution, service reservoirs, systems of supply, methods of lay out distribution pipes, wastage of water and permissible factors. Maintenance of distribution system. Filtration, disinfection, storage and distribution and their building complexes.

Sewerage and Storm Water Drains (Need Assessment in the context of Urbanisation, Planning Considerations and Norms, Basic Design Parameters and Appurtenances). Waste generation process in cities. Waste water disposal systems including storm water drainage, system designs, nodal facilities, technological and environmental considerations. Issues related to hydrological and geographical and development parameters – eutrophication. Biological concepts in environmental sanitation.

Sanitation technologies, their relevance to incremental growth of urban areas. Low cost sanitation technologies and concepts as related to Indian and third world country contexts

Sewage Treatment Plant and Water Treatment Plant (Components, Planning Considerations, Basic Design Parameters).

Urban Roads (Planning Considerations, Road Categories, Design Parameters/Cross Sections, Transportation).

**Other Infrastructure:**

Concepts and theories for design and operation of electricity networks, power generation (conventional and non-conventional) communication networks like telephone facilities, WLL, cable TV, Fibre optic and other broadband communications networks, etc. Integrated Infrastructure Planning: Case studies in India.

**References**

1. Arora K.R, Irrigation, Water power & Water resource engineering, standard publishers distributors New Delhi.
2. G.S.Bridle, Water Supply & Sanitary Engineering.
3. V.S. Mahajan , Transport Planning, Policy & development.
4. Itpi reader volumes.
5. HSMI reports.



## **ED 3.6 RESEARCH METHOD - II:**

L/s : 3/Wk    Int : 100    Total : 100    End Exam : Viva – voice    Cr : 03

### **Objective**

To give an opportunity to explore and to study central issues related to environmental architecture from past, to the present day and future.

The topic of the research paper could be selected in a such way that it could help to develop an appropriate methodology and research approach related to the Environmental Architectural Project taken up in semester-IV.

### **Course contents**

The subject deals with selecting an appropriate topic from the field of environmental architecture or allied disciplines, for the theoretical exploration related and supportive to the selected dissertation topic.

Research dissertation need to be submitted based upon the topic approved by the institute in around 5000 words, in format specified by the university.

The student shall present a paper (in a conference / journal) on a topic of his/ her choice on any subject, he/ she have learnt in the course curriculum. The paper necessarily should be first authored by the student during the course of study. The degree to the student will be awarded only after producing a proof of publication/ acceptance.

### **Reference:**

1. Technical Report writing by Daniel Riordan. Edition 10. Publisher Cengage learning 2013.
2. Scientific Approach to Scientific Writing John Blackwell, Jan Marlin.
3. Communicating research. Meadows.A.J.(Arthur Jack). San Diego. Academic Plans (1998)

## FOURTH SEMESTER

### Environmental Design Project

#### **ED 4.1 ENVIRONMENTAL ECONOMIC FEASIBILITY**

L/s : 6/Wk Int : 50 End Exam : 50 Total : 100 End Exam : 3Hrs Cr : 06

The objective of the course is to understand and relate the issue related to Economic & Feasibility of the project chosen in the thesis. The focus shall be on environmental aspects of the project.

Introduction to Project finance & Management. Project Management: Construction projects, Project development process, project management, main causes of project failure. . Project formulation: Generation and Screening of Project Ideas - Project identification – Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre-Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report.

Project Planning Process: Plan development process, time planning process, work scheduling process, resource planning process, Importance of planning, scheduling and controlling projects.

Project Finance: Introduction to project finance, Means of financing, Costs associated with projects, estimates, Economic analysis of project, economic studies, sensitivity analysis. Cost estimating principles. Detailed estimates, cost concepts, classification of costs, elements of costs, Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT Working Capital Management: Concept, Need and types of Working Capital; Determination of Working Capital; Estimation of Working Capital Needs; Financing of current assets – Matching, Conservative Approach, Aggressive Approach (Problem and Theory) .

#### **Reference Books**

1. Journal of Environmental Management Vol-88.Aug.2008
2. Chitkara, K.K, Construction Project management: Planning. Scheduling and Controlling.  
Tata McGraw-Hill Pub., New Delhi.1999. 8. Sharma, S.C, Construction Equipment and its Management, 4<sup>th</sup> ed. Khanna Pub., New Delhi, 2004.

## **ED 4.2 ENVIRONMENTAL DESIGN THESIS:**

L/s : 24/Wk Int : 250 End Exam : 250 Total : 500 End Exam : Viva – voice Cr : 24

The students are individually required to identify the title for environmental design thesis leading to design demonstration as an end product.

The area chosen shall be multidisciplinary & addressing present or immediate future situations of the environment.

Appropriate methodology shall be identified by each student which will include literature reviews, case studies & Analysis, Primary & secondary surveys leading to synthesis of the Environmental design project.

Selection of Guide:

Students are suggested to consult internal faculty members based on their own areas of interest. It is also possible for students to consult external faculty actively participating in academic programme. Taking up academicians of other Institute/Research Organizations, as External Guide is permitted. However, in that case, a Core Faculty should be chosen as Internal Guide.

DEPARTMENT OF ARCHITECTURE  
J N T U, SCHOOL OF PLANNING & ARCHITECTURE  
MAHAVEER MARG, HYDERABAD – 500 028.

**Course Structure for**  
**Master Degree in Architecture (Interior Design)**

DEPARTMENT OF ARCHITECTURE  
J N T U, SCHOOL OF PLANNING & ARCHITECTURE  
MAHAVEER MARG, HYDERABAD – 500 028.

**Course Structure for Master Degree in Architecture (Interior Design)**

**FIRST SEMESTER**

| Course No | Course Title                                 | Periods Per Week |           |         | Marks    |          |       |
|-----------|--|------------------|-----------|---------|----------|----------|-------|
|           |  | Lectures         | Tutorials | Studios | Internal | External | Total |
| I D 1.1.  | Theory of Aesthetics and Design              | 3                | --        | --      | 40       | 60       | 100   |
| I D 1.2   | Interior Design Materials & Construction – I | 2                | --        | --      | 40       | 60       | 100   |
| I D 1.3   | Environmental science for Interiors          | 2                |           |         | 40       | 60       | 100   |

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|         |                            |    |    |    |     |      |     |
|---------|----------------------------|----|----|----|-----|------|-----|
| I D 1.4 | CAD and Visualization      | 1  | 3  | -- | 40  | 60*  | 100 |
| I D 1.5 | Seminar                    | 2  | 2  | -- | 100 | 00   | 100 |
| I D 1.6 | Interior Design Studio – I | -- | -- | 9  | 80  | 120* | 200 |
| I D 1.7 | Workshop – I               | 1  | 2  | -- | 100 |      | 100 |

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|       |  |    |   |    |     |     |     |
|-------|--|----|---|----|-----|-----|-----|
| Total |  | 11 | 8 | 11 | 440 | 360 | 800 |
|-------|--|----|---|----|-----|-----|-----|

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**SECOND SEMESTER**

| Course No. | Course Title                             | Periods Per Week |               |         | Marks    |          |       |
|------------|--|------------------|---------------|---------|----------|----------|-------|
|            |  | Lectures         | Tutorials/Lab | Studios | Internal | External | Total |
| I D 2.1    | Theory and History of Design             | 3                | --            | --      | 40       | 60       | 100   |
| I D 2.2    | Interior Design Materials & Construction | 2                | --            | --      | 40       | 60       | 100   |
| I D 2.3    | Building Service systems for Interiors   | 3                | --            | --      | 40       | 60       | 100   |
| I D 2.4    | Furniture Design & Detailing             | 2                | --            | 2       | 40       | 60       | 100   |
| I D 2.5    | Critical Research Seminars               | 2                | 2             | --      | 100      | 00       | 100   |
| I D 2.6    | Interior Design Studio – II              | --               | --            | 9       | 80       | 120*     | 200   |
| I D 2.7    | Workshop – II                            | 1                | 2             |         | 100      | 00       | 100   |

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|       |  |    |   |    |     |     |     |
|-------|--|----|---|----|-----|-----|-----|
| Total |  | 13 | 4 | 13 | 440 | 360 | 800 |
|-------|--|----|---|----|-----|-----|-----|

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### THIRD SEMESTER

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| Course No. | Course Title       | Periods Per Week |               |         | Marks    |          |       |
|------------|--------------------|------------------|---------------|---------|----------|----------|-------|
|            |                    | Lectures         | Tutorials/Lab | Studios | Internal | External | Total |
| I D 3.1    | Practical Training | --               | --            | --      | 80       | 120*     | 200   |

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### FOURTH SEMESTER

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| Course No. | Course Title                            | Periods Per Week |               |         | Marks    |          |       |
|------------|---|------------------|---------------|---------|----------|----------|-------|
|            |   | Lectures         | Tutorials/Lab | Studios | Internal | External | Total |
| I D 4.1    | Design Presentation Through multi-media | 2                | 4             | --      | 100      |          | 100   |
| I D 4.2    | Interior Project Management & practice  | 4                | --            | --      | 40       | 60       | 100   |
| I D 4.3    | Elective                                | 4                | --            | --      | 40       | 60       | 100   |
| I D 4.4    | Interior Design project Dissertation    | --               |               | 16      | 200      | 300*     | 500   |
| Total      |   | 10               | 4             | 16      | 380      | 420      | 800   |

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\* Practical Examination.

- Viva - voce

## **M.Arch (Interior Design)**

### **FIRST SEMESTER**

#### **I D 1.1 Theory of Aesthetics & Design**

- Defining design & aesthetics
- The purpose of design, various fields of design
- The nature of good design Discussion on the theoretical basis to all present day design disciplines
- Principles and vocabulary of design – Balance, symmetry, contrast , rhythm, harmony, unity, scale, proportion etc,

Space : elements of space making and their combinative principles

Form : elements of form and the resultant configurations

Scale : Human scale & its manifestations. Qualifiers of space & form: light, colour, material & texture.

Issues of idea & theme as ordering mechanisms – of space, material, form, colour & light. Perception and response to visual phenomena. Gestalts principles.

Design related cognitive learning. Colour theory & application to the interior environment, principal colour systems, methods of colour harmony.

Appreciation of various arts; painting, murals sculpture, architecture etc. Interior Design in the context of other arts.

#### **I D 1.2 Interior Design Materials & Construction**

Physical, behavioural and visual properties of the following materials and their use in the construction of floor, walls, ceilings, doors, windows, staircase, built in furniture and other components of interior architecture

Wood – Soft, hard, panelling, plywood, boarding

Metals – Steel, iron, aluminum, bronze, brass, copper

Masonry – Stone, concrete, brick, tiles, gypsum, plaster

Market surveys, case studies and site visits to understand the system of construction & details. Study of material application in the form of a portfolio.

#### **I D 1.3 Environmental Science for Interiors**

##### **▪ Thermal Comfort:**

Importance of human comfort in interior spaces. Heat flow within buildings. Thermal properties of materials. Climate and material choices for interior spaces Human response to the thermal environment.

##### **▪ Lighting**

Lighting in interiors. Lighting levels & criteria. Natural & artificial lighting. Selection of lighting. Lighting devices available in the market and their characteristics. Economic issues. Fixture selection and placement – floor, table, desk, wall & ceiling units. Psychological impact on human moods & emotions.

▪ **Acoustics:**

Behaviour of sound in enclosed spaces.

Understanding acoustics and its integration with interior design. Sound absorbents – porous materials, panel or membrane absorbers, resonators.

Absorption coefficient of various acoustical materials.

Human responses to the sensation of sound.

**I D 1.4 CAD and Visualization**

A brief review of computer hardware and software required for interior architectural applications. Working in AUTOCAD for preparing drawings including plans, elevations and sections. Construction of models: working in 3D to construct wireframe modeling, surface modeling, solid modeling etc.

Introduction to rendering

Hidden surface removal, assigning shades, limited to simple exercises.

**I D 1.5 Seminar**

This subject is intended to equip the students with some knowledge in areas which are not covered otherwise in the curriculum, but topics which are of interest or currently significant. Some possible subjects are:

- Role of an interior designer in a project
- Relation of an interior designer with other consultants
- Interiors as a response to social and technological forces
- User participation in design
- Decorative accessories in interiors
- Occupant health & safety in interiors
- Signage & Graphics
- Optical Illusions
- Modular Co-ordinations
- Kitchen & bath design
- Storage design
- New materials
- Basic structural systems

Each student would be required to select one or more of the above subjects and present a written paper and a seminar at the end of the semester for final assessment. This should be based on extensive literature reviews, case studies (wherever possible), interviews, market surveys etc.

Based on the expertise available in the field, colloquiums will be organized. Student will be required to submit a report based on the inputs received for assessment.

**I D 1.6 Interior Design Studio – I**

The Design exercise should reflect the inputs from other subjects. The design process may involve literature studies, case studies, site visits, data collections and analysis eventually resulting in a interior scheme where theme based design is emphasized. Two interior schemes of different functional types viz residential, commercial, banks, restaurants, café etc. and institutional (relating to education & health) will form the major design assignments.



The design exercise should address issues such as institution character through interior environment, corporate image, economic factors & behavioural patterns; integration of commercial activity etc.

Design portfolio should include furniture layout, electrical layout, false ceiling plan, partition designs & details, flooring plan, design of doors & windows, colour schemes etc, specifying materials usage and the related technical knowledge.

Two time problems to be included on specialized product display systems, show case windows at street levels, graphic & signage design etc

### **I D 1.7      Workshop – I**

#### Wood & cane workshop.

Working with wood & wood products to understand material parameters. Wood joinery details, which are commonly used in timber construction in interiors.

Application of veneers / laminates on different types of timber surfaces i.e teak and commercial woods. Engraving and carving. Wood polishing, painting and other finishes.

Types of canes – its properties cane joinery and its strength finishes – colour and surface quality.

## **SECOND SEMESTER**

### **I D 2.1      Theory and History of Interior Design**

Land mark events in the history of International design movement. Historical development of artifact

Overview of the major styles like Regency, colonial, Art & crafts, Romanticism, Art Nouveau, Eclecticism, Art-Deco, Cubism, Post modernism, Late modernism and Deconstructivism

Industrialisation : changes in technology and production systems. Impact on life style and interiors.

The modern movement and its impact on India.

Shift from historical to modern methods of building spaces, change in the interior elements of design and interior architecture. Various schools of thought and design emphasis. Study of Interior Design in the Indian context, contemporary styles with particular reference to India.

Elements of Interior Design including floors, walls, ceiling, lighting, furniture, furnishings and indoor landscape. Indian elements of space making.

Anthropometrics, Ergonomics, Proxemics, and behavioural issues. Metaphor as a tool in the design process. Graphics & signage and its applications.

### **I D 2.2      Interior Design Materials & Construction – II**

Physical, behavioural and visual properties of the following materials and their use in the construction of floor, walls, ceilings, doors, windows, stairs, built in furniture, fixtures and other components of interior architecture.

Glass – Window, plate, tempered, mirror, block etc.

Plastics – Transparent, laminate, tile etc.

Textiles – Drapery, upholstery, wall covering, carpets, durries etc.

Miscellaneous materials such as linoleum, asphalt, cork, rubber, leather, paper, rexine, paints & finishes.

Market survey, case studies and site visits to understand the system of construction. Study of material application in the form of a portfolio.

### **I D 2.3 Building Service Systems for Interiors**

- Plumbing and drainage, implications on interior layouts
- Indian electricity rules, relevant provisions of N.B.C. Preparation of electrical layout scheme for a interior using standard electrical symbols
- HVAC – Air-conditioning, methods and equipment. Air distribution systems – ducts, air inlets. Calculation of AC loads, zoning – purpose & advantage Elevators & Escalators; Definition, application, location & arrangement conveyor belts.
- Fire safety; Role of an interior designer in ensuring fire safety. Study of fire safety regulations of NBC
- Provisions made for services like cable TV, PABX, burglar alarm, other security systems

### **I D 2.4 Furniture Design & Detailing**

Analysis of the form, function & technical aspects of existing furniture.

Measured drawing of existing furniture – plan, elevations and details.

History of furniture from early days to industrial revolution. Study of various styles, systems and products available in market. Scientific way of designing any two types of furniture systems based on ergonomics, materials, working parameters and visual perception. Drawings details and models.

Cost criteria of design & mass production of furniture forms. Knowing and understanding of modern furniture designers such as Ward Bennet, Alvar Aalto, Owen Jones, Florence Knoll, Mies van der Rohe, George Nelson, Henri van de velde, Hans Wegner etc.

### **I D 2.5 Critical Research Seminars**

#### **Research Methods:**

Introduction to the nature & purpose of research and its role in problem solving and theory in the field of interiors. Discussion of various principles & approaches to research.

#### **Suggested areas for research**

1. Studies of Indian art & craft. Influence of location, tradition, culture and socio-economic development on art & craft in rural & urban India. Visit to traditional craft pockets, documenting people, life, culture & craft and understand the materials, tools, technology, processes and forms. Suggest suitable changes in technology to improve the products so as to make it acceptable in today's context.
2. Studies of the work of different interior designers through observation, interview and research. Understanding of the concepts of space, structure, organisation, symbolism, form, colour, modes of presentation etc.
3. The student may chose any other area of interest in consultation with the concerned faculty for research. The study would be presented as a term paper with supporting illustrations. It will be periodically reviewed and presented as a seminar for final assessment.

## **I D 2.6 Interior Design Studio – II**

The design exercise should reflect the assimilation of knowledge of various streams and follows the design process of data collection, analysis, review & study. Two interior schemes of different functional types viz commercial (shopping malls), recreational, (theatres, clubs etc). and public use complexes (airports, bus terminals, railways stations). The design exercise should address issues like design language, visual coordination, culture, traditions and behaviour patterns in the use of space.

Design portfolio should include furniture layout, electrical layout, false ceiling plan, partition design, flooring plans, design of doors & windows, colour schemes, surface treatments etc.

Time problems may be based on exhibition display or special purpose interiors such as barrier free interiors of public areas; interiors for children or the elderly

## **I D 2.7 Workshop – II**

- Ceramic, metal & plastics workshop. Understanding of ceramic products for interior spaces. Processes and techniques of forming & decorating ceramics slab work, throwing, pinching, coil work and firing. Colour pigments and design qualities. Making ceramic tiles, plaster slab and carving
- Types of metals, properties, methods of working with metals, fixing and joinery in metals, finishing and treatment of metals. Metal products & furniture forms used in interiors
- Plastic, F.R.P and acrylic products – design process, tools & technology Development of innovative forms for interiors elements with colour variations.

## **THIRD SEMESTER**

### **I D 3.1 PRACTICAL TRAINING**

Periods:20 /Wks, Int:100, Ext:100, Tot:200, End exam: Viva-voce

Every student must work in an Architect's Office as a full-time trainee for a period of 20 calendar weeks (excluding Viva-voce) from the date of commencement of training. The Chief Architect in the firm should be registered with the Council of Architecture and have a minimum of five years of practical/professional experience after her/his graduation. The student should involve herself/himself in various aspects of work in an office like working drawings, presentation drawings, presentation drawings, quantity estimating, site supervision, municipal drawings, etc. Detailed instructions regarding the training will be issued at the end of the Ninth Semester, regarding the frequency of reporting to the department, etc., which the student must strictly follow.

After completion of training, every student will have to submit a detailed report with a set of drawings on at least two projects on which she/he has worked during the twenty two calendar weeks of the practical training period. This report will be evaluated at a viva-voce by a jury. After submission of the report the department at its convenience will arrange for the conduct of the viva-voce examination.

## **FOURTH SEMESTER**

### **I D 4.1 Design Presentation through Multi-Media**

Computers for documentation and presentation including graphic design, 3D modelling, color rendering, lighting effects, animation, image editing, video editing, sound editing, interactive simulation and web design.

Introduction to interactive multi-media technology and its use in interior architecture.

Use of suitable applications such as:-

- 3 D studio, Alias & character studio for modelling, rendering and animation
- Adobe photoshop & Adobe illustrator for graphic design & touch-ups
- Aldus photostyle, Adobe premiere, sound forge, Director & Razor pro for image editing, Audio-Video editing
- Power point for computer stills & slides.
- Alternative software applications such as Accu Render, Artisan, spotlight ray tracer & model view etc may also be used.

#### **References:**

1. Hyper realistic Computer Generated Architectural Renderings – Oscar Riera Ojeda  
Lucastt Guerre
2. Virtual architecture – Giuliano Zampi Conway Lloyd Morgan

### **I D 4.2 Interior project Management & Practice**

Introduction to interior project management, its objectives, resources and team.

Client contacts and relationship issues, Design development stage and co-ordination with various agencies. Execution of work – Planning, scheduling and control. Project monitoring, programming of works. Tools & techniques for project management; bar charts, network techniques.

Project cost analysis – methods of estimating, total budgeting and schedule of payment of various agencies.

Interior Design profession : Survey of various interior designers, working procedures. Fee systems, Professional Interior Design Societies; Licensing and Registering

### **I D 4.3 Elective**

#### **I D 4.3.1 Interior Landscaping**

- Elements of interior landscape
- Types of indoor plants, plant characteristics; size, biology, soil, moisture, light, nutrient, atmospheric conditions, growing medium, pests & diseases. Market survey & costs.
- Flowers, its colours, texture and its visual perception in various indoor spaces. Science of flower arrangement.
- Manual versions automatic irrigation costing and installation of micro irrigation systems.
- Interior landscape application for residential, commercial and other public use spaces.

**Ref:** Building interiors, Plants and automation

#### **I D 4.3.2 Ergonomics and Product Design**

Introduction to ergonomics – its basic theory and relationship with human comfort criteria.

Ergonomic principles in design process and product design. Principles of product

design – user centric, theme, metaphor, contemporary trends – Fabrication and proto typing techniques, material & processes employed as per industry standards.

Computer aided product design – scope, areas of application, software available.

Creative engineering design - principle mechanisms & linkages.

**Ref:** Product Design: Tucker Veimeistu  
Product Design & Manufacturing- John R Lindbeck

### **I D 4.3.3 Psychology & Human Behaviour**

Analysis of human mind & his / her image world. Human being and social behaviour patterns in various public and private areas.

Human behaviour in a group of two, three and more. Activities and its relationship with grouping of people. Privacy, Territoriality & defensible space.

Modernization, change in society, change in thought process and behaviour patterns.

Behaviour patterns and its correlation to design elements.

Reflection of behaviour patterns of human being in space planning for public areas like theatre lounge, waiting rooms, hotel foyer, café and other spaces.

### **I D 4.4 Interior Design Project**

Interior Design project is intended to evaluate the students maturity in the design of interiors and should reflect the knowledge gained from all the courses undertaken by the student in the previous semesters. The student is expected to submit a proposal for a project of his choice for approval, to the project co-ordinator. The proposal must clearly indicate the scope of work, methodology, objectives and case studies. Live projects should be taken up, wherever possible.

Periodic submissions must be made for review by the guide and a panel of internal examiners as per the schedule given by the co-ordinator. The final portfolio must contain comprehensive proposals for the interior supported by drawings, illustrations and models, which will be evaluated by a panel of external examiners. The client may also participate as an examiner in case of real projects.

### **I D 4.5 Dissertation**

Each student is expected to prepare a dissertation under a department approved guide / adviser. The topic chosen should preferably relate to the design project and may involve the following areas of study:

- An in-depth investigation into any aspect of the chosen area
- Analysis of data, inferences to establish underlying principles
- Evaluation of existing theory in new concepts
- Establishment of a hypothesis and its substantiation.

The particulars of schedule, content presentation, format etc, as decided by the department from time to time, shall be strictly followed. The progress will be periodically reviewed by internal jury members.