



church of South India - Diocese of Medak



# **Church of South India Institute of Technology**

**School of Architecture & Planning**

**(Affiliated to Jawaharlal Nehru Architecture & Fine Arts University)**

**145, McIntyre Road, Opp Anand Theater**

**Secunderabad - 500003 TELANGANA**

**R22 SYLLABUS effective from  
Batch 2022**



# 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

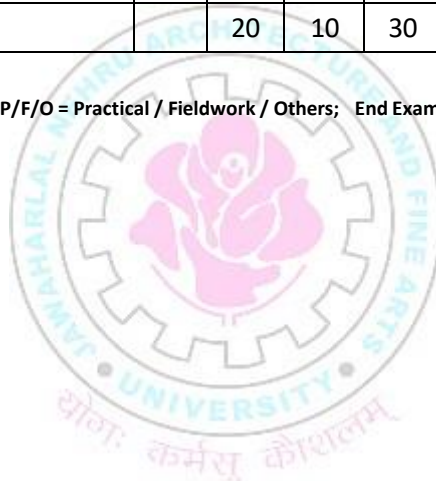


## Course Structure for B.Arch.

**(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.*

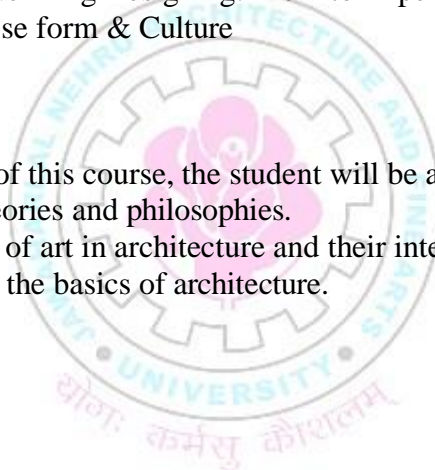
#### **Reference:**

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;

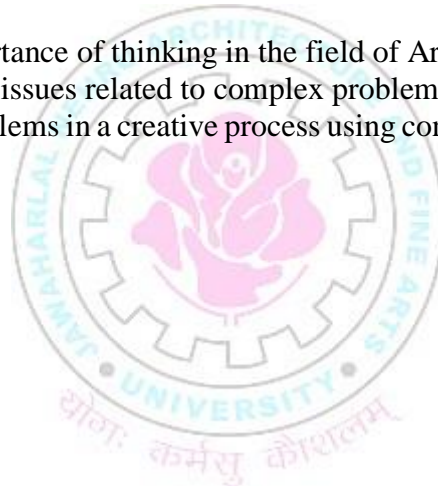
**Reference:**

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 Jercy, 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 Kropt, 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-workartists-voice-louis-i-kahn-lesson-1">https://www.oxfordartonline.com/page/artists-work-artists-voice-louis-i.-kahn:-lesson-1/artists-workartists-voice-louis-i-kahn-lesson-1</a>	Artist's Work/Artists 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' 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=IZGOyBzy5c8">https://www.youtube.com/watch?v=IZGOyBzy5c8</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

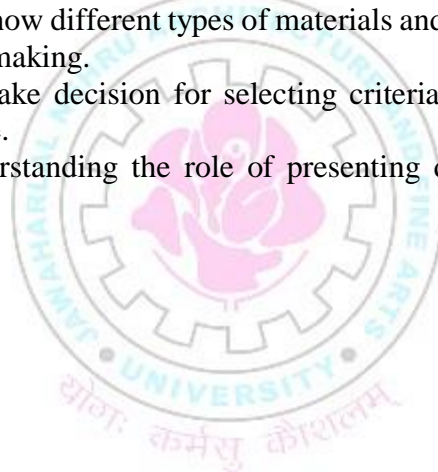
### **Reference Books:**

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, tsunami 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
				<b>25</b>	<b>5</b>	<b>30</b>	<b>30</b>	<b>400</b>	<b>350</b>	<b>750</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

## 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:

- Imparting comprehensive knowledge to the students on the building materials while highlighting the current innovations and trends.
- 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.
- 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.
- 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.
- 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.nbmcw.com/product-technology/construction-chemicals-waterproofing/concrete-admixtures/sustainable-concrete-an-inevitable-need-for-present-future.html">https://www.nbmcw.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/ PO</b>	<b>PO- 1</b>	<b>PO- 2</b>	<b>PO- 3</b>	<b>PO- 4</b>	<b>PO- 5</b>	<b>PO- 6</b>	<b>PO- 7</b>	<b>PO- 8</b>	<b>PO- 9</b>	<b>PO- 10</b>	<b>PO- 11</b>	<b>PO- 12</b>		<b>PSO 2</b>
<b>1</b>	3	2	1	-	1	2	-	-	2	3	-	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		-
<b>4</b>	3	2	2	2	-	1	-	-	-	3	-	-		3
<b>5</b>	3	3	-	-	-	-	2	2	-	3	3	-		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 , <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, <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/cmhc/exhibitions/civil/egypt/egcivile.html">https://www.historymuseum.ca/cmhc/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 3.5C</b>	<b>PO- 1</b>	<b>PO- 2</b>	<b>PO- 3</b>	<b>PO- 4</b>	<b>PO- 5</b>	<b>PO- 6</b>	<b>PO- 7</b>	<b>PO- 8</b>	<b>PO- 9</b>	<b>PO- 10</b>	<b>PO- 11</b>	<b>PO- 12</b>	<b>PSO 1</b>	<b>PSO 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: PracticeSessionPS4Exploring 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 Roorkie).
<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 W/J/S/P
				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. Marja Sarvimaki, 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:

COURSE OUTCOME	DESCRIPTION
CO1	Formulate various conditioning factors that play important role in architecture design such Scio-economic aspects, cultural and historic aspects, climate responsive solutions, etc.
CO2	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.
CO3	Investigate various statutory norms, NBC local bye laws and other codes relevant to buildings and adopt salient guidelines for specific building topologies.
CO4	Generate a methodology for structural basis in architectural design for while discussing the different structural components and their roles in the building.
CO5	Categorize various building materials employed in modern-day buildings and develop appropriate selection criteria for using them.

**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	PS- 01	PS- 02
CO 1	2	1	1	2	1	2	3	2	1	3	2	3	2	2
CO 2	3	2	1	1	2	1	1	-	-	2	-	1	3	2
CO 3	2	2	3	1	2	3	1	1	3	1	2	3	2	2
CO 4	2	3	1	2	2	2	2	1	2	3	2	3	1	3
CO 5	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/ 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
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:

<b>COURSE OUTCOME</b>	<b>DESCRIPTION</b>
<b>CO1</b>	<b>Understand</b> the history and development of landscape architecture and its role in built environment.
<b>CO 2</b>	<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
<b>CO 3</b>	<b>Assimilate</b> and <b>apply</b> site planning principles to <b>develop</b> site for various land uses.
<b>CO 4</b>	<b>Identify</b> plants and <b>design</b> with plants for functional, environmental, and visual effects.
<b>CO 5</b>	<b>Skill</b> to design and <b>detail</b> various landscape elements and <b>specify</b> appropriate materials and construction techniques to be used.
<b>CO 6</b>	<b>Research, document, discuss</b> and <b>narrate</b> designed landscapes /works of landscape architects
<b>CO 7</b>	<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 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 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/kef_a106.pdf">https://ncert.nic.in/textbook/pdf/kef_a106.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">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%20oc curs%20in%20both%20directions.">https://tribby3d.com/blog/one-way-slab-and-two-way-slab/#:~:text=In%20a%20one%2Dway%20slab,it%20oc curs%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_PA_C_Urbaanic_Final.pdf">https://bmtpc.org/DataFiles/CMS/file/PDF_Files/61_PA_C_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 .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 -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	
CO 1	2	-	1	-	1	-	2	1	1	-	-	1	1,3,5,7,8,9,12
CO 2	3	-	-	2	1	3	1	-	2	3	-	2	1,4,5,6,7,9,10, 12
CO 3	2	-	-	-	3	3	2	2	2	1	2	-	1,5,6,7,8,9,10, 11
CO 4	-	2	3	2	-	2	-	3	2	-	-	-	2,3,4,6,8,9
CO 5	1	3	2	-	1	2	-	-	3	-	3	1	1,2,3,5,6,9,11, 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. **Georgemura,** 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