

# ADHIYAMAAN COLLEGE OF ENGINEERING

[An Autonomous Institution Affiliated to Anna University, Chennai]

[Accredited by NAAC]

REGULATIONS 2022

CHOICE BASED CREDIT SYSTEM

B. ARCH – ARCHITECTURE

## CURRICULA AND SYLLABI FOR SEMESTER I

COURSE CODE	COURSE TITLE	CATEGOR Y	CONTACT PERIODS	L	T	P	C	IA	EA	M
<b>THEORY</b>										
122ART01	Mathematics	BSC	3	2	1	0	<b>3</b>	40	60	100
122ART02	Fundamentals of Architecture	PCC	3	3	0	0	<b>3</b>	40	60	100
122ART03	Professional English	SEC	3	2	1	0	<b>3</b>	40	60	100
<b>THEORY CUM STUDIO</b>										
122ART04	Architectural Drawing I	PCC	5	1	2	2	<b>4</b>	50	50	100
122ART05	Building Material and Construction - I	PCC	5	1	2	2	<b>4</b>	50	50	100
<b>STUDIO</b>										
122ARP06	Basic Art Studio I	PCC	4	0	2	2	<b>3</b>	60	40	100
122ARP07	Fundamental Design Studio	PCC	12	0	0	12	<b>6</b>	60	40	100
122HST07	Heritage of Tamil	HS	-	-	-	-	<b>1</b>	-	-	-
<b>TOTAL</b>			<b>35</b>	<b>9</b>	<b>8</b>	<b>18</b>	<b>26 +1</b>			

**COURSE OBJECTIVES:**

- To introduce basic statistical techniques and probability concepts which prevail in everyday life.
- To study the trigonometric functions.
- To understand the concept of three dimensional analytical geometries.
- To learn to solve the ordinary differential equations.
- To acquire the knowledge of integral calculus.

**UNIT I STATISTICS AND PROBABILITY****9 HRS**

Measures of central tendency- Mean, Median, Mode, Measures of dispersion- Standard deviation, Variance and Correlation coefficient and Regression – Graphical representation of data- pie chart, bar graph, Histogram and Ogives. Elementary probability: Definition of Probability – Laws of addition and multiplication probabilities- Conditional Probability-Independence of Events.

**UNIT II TRIGONOMETRY AND MENSURATION****9 HRS**

Trigonometric (sine, cosine and tan functions) and exponential functions. De- Moivre's theorem. Mensuration: Area of plane figures. Computation of volume of solid figures.

**UNIT III THREE DIMENSIONAL ANALYTICAL GEOMETRY****9 HRS**

Direction cosines and ratio's – Angle between two lines – Equations of a plane – Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of sphere.

**UNIT IV ORDINARY DIFFERENTIAL EQUATIONS****9 HRS**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations - Applications to Engineering problems like Simple Harmonic Motions and Bending of beams.

**UNIT V INTEGRAL CALCULUS****9 HRS**

Definite and Indefinite integrals: Properties of definite integrals, Integration of rational, trigonometric and irrational functions, reduction formulae for trigonometric functions.

**TOTAL: 45 HOURS****COURSE OUTCOMES:**

After completing this course, the student will be able to

**CO 1:** Acquire the knowledge of basic statistics and probability concepts.

**CO 2:** Apply trigonometric concepts and mensuration.

**CO 3:** Associate the concept of three dimensional analytical geometries to real time applications.

**CO 4:** Apply the techniques to solve ordinary differential equations.

**CO 5:** Evaluate integrals involving rational and irrational functions which have an application in many engineering fields.

**REQUIRED READING:**

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 44<sup>th</sup> Edition, 2017.

**REFERENCES:**

1. Gupta.S.C., & Kapoor,V.K., "Fundamentals of mathematical statistics", 11th edition, Sultan Chand & Sons publishers, New Delhi.



**COURSE OBJECTIVES:**

- To provide the student of architecture a foundation in the conception of forms, spatial aspects, compositions and their analysis in buildings.
- To develop the understanding of basic elements in Architecture.
- To introduce the basic principles of Architecture which lends meaning to architectural expression.
- To make students understand the interaction that happens between form and spaces resulting in definite relationships, and the way various forms of organization influence the concept of design.
- To make student understand how movement and circulation is enhanced in and around buildings through appropriate examples.

**UNIT I INTRODUCTION TO ARCHITECTURE****9HRS**

Origin and Definitions of Architecture –Architecture as a discipline – context for architecture as satisfying human needs: functional, aesthetic and psychological-outline of components and aspects of architectural form-site, structure, skin, materials, services, use, circulation, expression, character, experience, symbolism.Sensations of space – architecture as space, perceptual space and multi-sensory space.

**UNIT II GEOMETRIC ELEMENTS AND THEIR EFFECTS****9HRS**

Form as embodied in and/or constituted by geometric elements such as point, line, plane, volumes. Attributes, generation and interrelationships among elements- shape, pattern, light & shade, colour and texture. Perceptual effects and use of specific manifestations of the elements- planes as shapes and volumes as geometric forms/space such as sphere, cube, pyramid, cylinder, cone and their sections/derivatives and transformation. Architectural use of elements. Exercises and architectural case studies.

**UNIT III ATTRIBUTES & PRINCIPLES****9HRS**

Ordering principles- their need and application in Architecture. Understanding fundamental principles such as Axis, Symmetry / Asymmetry, Hierarchy, Datum, Rhythm, Repetition, Harmony, Transformation, Balance, Contrast, Unity, Pattern, Dominance, Climax. Measure and Balance in architecture – Scale- human scale and generic scale – anthropometrics (static and dynamic), proxemics – Proportion (introduction, various proportioning systems and theories of proportion). Application of order, Golden section, modular section with examples.

**UNIT IV SPATIAL RELATIONSHIP AND ORGANISATION****9HRS**

Understanding perceptual effects of specific configuration of architectural spaces –Continuous spaces, internal and External space – Spatial relationship and its types, – built form and open space relationships. Spatial Quality – Degree of Enclosure: 2-dimensional and 3-dimensional spatial linkage. Spatial organization: Centralized, Linear, Radial, Clustered, Grid. Exercise based on works of Architects.

**UNIT IV CIRCULATION****9HRS**

Movement with reference to the architectural form and space – detailed study of relationship between architectural form and circulation –Factors shaping built environment - components of building circulation. Types of circulation –Building approach and entrance, path configuration and form, path space relationship, orientation. Simple circulation diagram for buildings with examples.

**TOTAL: 45 HOURS**

**COURSE OUTCOMES:**

On the successful completion of the course, students will be able to

**CO1:** Understand briefly on the definition of architecture; components and aspects in architectural space.

**CO2:** Understand elements of architectures wrt form and space and applications of the same in buildings.

**CO3:** Compare Architectural Examples with respect to basic elements of architecture and ordering principles

**CO4:** Understand the phenomena of perception and interpret the qualities of an architectural space along with spatial relationship and organization

**CO5:** Analyse factors that significantly shape a built environment and circulation in the buildings.

**REQUIRED READINGS:**

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. V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Private Ltd., New Delhi, 1973.
4. Geoffrey Broadbent, 'Design in Architecture - Architecture and the Human Sciences', D.Fulton, 1988.
5. Yatin Pandya, 'Elements of Space Making', Mapin, 2008.

**REFERENCES:**

8. Leland M.Roth - Understanding Architecture, its experience history and meaning, Craftsman house, 1994.
9. Steen Eiler Rasmussen - Experiencing architecture, MIT Press, 1964
10. Peter von Meiss -Elements of architecture - from form to place, Spon Press 1992.
11. Rudolf Arnheim- The dynamics of architectural form, University of California Press 1977
12. NeilsPrak, Mounton& Co 1968 The language of Architecture
13. Paul Alan Johnson - The Theory of Architecture - Concepts and themes, Van Nostrand Reinhold Co., New York, 1994.
14. Helen Marie Evans and Carla David Dunneshil, An invitation to design, Macmillan Publishing Co. Inc., New York, 1982.
15. Bryan Lawson, 'The Language of space' , Architectural Press, 2001
16. Ernest Burden-Elements of Architectural Design- A visual resource, Van Nostrand Reinhold,1994.

Course Outcomes		Program Outcomes											
CO's		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	Understand briefly on the definition of architecture; components and aspects in architectural space.	3	1	3	2	3	2	-	1	2	1	-	1
CO2	Understand elements of architectures wrt form and space and applications of the same in buildings.	1	2	3	1	3	2	-	2	3	-	-	2
CO3	Compare Architectural Examples with respect to basic elements of architecture and ordering principles	1	3	1	2	3	2	-	1	2	-	-	2
CO4	Understand the phenomena of perception and interpret the qualities of an architectural space along with spatial relationship and organization	2	1	3	1	3	2	-	1	2	-	-	2
CO5	Analyze factors that significantly shape a built environment and circulation in the buildings	2	1	1	2	3	2	-	2	3	-	-	2

**COURSE OBJECTIVES:**

The Course prepares first semester Engineering and Technology students to:

- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.
- Present information in an appropriate oral form.
- Develop strategies and skills to enhance their ability to read and comprehend technical texts.
- Foster their ability to write anything convincingly with grammatical accuracy.

**UNIT I LISTENING 9HRS**

Listening to news and understanding its perspectives - Listening to motivational speech to comprehend the purpose - Listening to technical talks to understand its significance - Listening to classroom lecture to equip content knowledge - Listening comprehension

**UNIT II SPEAKING 9HRS**

Everyday activities for day to day communication - Extempore/Impromptu to develop spontaneous thoughts - Self introduction to face interviews - Presenting ideas & information for persuading the audience - Debate to promote critical thinking.

**UNIT III READING 9HRS**

Newspaper reading to upgrade world knowledge – Reading Comprehension to analyse the text – Novels to improve creativity - Magazines to synthesise architectural experience - Technical articles for upgrading technical knowledge.

**UNIT IV WRITING 9HRS**

Paragraphs-Essays-Invitation letter - Quotation letter -Email etiquettes -Reports - Minutes of a meeting – Process description – Hints development

**UNIT V LANGUAGE DEVELOPMENT 9HRS**

Technical vocabulary - Parts of speech - Consonants & vowels – Phonetic transcription –Articles Tenses - Voices – Question tags - Misspelled words – Singular and plural nouns - Modals – Conditionals.

**TOTAL: 45 HOURS**

**COURSE OUTCOMES:**

At the end of the course, learners will be able to:

- CO1:** Listen and comprehend lectures and talks in their area of specialization successfully.  
**CO2:** Speak appropriately and effectively in varied formal and informal contexts.  
**CO3:** Read and comprehend texts effortlessly.  
**CO4:** Write any formal documents effectively.  
**CO5:** Understand the basic grammatical structures and its applications.

**REQUIRED READINGS:**

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.
2. Sudharshana.N.Pand Saveetha.C. English for Technical Communication. Cambridge University Press: New Delhi, 2016. Uttham Kumar.N. **Technical English** (with workbook). Sahana Publications, Coimbatore, 2016.

**REFERENCES:**

1. Raman, Meenakshi and Sharma, Sangeetha-Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
2. Kumar, Suresh.E. Engineering English. Orient Blackswan: Hyderabad, 2015.
3. Booth-L.Diana, ProjectWork,Oxford UniversityPress,Oxford:2014.
4. Grussendorf,Marion,English forPresentations, OxfordUniversityPress, Oxford:2007
5. Means,L.ThomasandElaineLanglois,English&CommunicationForColleges.CengageLearning,U SA:2007.

Course Outcomes		Program Outcomes											
CO's		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	Listen and comprehend lectures and talks in their area overspecialization successfully.	-	1	2	-	2	-	-	-	-	1	1	2
CO2	Speak appropriately and effectively in varied formal and informal contexts	-	-	3	-	2	2	-	-	-	-	-	2
CO3	Read and comprehend texts effortlessly	2	-	2	2	2	-	-	-	-	2	2	1
CO4	Write any formal documents effectively	-	1	3	-	1	1	-	-	-	-	-	2
CO5	Understand the basic grammatical structures and its applications	2	-	3	2	1	2	-	1	-	-	-	2

**AIM**

To introduce the concepts and fundamentals of architectural drawing to develop representation Skills and to nurture the understanding of the nature of geometrical forms and simple building Forms and to teach the language of architectural and building representation.

**COURSE OBJECTIVES:**

- To understand the concepts of Architectural Drawing with the introduction of drafting fundamentals.
- To understand the language of Architectural representations through Architectural
- Drawing systems and to understand drawing as a medium to visualize and communicate design ideas.
- To involve students in a number of exercises that will help to understand the representation of 3 Dimensional forms through isometric and axonometric drawings.

<b>UNIT I</b>	<b>INTRODUCTION - GEOMETRIC DRAWING</b>	<b>15 HRS</b>
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Introduction to fundamentals of drawing/ drafting: Construction of lines, line value, line types, lettering, dimensioning, format for presentation. Construction of angles, use of scales, Construction of circles, tangents, curves.

<b>UNIT II</b>	<b>GEOMETRICAL DRAWING - PLANE GEOMETRY</b>	<b>20 HRS</b>
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Construction and development of planar surface - square, rectangle, polygon, etc. Introduction of multi-view projection- projection of points, lines and planes, Description of Plane Curves: Ellipse, Parabola and Hyperbola.

<b>UNIT III</b>	<b>GEOMETRICAL DRAWING - SOLID GEOMETRY</b>	<b>20 HRS</b>
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Multi- view projection of solids -cube, prism, pyramids, cones, cylinders etc.; Sections of solids, true shape of solids.

<b>UNIT IV</b>	<b>GEOMETRICALDRAWING: AXONOMETRIC PROJECTION</b>	<b>20 HRS</b>
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Axonometric, Isometric, plan oblique and elevation oblique projection of planes, solids and combination of solids, introduction to scales.

Note: Exercises on projections will be integrated with models done in art studio I.

**TOTAL: 75 HOURS**

**COURSE OUTCOMES:**

**CO1:** Understand concepts and fundamentals of architectural drawing to develop representation

**CO2:** Gain knowledge on geometrical forms and simple building

Understanding on the concepts of architectural drawing as well as representation skills is imparted.

**CO3:** Understanding on the building representation in 2D among students in addition to preparation of measured drawing.

**CO4:** Understand axonometric projections and its applications.



**REQUIRED READINGS:**

1. IH. Morris, Geometrical Drawing for Art Students - Orient Longman, Madras, 2004.
2. Francis Ching, Architectural Graphics, Van Nostrand Rein Hold Company, New York, 1964.

**REFERENCES:**

1. George K.Stegman, Harry J.Stegman, Architectural Drafting Printed in USA by American
2. Technical Society, 1966.
3. C.Leslie Martin, Architectural Graphics, The Macmillan Company, New York, 1964
4. Francis D.K. Ching, Architectural Graphics, John Wiley and Sons, 2009
5. Fraser Reekie& Tony McCarthy, Reekie's Architectural Drawing, Architectural Press, 1995
6. Leslie Martin C., Architectural Graphics, The Macmillan Company, New York, 1978
7. George A Dinsmore, Analytical Graphics, Van Nostrand, Company Inc., Canada, 1968

Course Outcomes		Program Outcomes											
CO's		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	Understand concepts and fundamentals of architectural drawing to develop representation	2	3	3	3	2	3	-	-	1	1	-	-
CO2	Gain knowledge on geometrical forms and simple building	1	2	3	3	2	3	-	-	1	-	-	-
CO3	Understanding on the building representation in 2D among students in addition to preparation of measured drawing	1	2	3	3	2	3	-	-	1	-	-	-
CO4	Understand axonometric projections and its applications	1	2	3	3	2	3	-	-	2	-	-	-

**COURSE OBJECTIVES:**

- To inform the properties, characteristics and use of bamboo, palm, straw, etc. and methods of preservation and treatment.
- To enable the students to know more about the elements, components, materials and construction techniques to develop strong sense of visualization and involve students in a number of drawing exercises that will analyse the various building components in a simple load bearing structure.
- To enable a student, draw joinery details, the various use in building industry, its structural application, and furniture through select exercises.
- To understand cost efficient techniques of mud construction and its application in buildings.

**UNIT I INTRODUCTION TO BUILDING MATERIALS AND BASIC SHELTERS 15HRS**

Natural shelters – huts, tent (materials used to make them) – natural materials like Soil, Clays, Mud, Cob, adobe/ sun dried blocks, Rammed earth, Wattle and Daub, bamboo, stone, timber; function and characters of openings – doors, windows, jalliworks; exterior treatments – lime plaster, mud mortar plaster; coverings of the shelter – thatched roof, Mangalore tiles; construction without nails.

**UNIT II INTRODUCTION TO BUILDING COMPONENTS 20 HRS**

Introduction to building construction, understanding relation between architectural designs, building components (Foundation, plinth, wall, sill, lintel, roof, doors, windows, ventilators, staircases, sunshades etc.) along with the building materials.

Exercises and drawings on various components of a building and understanding through measuring drawing.

**UNIT III TIMBER 20 HRS**

Timbers - Methods of construction using natural timber in joinery works including methods of fixing and options for finishing - Manufacture and uses - current developments. Different types and joinery details - Doors and windows, Types of Timber roofs (Flat, Pitched, Lean to) - Types of Roof trusses (King post, Queen post, Open plan. Storage, Scissor, Slope), Methods of construction using natural timber in walls and floors- ply woods, block boards, in fixed partitions, sliding/folding partitions, wall paneling/Cladding.

Exercises and drawings on various joints, parts of a door, types of roof in timber.

**UNIT IV SOIL 15 HRS**

Classification of soil, its properties and application in building construction. Appropriate foundations for various types of soil. Mud as a building material – Soil stabilization: Need for soil stabilization – Stabilized mud blocks, compressed mud block, adobe construction etc.

**TOTAL: 75 HOURS**

**COURSE OUTCOMES:**

**CO 1:** Understood the properties, characteristics, strength and application of naturally occurring building materials such as Stone, Bamboo and Mud as building materials and use appropriate rural building materials based on the properties, behaviour and applications.

**CO 2:** Gained Knowledge on the importance of foundations, plinth, superstructure, and roof of a conventional building by manual drafting and theoretical understanding of soils, mortar as building materials.

**CO 3:** An Understanding of different timber joinery details and methods of construction and worked on Sheets showing the fixing details of timber doors and windows, partitions.

**CO 4:** Exposed to various use of Earthen blocks and its application in the construction field.

## REQUIRED READINGS:

1. Varghese P.C., "Building Materials", Prentice Hall of India put Ltd New Delhi, 2005.
2. Dunkelberg (K), "Bambus – Bamboo, Bamboo as a Building Material", Karl Kramer Verlag Stuttgart, 2000.
3. Gernot Minke and FriedemannMahlke "Building with straw: Design and Technology of a Sustainable Architecture", Birkhauser,Publisher for Architecture Berlin, Bostan, 2005.
4. Barry, "Construction of Buildings", Volume 1&2, Blackwell Publishing Ltd., Oxford, 2005
5. KlansDukeeberg, Bambus – Bamboo, Karl Kramer Verlag Stuttgart Germany, 2000.
6. National Building Code of India 2005- Part 6 Structural Design- Section 3 Timber and Bamboo.

## REFERENCES:

1. Don A. Watson, "Construction Materials and Processes", McGraw Hill, 1972.
2. W.B. McKay, "Building Construction", Vol, 1 and 2, Longmans, UK, 1981.
3. S.C Rangwala "Building Construction", Charotar Publishing House, India, 2000
4. S.K.Sharma, "A Text book of Building Construction", S.Chand& Co Ltd., New Delhi, 1998
5. Francis D.K Ching "Building Construction" illustrated, John Willey & Sons, 2008.
6. Wills H Wagner, Howard Bud, " Modern Carpentry", Good Heart – Wilcox publishers, Portland, 2003.
7. Arora S.P. and Bindra S.P., "Text book of Building Construction", Dhanpat Rai & Sons, New Delhi, 2012.
8. Alanwerth, Materials, The Mitchell Pub. Co. Ltd., London, 1986.
9. R.Chudleu, 'Building Construction Handbook', British Library Cataloguing in Publication Data, London, 1990.

Course Outcomes		Program Outcomes											
CO's		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	Understood the properties, characteristics, strength and application of naturally occurring building materials such as Stone, Bamboo and Mud as building materials and use appropriate rural building materials based on the properties, behaviour and applications.	-	3	-	-	2	-	1	3	2	3	-	2
CO2	Gained Knowledge on the importance of foundations, plinth, superstructure, and roof of a conventional building by manual drafting and theoretical understanding of soils, mortar as building materials.	1	2	3	3	3	2	2	3	2	3	-	1
CO3	An Understanding of different timber joinery details and methods of construction and worked on Sheets showing the fixing details of timber doors and windows, partitions.	1	3	1	2	2	2	2	2	2	3	-	1
CO4	Exposed to various use of Earthen blocks and its application in the construction field.	2	1	3	1	2	-	2	2	2	3	-	2

**COURSE OBJECTIVES:**

- To develop presentation skills, visual expression and representation, imaginative thinking and creativity through a hands on working with various mediums and materials.
- To familiarize the students with the various mediums and techniques of art through which artistic expression can be achieved
- To involve students in a series of exercises which will look at graphic and abstract representations of art
- To sensitize students to the grammar of visual perception by involving them in a series of free hand exercises to understand form, proportion, scale, figure ground etc.,

**UNIT I      BASICS OF DRAWING****20 HRS**

Introduction to Drawing through various period of History - Seeing (Observation / Proposition /Scale / Texture through study of still life and natural objects), Visualizing (Memory Drawing /Exploratory Drawing), Expressing (Qualities of Lines / Drawing tools and Quality of Expressions – Pen, Pencil, Charcoal, Marker) – Abstraction and communication (Sketching and Free hand perspective Drawing)

**UNIT II      DRAWING FROM OBSERVATION****20 HRS**

The processes of seeing, Imagining and Representing - Observations on Line and Shape - Observation on Tone and Texture - Observations on Form and Structure - Observations on Space and Depth - Sketching Exercises related to the contents specified above.

**UNIT III      GRAPHIC DESIGN****15HRS**

Introduction to history of Graphic Design – Visual perception theory (Gestalts) – Principle of Compositions – Colour Theory – Type Design and Typography (Layouts / Format / Calligraphy)– Environmental Graphics (Signage / Logo / enhancing the built environment) – Exercises in Environmental graphic design, colour and composition

**UNIT IV      PAINTING****20 HRS**

Introduction to Art / Artists' / Movements and Styles before and after industrial revolution and itsImplication on design and architecture – Mediums, Techniques and Tools (Water colours /Posters / Acrylic / Inks / Brushes / Knives / Mixed Media) - Exercises using various techniquesand mediums.

**TOTAL: 75HOURS****COURSE OUTCOMES:**

**CO1:** The students are exposed to various mediums, techniques and tools.

**CO2:** The students gain mastery in sketching, visualizing and expression through manual drawing.

**CO3:** Sensitized to culture, craft and context.

**CO4:** Skill Development in Handling Materials and in Making Products.

**REQUIRED READINGS:**

1. Webb, Frank, "The Artist guide to Composition", David & Charles, U.K., 1994.
2. Ching Francis, "Drawing a Creative Process", Van Nostrand Reinhold, New York, 1990.
3. Alan Swann, "Graphic Design School", Harper Collins, 1991.
4. Envisioning Architecture – an analysis of drawing , Iain Fraser & Rod Henmi, 1991

## REFERENCES:

1. Moivahuntly, "The artist drawing book", David & Charles, U.K., 1994.
2. Arundell (Jan) Exploring sculpture, Mills and Boon, London/Charles, T. Brand Ford
3. Company, U.S.A.
4. The art of drawing trees, heads, colours, mixing, drawing, landscape and painting, water
5. colour oil colour, etc. – The Grumbacher Library Books, New York, 1996.
6. Caldwell peter, "Pen and Ink Sketching", B.T. Bats ford Ltd., London, 1995.

Course Outcomes		Program Outcomes											
CO's		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	The students are exposed to various mediums, techniques and tools.	-	-	2	2	2	2	-	-	-	3	-	2
CO2	The students gain mastery in sketching, visualizing and expression through manual drawing.	1	-	3	-	3	3	-	-	-	3	-	1
CO3	Sensitized to culture, craft and context	1	-	2	-	2	3	-	-	-	3	-	2
CO4	Skill Development in Handling Materials and in Making Products.	1	-	3	-	3	3	-	-	-	3	-	2

**AIM**

To introduce the meaning of “design” and relate it to “architecture” through an understanding of basic elements of design, the principles of design relationships and analysis of design elements.

**COURSE OBJECTIVES:**

- To understand the elements and principles of Basic Design as the building blocks of Creative design through exercises that will develop originality, expression, skill and creative thinking.
- To involve students in a number of exercises to understand the grammar of Design and Visual composition.
- To enable the understanding of 3D Composition by involving students in a number of exercises which will help generation of a form from a two dimensional / abstract idea.
- To understand architecture as a craft, of making and of putting together.
- To sensitize students to materials both planar and plastics and Processes involved in working with them.

**CONTENT**

Introduction to Spatial Design, Form and Structures through Basic Design – Elements of Design: Properties, qualities and characteristics of point, line, direction shape, form, colour and texture – Principles of Design: Scale, Proportion, Balance, Harmony, Rhythm and Contrast. – Concepts of Visual perception – Material and processes. The course shall be conducted by giving a number of exercises in the form of Design studios, Seminars and Creative workshops that are aimed at teaching the following: Elements and Principles of Visual Composition and Pattern making. Exploring Colour theories and their application in a Visual composition. Study of texture and schemes of texture both applied and stimulated and their application. Material and Form / Structures – Nature based enquiry into form both Linear and Planar, fluid and plastic forms using simple material like Mount Board, wire string, foam board. Study of solids and voids to evolve sculptural forms and spaces. Analytical appraisal of building form in terms of visual character, form and function, play of light and shade, solids and voids, colors and texture.

**TOTAL: 180 HOURS**

**COURSE OUTCOMES:**

**CO1:**An understanding of the qualities of different elements as well as their composite fusions.

**CO2:**An ability to engage and combine the elements of design in spontaneous as well as intentional ways in order to create desired qualities and effects.

**CO3:**Development of required skills – observation / analysis / abstractions / interpretation/representations / expressions through models and drawings.

**CO4:**Students are trained to develop abstract and real compositions in drawings. Simultaneously workshop exercises involving real and abstract models made of match sticks, Card boards, wires, wood pieces to familiarize students with such skills shall be given importance.

**REQUIRED READINGS:**

1. Owen Cappleman& Michael Jack Jordon, Foundations in Architecture: An Annotated Anthology of Beginning Design Project, Van Nostrand Reinhold New York, 1993.
2. Charles Wallschlag& Cynthia Busic-Snyder, Basic Visual Concepts and Principles for Artists, Architects and Designers, McGraw Hill, New York 1992.

**REFERENCES:**

1. V.S.Pramar, Design fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi, 1973.
2. Francis D. K. Ching - Architecture - Form Space and Order Van Nostrand Reinhold Co., (Canada), 1979.
3. Elda Fezei, Henry Moore, Hamlyn, London, New York, Sydney, Toronto, 1972.
4. C. Lawrence Bunchy - Acrylic for Sculpture and Design, 450, West 33rd Street, New York, N.Y. 10001, 1972.
5. Exner. V, Pressel. D, Basics Spatial Design, Birkhanser, 2009.

Course Outcomes		Program Outcomes											
CO's		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	An understanding of the qualities of different elements as well as their composite fusions	-	2	2	2	2	2	-	-	-	3	-	2
CO2	An ability to engage and combine the elements of design in spontaneous as well as intentional ways in order to create desired qualities and effects	2	2	3	3	3	3	-	-	-	3	-	1
CO3	Development of required skills – observation / analysis / abstractions / interpretation/representations / expressions through models and drawings.	1	3	2	3	2	3	-	-	-	3	-	2
CO4	Students are trained to develop abstract and real compositions in drawings. Simultaneously workshop exercises involving real and abstract models made of match sticks, Card boards, wires, wood pieces to familiarize students with such skills shall be given importance.	1	2	3	3	3	3	-	-	-	3	-	2

# ADHIYAMAAN COLLEGE OF ENGINEERING

[An Autonomous Institution Affiliated to Anna University, Chennai]

[Accredited by NAAC]

REGULATIONS 2022

CHOICE BASED CREDIT SYSTEM

B. ARCH – ARCHITECTURE

## CURRICULA AND SYLLABI FOR SEMESTER II

COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C	IA	EA	M
<b>THEORY</b>										
222ART01	Mechanics of Structures	AEC	3	2	1	0	3	40	60	100
222ART02	History of Architecture and Culture - I	PCC	3	3	0	0	3	40	60	100
222ART03	Environmental Science for Architecture	AEC	3	2	1	0	3	40	60	100
<b>THEORY CUM STUDIO</b>										
222ART04	Architectural Drawing II	PCC	5	1	2	2	4	50	50	100
222ART05	Building Materials and Construction II	PCC	5	1	2	2	4	50	50	100
<b>STUDIO</b>										
222ARP06	Rendering Techniques and Model Making	SEC	4	0	2	2	3	60	40	100
222ARP07	Architectural Design Studio I	PCC	12	0	2	12	6	60	40	100
222HST07	Tamils and Technology	HS	-	-	-	-	-	-	-	-
		<b>TOTAL</b>	<b>35</b>	<b>9</b>	<b>10</b>	<b>18</b>	<b>26</b>			



**COURSE OBJECTIVES:**

- To interpret the effect of forces on a body and the concept of equilibrium of the body through exercises. student about
- To devise the structural properties (centroid, moment of inertia, section modulus and radius of gyration) for various sections and elastic properties of materials by working out problems. of
- To extract the student how to correlate shear force and bending moment on beams subjected to different loading conditions.
- To write the shear stress and bending stress distribution in beam sections.
- To relate the behavior of long and short columns using Euler's and Rankin's formula.

**UNIT I FORCES AND STRUCTURAL SYSTEMS****8 HRS**

Types of force systems - Resultant of forces - Lami's theorem - principle of moments - Varignon's theorem - principle of equilibrium (no reaction problems) - simple problem

**UNIT II STRUCTURAL PROPERTIES OF SECTION AND ELASTIC PROPERTIES OF SOLID****10 HRS**

Centroid - Moment of Inertia - Section modulus - Radius of gyration - Theorem of perpendicular axis - Theorem of parallel axis - simple problems.

Definition for stress, strain and its types - young's Modulus, Poisson's Ratio -

Stress-strain diagram for mild steel - Compound bars - Elastic constants - Relation between elastic constants - Application to problems.

**UNIT III SHEAR FORCE AND BENDING MOMENT****9 HRS**

Basic concepts - Shear force and bending moment diagrams for cantilever and simply supported beams subjected to various types of loadings (Point load & Uniformly distributed load) - Point of contraflexure.

**UNIT IV STRESSES IN BEAMS AND DEFLECTION OF BEAMS****10 HRS**

Theory of simple bending - bending stresses and shear stresses in beams - examples on simple sections. Stress distribution diagrams.

Slope and deflection at a section - Double Integration method for simply supported and cantilever beams for point loads and uniformly distributed loads

**UNIT V THEORY OF COLUMNS****8 HRS**

Short and long columns - Euler's theory - assumptions and limitations - load carrying capacity of columns with different end conditions - Rankine's formula for columns (No derivations) - simple problems.

**TOTAL: 45 HOURS****COURSE OUTCOMES:**

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

- CO1:** Transfer the concepts of action of forces and equilibrium concepts on a body.
- CO2:** Solve these sectional properties for any geometrical shapes and to understand the concepts of elastic constants and its applications for various types of problems.
- CO3:** Relate the different types of determinate beams.
- CO4:** Use the theory of simple bending theory to find the deflection in beams.
- CO5:** Illustrate and solve the different types of columns

**TEXTBOOKS:**

- Francis D K Ching, Building Structure Illustrated: Patterns, System and Design, 2<sup>nd</sup> edition 2014.
- Bansal R.K.–A text book on Engineering Mechanics, Laxmi Publications, Delhi, 6<sup>th</sup> edition, 2015.
- Bansal R.K.–A text book on Strength of Materials, Lakshmi Publications, Delhi 6<sup>th</sup> edition, 2018.
- Punmia P.C., Theory of Structures”; Vol.I, Lakmi Publications, Delhi, thirteenth edition 2017.
- Rajput R.K., “Strength of Materials”, S.Chand & Company Ltd., New Delhi, 6<sup>th</sup> edition 2015

**E- CONTENT:**

- NPTEL course video on Force systems - [https://youtu.be/6u\\_rjLjv-MY](https://youtu.be/6u_rjLjv-MY)
- NPTEL course video on equilibrium of rigid bodies - <https://youtu.be/ljDIIMvx-eg>
- NPTEL course video on types of beams - <https://youtu.be/z95UW4wwzSc>
- [http://nptel.ac.in/courses/112107147/23\\_2](http://nptel.ac.in/courses/112107147/23_2)
- <https://nptel.ac.in/courses/105/105/105105108/>
- <https://archive.nptel.ac.in/courses/105/104/105104160/>

**REFERENCES:**

- Ramamrutham S., “Strength of Materials”, Dhanpat rai & Sons, Delhi, 18th Edition, 2014
- W.A.Nash, Strength of Materials –Schaums Series–McGraw Hill Book Company, 6<sup>th</sup> edition 2013.
- Timoshenko, S.P. and D.H. Young, “Elements of Strength of Materials”, East West , 5<sup>th</sup> edition , 2003

Course Outcome		Program Outcome												Program Specific Outcome		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Transfer the concepts of action of forces and equilibrium concepts on a body.	3	2	-	3	2	-	-	3	1	-	-	-	2	-	1
CO2	Solve these sectional properties for any geometrical shapes and to understand the concepts of elastic constants and its applications for various types of problems.	3	2	-	3	2	-	-	3	1	-	-	-	2	-	1
CO3	Relate the different types of determinate beams.	3	2	-	3	2	-	-	3	1	-	-	-	2	-	1
CO4	Use the theory of simple bending theory to find the deflection in beams.	3	2	-	3	2	-	-	3	1	-	-	-	2	-	1

CO5	Illustrate and solve the different types of columns.	3	2	-	3	2	-	-	3	1	-	-	-	2	-	1
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**222ART02**

**HISTORY OF ARCHITECTURE AND CULTURE I**

**LTP C**

**3 003**

**COURSE OBJECTIVES:**

- To understand the origins of human societies and examine the ways in which prehistoric people adapted to their environments, the lifestyles, cultures, and artistic expressions of prehistoric societies and developed new technologies.
- To examine the technological innovations of these civilizations and their contributions to human civilization by understanding the religious and cultural beliefs, political, social, and economic structures of these civilizations.
- To explore the social, religious and cultural beliefs in shaping the structures of ancient Egyptians and its impact on later civilizations.
- To sensitize the major political, social, economic structures and understand the cultural legacy of ancient Greece and its influence on Western civilization.
- To understand architecture of Rome as evolving within specific cultural contexts including aspects of politics, society, religion and climate.

**UNIT I PREHISTORIC ARCHITECTURE**

**6HRS**

Introduction to the concept of shelter - the cave and the Stone Age buildings, Primitive place types- clustered dwelling units - hearth, altar, bed space, communal spaces, performance places- its evolution and transformation. Agriculture revolution and its impact on culture and civilization.

**UNIT II ANCIENT CIVILIZATIONS IN ASIA**

**12HRS**

Ancient Hearths of Civilization- River valley civilization (Tigris and the Euphrates in Mesopotamia; the River Nile in Egypt; the Indus River in India; and the Yellow river in China). - various factors affecting architecture - climate, socio- culture, geography, attitude and patronage, construction methods and materials, highlighting case examples and detail understanding and analysis of housing structure.

**UNIT III EGYPT**

**9 HRS**

Ancient Egypt, history, religious and funerary beliefs and practices - Tomb Architecture: Evolution of the pyramid from Mastaba, Pyramids-Giza (monumentality), Detail understanding and analysis of housing structure. Temple Architecture - Temple of Ammon Ra-Karnak, Temple of Abu Simbel.

**UNIT IV CLASSICAL PERIOD: GREECE**

**9**

**HRS** Introduction to Greek Architecture (The Geometric period), Impact of culture, orders, optical illusion, Factors influencing architectural character, Evolution of City States - Agora, Acropolis, Emergence of Greek Temple – Parthenon, Erechthion, Brief Study of Greek Houses.

**UNIT V ROME**

**9HRS**

Roman Architecture: A brief account of materials, structural systems adopted and construction techniques - The Roman orders – Tuscan & Composite orders, Detail understanding and analysis of housing structure and few building examples - The Colosseum, The Pantheon, Rome, Aqueducts.

**COURSE OUTCOMES:**

**CO1:**Recognize the significance of history of architecture and the role of various factors in shaping the built environment by studying early culture and civilization.

**CO2:**Extrapolate about the ancient civilizations of the world, and explored their religious and cultural beliefs and architectural developments, spatial structures associated with housing.

**CO3:**Understand the historical context in which the structures were built, including the political, social, and cultural factors that influenced their design and construction.

**CO4:**Gain an understanding of the cultural context in which these structures were built, including the religious, social, and political factors that influenced their design and construction.

**CO5:**Summarize the cultural values and beliefs of ancient Roman society and examine the architecture they created and the purposes these structures served.

**TEXT BOOKS:**

1. Sir Banister Fletcher, A History of Architecture, University of London, The Antholone
2. Press, 1996.
3. Spiro Kostof - A History of Architecture - Setting and Rituals, Oxford University
4. Press, London, 1985.
5. Leland M Roth; Understanding Architecture: Its elements, history and meaning; CraftsmanHouse; 1994.
6. Charles Gates, Ancient Cities- The archeology of urban life in the ancient near east and Egypt, Greece and Rome
7. Christopher Tadgell , The History of Architecture of India from the Dawn of Civilization to the end of the Raj , Longman UK, London, 1990
8. Percy Brown , Indian Architecture (Buddhist Period) , Volume I, Taraporevala and Sons, Bombay, 1983
9. Satish Grover , The Architecture of India (Buddhist period), Vikas Publishing House Pvt. Ltd., New Delhi, 1981
10. Henri Stelerlin - The Pharaohs - Plerre Terrail - 2001.
11. Francis D.K. Ching and others - A global History of Architecture - John wiley and sons, Inc., - 2011(2nd edition).
12. G.K.Hiraskar - Great Ages of World Architecture - Dhanpat Rai and Sons, Delhi

**E-CONTENT:**

1. MOOC - <https://sloolie72.wordpress.com/2017/12/18/history-of-architecture-mooc/>
2. NPTEL Course Video on Ancient Egypt  
<https://www.classcentral.com/course/introancientegypt-7326>
3. NPTEL Course Video on Roman architecture  
<https://www.classcentral.com/course/romanarchitecture-910>
4. <https://www.youtube.com/watch?v=sloJD4UcBZE> – prehistoric architecture
5. <https://www.youtube.com/watch?v=IYQ9P0k7MoA> – Indus valley civilization
6. <https://www.youtube.com/watch?v=PHouTCFsZqg> –Bronze age
7. <https://www.youtube.com/watch?v=KSpR6vi3kkA> – Greek Architecture
8. <https://www.youtube.com/watch?v=agbRzU7DZIk> – Roman Architecture
9. [https://www.youtube.com/watch?v=TMDEA1Nf\\_w8](https://www.youtube.com/watch?v=TMDEA1Nf_w8) – Rock cut Architecture

10. [https://www.academia.edu/36093525/History\\_of\\_Architecture\\_I\\_Prehistoric\\_Architecture\\_II](https://www.academia.edu/36093525/History_of_Architecture_I_Prehistoric_Architecture_II)
11. <https://thearchspace.com/ancient-egyptian-architecture/> - Ancient Egyptian Architecture and Their Spectacular Structures
12. <https://www.youtube.com/watch?v=NhGn1t8imWo> – Ancient Egypt
13. <https://earthlymission.com/the-homes-of-ancient-egyptians/> - The Home of Ancient Egyptians

## REFERENCES:

1. Pier Luigi Nervi, General Editor - History of World Architecture - Series, Harry N.Abrams, Inc.Pub., New York, 1972.
2. S.Lloyd and H.W.Muller, History of World Architecture - Series, Faber and Faber Ltd.,London, 1986.
3. Gosta,E.Samdstp, Man the Builder, Mc.Graw Hill Book Company, New York, 1970.
4. Webb and Schaeffer; Western Civilisation Volume I; VNR: NY: 1962
5. Vincent Scully: Architecture; Architecture – The Natural and the Man Made: Harper CollinsPub: 1991.
6. Mark M.Jarzombek, VikramadityaPrakash, A global history of architecture, Wiley, 2011
7. Spiro Kostof, A history of Architecture - settings and Rituals, Oxford University Press London 1985
8. Volwahren , Living Architecture: India (Buddhist Period), Macdonald & Co, London, 1969
9. Marco Bussagli - Rome Art and Architecture - Konemann Publications - 2004.
10. Ingersoll, R. And Kostof, S. (2013). *World architecture: a cross-cultural history*. Oxford : OxfordUniversity Press.
11. Watkin, D. (2005). *A History of Western Architecture*. 4th Ed. London :Laurence King Publishing.
12. Faulkner, H. T. (1953). *Architecture through the Ages*. New York : Putnam Adult.
13. Roth, M. L. (2006). *Understanding Architecture: Its Elements, History, and Meaning*. Columbia : West-view Press

CourseOutcome		ProgramOutcome												ProgramSpecificOutcome		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Recognize the significance of history of architecture and the role of various factors in shaping the built environment by studying early culture and civilization.	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-
CO2	Extrapolate about the ancient civilizations of the world, and explored their religious and cultural beliefs and architectural developments, spatial and stylistic qualities associated with architecture.	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-
CO3	Understand the historical context in which the structures were built, including the political,	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-

	social, and cultural factors that influenced their design and construction.															
CO4	Gain an understanding of the cultural context in which these structures were built, including the religious, social, and political factors that influenced their design and construction.	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-
CO5	Summarize the cultural values and beliefs of ancient Roman society and examined the architecture they created and the purposes these structures served.	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-

**COURSE OBJECTIVES:**

- To make students understand the basic fundamentals of Environment and its Ecosystem and its relationship with built environment.
- To give the awareness of biodiversity and emphasize on the biodiversity of India and its conservation.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measure to preserve them.
- To impart knowledge on the causes, effects, control or prevention measures of environmental pollution and introduce the legal provision, National and international laws and conventions for environmental protection.
- To make students understands the importance of water quality, its purification treatments at city level and distribution in small towns and at individual building level, Management of solid waste and storm water drains and disposals along with new sustainable methods.

**UNIT I NATURE AND ITS RELATION WITH BUILT ENVIRONMENT 10 HRS**

Definition, scope and importance of environment – need for public awareness. Introduction to Ecology, ecological balance. Concepts of ecosystem and its types, characteristics features, structure and functions of Ecosystems – Ecological zones in Tamil literature. Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries).

**UNIT II BIODIVERSITY AND CONSERVATION 8 HRS**

Introduction to biodiversity Biogeographically classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity with case examples – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

**UNIT III RENEWABLE AND NON-RENEWABLE RESOURCES 10 HRS**

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

**UNIT IV ENVIRONMENTAL ISSUES & PRACTICES 7 HRS**

Environmental Issues at Macro Level and Micro Level in India – Deforestation, Pollution,

and Climate Change etc. Environmental Disturbances – Types of Environmental Disturbances due to human intervention – Remedial Measures – Ecologically Distributed Sites and Restoration – Case Example – Waste Disposal and Waste Management at Building Level and Site Level – Case Examples – Remedial Measures – Water Conservation – Water Shed Management – Waste Land Reclamation – Forest Conservation – Wild Conservation.

## **UNIT V ENVIRONMENTAL PLANNING AND ASSESSMENT 10 HRS**

Introduction to Concepts and Approaches to Ecological Planning and Environmental Planning- Introduction to Environmental Law and Environmental Management- Environmental Legislation in India. Issues involved in enforcement of environmental legislation. Environmental aspects in Accessibility laws - ECBC, EIA, NBC permitted activities in coastal regulation zone. Contribution of Architects, Landscape Architects, Environmental Planners, Environmental Engineers in Environmental Clearance projects.

**TOTAL: 45 HOURS**

### **COURSE OUTCOMES:**

**CO 1:** The students are exposed about environment and its ecosystem to Indian geographical context.

**CO 2:** Gained knowledge on the significance at global, regional and local level.

**CO 3:** The students would have understood the effects of the existing natural resources and the need for preserving them.

**CO 4:** Apprehend environmental problems and its linkage to the health and safety of society: think and act with sense of responsibility, committing to the professional ethics. Also knowing alternate Sustainable practices for Water harvesting and environmental challenges, hence develop employability skills

**CO 5:** Understood the concepts and approaches to ecological planning and environmental planning. Realized the active involvement of oneself and society in designing the active involvement and ecosystem would be preserved, considering public health and safety. They are also exposed to various issues and pollutions related to environment and acts and policies to protect environment.

### **TEXTBOOKS:**

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
3. G.M.Fair, J.C.Geyer and D.Okun, Water and Waste Water Engineering, Vol. II, John Wiley & Sons, Inc., New York, 1968.
4. Manual of Water supply and Treatment, Second Edition, CPHEEO, Ministry of Works and Housing, New Delhi, 1999.
5. Manual on Storm water drainage system, CPHEEO, Ministry of Works and Housing, New Delhi, 2019.
6. Rajagopalan, R. (2016). Environmental Studies; From Crisis to Cure, Oxford University Press.
7. Bharucha, E. (2013). Text book of Environmental Studies for undergraduate courses, Universities Press, Hyderabad, 2nd Edition.
8. Dey, A. K. & Dey, A. K., 2007. Environmental Studies. New Delhi: New Age International Publishers.
9. Rao, P. V., 2008. Principles of Environmental Science and Engineering. New Delhi: Prentice Hall of India Private Limited.



10. Singh, J. S., Singh, S. P. and Gupta, S. R. (2014). Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
11. Walter Leal Filho & Paul Pace “Teaching Education for Sustainable development at University Level”, Springer Publication, 2015.
12. B.K.Sharma & H.Kaur, An Introduction to Environmental pollution, GOEL Publishing House, Meerut First Edition, 1997

### E-CONTENT:

1. David Lee Smith, 2011, Environmental Issues for Architecture 1st Edition, Kindle Edition, Wiley.
2. NPTEL Video on Environmental Impact Assessment (EIA) Part-1 - [https://youtu.be/\\_iLdyhgFv1U](https://youtu.be/_iLdyhgFv1U)
3. NPTEL Video on Environmental Impact Assessment (EIA) Part-2 <https://youtu.be/DbZq9dlx6dY>.
4. MOOC - <https://www.edx.org/course/natural-resources-for-sustainable-development>.

### REFERENCES:

1. Dharmendra S. Sengar, ‘Environmental law’, Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, “Textbook of Environmental Studies”, Universities Press(I) PVT, LTD, Hyderabad, 2015.
3. G. Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India PVT, LTD, Delhi, 2014.
4. Rajagopalan, R, ‘Environmental Studies-From Crisis to Cure’, Oxford University Press, 2005.
5. Simon Jilian, “The Ultimate Resource”, Princeton University press, N.J, 1981.
6. Brown, Lester, “Building a sustainable society”, Norton, 1981.
7. Adams, W.M and Jean Renaud, “Transition to Sustainability: Towards a Humane and diverse world”, Gland, Switzerland.
8. Wright & Nebel, Environmental science towards a sustainable future, Prentice Hall of India Ltd, 2000.

Course Outcome		Program Outcome												Program Specific Outcome		
CO'S		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	The students are exposed about environment and its ecosystem to Indian geographical context.	1	3	2	3	3	-	3	3	1	-	-	1	3	2	2
CO2	Gained knowledge on the significance at global, regional and local level.	2	-	1	-	2	-	2	2	-	-	-	2	2	1	1
CO3	The students would have understood the effects of the existing natural resources and the need for preserving them.	-	1	2	2	-	-	2	-	-	-	-	1	2	-	1
CO4	Apprehend environmental problems and its linkage to the health and safety of society: think and act with sense of responsibility, committing to the professional ethics. Also knowing alternate	2	3	1	2	3	-	2	-	-	-	-	2	2	2	-

	Sustainable practices for Water harvesting and environmental challenges, hence develop employability skills																
CO5	Understood the concepts and approaches to ecological planning and environmental planning. Realized the active involvement of oneself and society in designing the active involvement and ecosystem would be preserved, considering public health and safety. They are also exposed to various issues and pollutions related to environment and acts and policies to protect environment..	3	3	2	3	3	-	3	2	-	-	-	3	2	2	1	

**COURSE OBJECTIVES:**

- To enable understanding of the important attributes of composition and detailing in drawing
- To facilitate exploration of advance drawing techniques involving one-point perspective.
- To enable a sensitivity towards advance drawing techniques involving two-point and three- point perspective.
- To enhance the visual appeal of architectural drawings with shade and shadow which add texture and depth to it, making it more visually appealing and realistic.

**UNIT I PLANS & SECTIONS OF BUILDINGS****15 HRS**

Introduction to the basic principles of drawing - scale conversion. Graphical representation of plans and sections of buildings. Floor plans, elements above and below plan cut, reflected ceiling plan, site plan with contours, site sections, building elevations, section of buildings.

**UNIT II PERSPECTIVE: ONE POINT****15 HRS**

Concepts and methods of perspective drawing. One-point perspective of simple geometrical shapes like cube, prism, combination of shapes, simple one perspective of building interiors and exteriors. Adding of figures, trees furniture, shade and shadows and applying rendering techniques.

**UNIT III PERSPECTIVE: TWO POINT & THREE POINT****15 HRS**

Concepts and methods of perspective drawing. Two-point and three-point perspective of simple geometrical shapes like cube, prism, combination of shapes, simple two and three-point perspective of building interiors and exteriors. Adding of figures, trees furniture, shade and shadows and applying rendering techniques

**UNIT IV SCIOGRAPHY****15 HRS**

Principles of shade and shadow – construction of shadow of simple geometrical shapes – construction of sciography on building, shadows of architectural elements.

**TOTAL: 60 HOURS****COURSE OUTCOMES**

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

**CO1:**Communicate the design in form of technical drawings.

**CO2:** Create the modeling of their design with drawing techniques using one-point perceptive.

**CO3:**Apply their representation skills in Architectural & Construction drawings with two and three-point perspective.

**CO4:** Applying sciographic technique in the building design.

**TEXT BOOK:**

1. John M.Holmes, Applied Perspective, Sir Isaac, Piotman and Sons Ltd., London 1954.
2. Robert W.Gill, Basic Perspective, Thames and Hudson, London, 1974.
3. C.Leslie Martin, Architectural Graphics, The Macmillan Company, New York, 1964.

4. Francis D K Ching, Architectural Graphics, Van Nostrand and Reinhold Company, NY 1975
5. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar PublishingHouse
6. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

#### E- CONTENT:

1. <https://www.elsevier.com/book/architectural-graphics/ching/9780731290555>
2. <https://dtcc.edu/project.inco.arch.dwg>
3. <https://youtu.be/q8R1618khj4>
4. [Architectural Graphics, Perspective Drawings, Section Perspective Tutorial - YouTube](#)
5. [How to Draw a Building in 2-Point Perspective: Step by Steps - YouTube](#)
6. [https://youtu.be/Ry\\_rv66mCDE](https://youtu.be/Ry_rv66mCDE)

#### REFERENCES:

1. Claude Batley, Indian Architecture, D.B.Taraporevale Sons and Co., Ltd., Bombay
2. William Kirby Lockard, Drawing as a Means to Architecture, Van Nostrand, Reinhold Company, New York.
3. George A Dinsmore, Analytical Graphics – D.VanNostrand, Company Inc., Canada.
4. Interiors: Perspective in Architectural Design Graphic - SMA Publishing Co. Ltd., Japan, 1967.
5. Ernest Norling, Perspective drawing, Walter Foster Art Books, California, 1986.
6. Bernard Alkins- 147, Architectural Rendering, Walter Foster Art Books, 1986.
7. RoberW.Gill, Advanced Perspective, Thames and Hudson, London, 1974
8. Francis D K Ching “Design Drawing”, Wiley India Pvt Ltd, 2012

CourseOutcome		ProgramOutcome												ProgramSpecificOutcome		
CO'S		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Communicate the design in form of technical drawings.	-	2	3	1	1	3	-	1	-	-	-	-	2	-	1
CO2	Create the modeling of their design with drawing techniques using one-point perspective.	-	3	3	2	1	3	-	1	-	-	-	-	1	-	1
CO3	Apply their representation skills in Architectural & Construction drawings with two and three-point perspective.	-	3	3	2	1	3	-	1	-	-	-	-	1	-	1
CO4	Applying sciographic technique in the building design.	-	2	3	1	1	3	-	1	-	-	-	-	2	-	1

**COURSE OBJECTIVES:**

- To involve students in a number of drawing exercises that will look at the design and to understand how to choose the appropriate brick bonding pattern for a specific project
- To increase the ability to understand and design stone structures by involving students in number of exercise of different types of stone masonry.
- To enable students to learn about different foundation types and how they are used in various building contexts.
- To provide knowledge on different flooring materials its advantages and disadvantages and its applicability with the design requirements.

**UNIT I BRICK****25 HRS**

Properties, types and various sizes of brick – modular, conventional bricks, special purpose bricks, Selection of good brick - simple brick footing - Brick bonds and its application in various buildings, English and Flemish bond, rat trap bond, T-Junctions (1 and 1 1 / 2, 2 bricks), L - Junctions, Cross junction (2 bricks), Brick piers, Cavity walls, rat trap bond, plinth and Sill details, brick arches and lintels, compound walls.  
Exercises and drawings on types of brick bonding with junctions.

**UNIT II STONE****25 HRS**

Classification of rocks – Building stones – their uses - properties, criteria for selection of stone, brief study of test for stones – deterioration types of finishes, Preservation of stone and application in various building components -Stone foundation - random rubble/ ashlar, copings, stone piers, plinth and sill details, stone arche sand lintels, stone fencing,  
Exercises and drawings on Types of stone masonry – random rubble and ashlar.

**UNIT III FOUNDATIONS****15 HRS**

Definitions, Purpose of foundation, types of foundation, selection criteria for foundation based on soil conditions, physical properties and behavior of various types of soil, bearing capacity, methods of site exploration and testing of soil, introduction to shallow and deep foundation, retaining wall construction.  
Exercises and drawings on Load bearing Foundation (brick and stone)

**UNIT IV FLOORING****10 HRS**

Flooring: rammed earth, Natural stones like Shahabad, Tandur, Kota, Kadappa, Marble, Granite, etc., athanguditiles, red oxide, terracotta tiles (Laying details), brick paving, glazed ceramic tiles, Vitrified tiles - Finishes: pointing, grouting, pavement, mud plastering, PCC.

**TOTAL: 75 HOURS****COURSE OUTCOMES:**

**CO 1:** Exposed Students about the basic principles of laying bricks in various patterns to create a strong and stable structure and the importance of mortar selection and application, brick size and shape, and joint thickness and alignment.

**CO2:** Developed the necessary skills and knowledge to work on stone structures for residential, commercial buildings. and understand how to use different techniques to shape

and fit stones together to create a stable and aesthetically pleasing structure.

**CO 3:** Learned different types of foundations, including shallow and deep foundations, spread footings, pile foundations, and mat foundations and understand the advantages and disadvantages of each type of foundation and how to select the appropriate type for a specific project.

**CO 4:** Gained knowledge on various materials used in flooring and characteristics of each material, such as durability, ease of maintenance, and cost to explore different design possibilities using patterns, textures, and colors and how to incorporate them into their projects.

### TEXT BOOKS:

1. Dr. P. C. Verghese, "Building materials" Prentice Hall India 2015
2. S.C. Rangwala, "Engineering Materials", Charotar Publishing House – Anand 2007
3. Dr. BalaGopal, "Building Design and Civil Engineering Drawing", Spades Publishers Distributors, 2016
4. A.K.Jain & B. C. Punmia, "Building Construction" Laxmi Publications, 2008

### E-CONTENT:

1. <http://www.aboutcivil.org/stone-mortars.html>
2. <http://theconstructor.org>
3. <http://www.thebalancesmb.com/bricks-types-uses-and-advantages-844819>
4. <http://www.baboo-Flooring.com>
5. NPTEL Course Video on Basic Construction Materials  
<https://archive.nptel.ac.in/courses/124/105/124105013/>
6. NPTEL Course Video on Design of Masonry Structures  
[https://onlinecourses.nptel.ac.in/noc19\\_ce21/preview/](https://onlinecourses.nptel.ac.in/noc19_ce21/preview/)
7. MOOC - <https://www.frogview.com/building-materials-mock-test-online-civil-engineering-test/>
8. MOOC - <http://www.acseduonline.com/courses/self-sufficiency-19/mud-brick-construction-ass103-430.aspx>
9. MOOC - <http://bestbricy.com/free-bricklaying-course-videos-online/>

### REFERENCES:

1. W. B. McKay, "Building Construction", Vol. 1,2,3 – Longmans U.K 1992.
2. R.J.S.Spencke and D.J.Cook, "Building Materials in Developing Countries", JohnWiley and Sons, 1983.
3. Don A. Watson, "Construction Materials and Processes", McGraw Hill Co., 1972.
4. Alanwerth, "Materials", The Mitchell Pub. Co. Ltd., London, 1986.
5. R. Chudleu, & R Greeno, "Building Construction Handbook", Butterworth – Heinemann Ltd., 7<sup>th</sup> Revised edition, Elsevier 2008.

CourseOutcome		ProgramOutcome												ProgramSpecificOutcome		
CO'S		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Exposed Students about the basic principles of laying bricks in various patterns to create a strong and stable structure and the importance of mortar selection and application,	3	3	3	2	3	2	3	3	3	-	-	3	3	-	2

	brick size and shape, and joint thickness and alignment.																
CO2	Developed the necessary skills and knowledge to work on stone structures for residential, commercial buildings, and understand how to use different techniques to shape and fit stones together to create a stable and aesthetically pleasing structure.	3	3	3	2	3	2	3	3	3	-	-	3	3	-	2	
CO3	Learned different types of foundations, including shallow and deep foundations, spread footings, pile foundations, and mat foundations and understand the advantages and disadvantages of each type of foundation and how to select the appropriate type for a specific project.	3	3	3	2	3	2	3	3	3	-	-	3	3	-	1	
CO4	Gained knowledge on various materials used in flooring and characteristics of each material, such as durability, ease of maintenance, and cost to explore different design possibilities using patterns, textures, and colors and how to incorporate them into their projects.	3	3	3	2	3	2	3	3	3	-	-	3	3	-	1	

**COURSE OBJECTIVES:**

- To familiarize the students with the various mediums and techniques of art through which artistic expression can be achieved. Also to develop dexterity of hand in manipulation of different materials.
- To familiarize the students with the grammar of art by involving them in a series of free hand exercise both indoor and outdoor to understand form, proportion, scale.
- To develop presentation skills, visual expression and representation, imaginative thinking and creativity through a hands on working with various mediums and materials.
- To elaborate the importance of model making also to acquire the skills in constructing three dimensional forms using different model making materials and equipment, using different scale.

**Introduction to Rendering techniques** – Introduction of art - Elements and principles of Art - Types of arts & painting visual effects of drawing – Composition - Approach to sketching - Study of light and shadow. Drawing skills - Freehand exercises on artistic expression, nature - Scale drawing. Rendering techniques for architectural drawing - Building perspective, Interior and Exterior in various medium like Pencil, Ink, Pastel, Water colors- Opaque and Transparent Painting method in which the paints are made of pigments. Drawing from imagination Exercises for gaining confidence and enhancing the creativity.

**Drawing skills and Graphical representation** - Sketching Human Form: Anatomy and Expression. Sketching Memory drawing and Creative Sketching, Outdoor sketching Methods and techniques using Pencil, Pen and Ink to prepare drawings in Outdoor areas. Techniques of rendering with pen and ink- Graphical representation of building and Landscape such as Tree, laws, Shrubs, Paving, Pathway, Flowerbed, Water fools, Human figures, Vehicles.

**Clay Art** – Overview- significance, scope & purpose; material types, source, composition, properties, tools & equipment, techniques, processes, finishing; applications. Utilitarian/ Non-utilitarian products, pottery, sculpture, wall art, garden art, sign art, accessories.

**Model Making** – Essentials of model making: understanding of various tools and machines employed, best practices involved in operating the tools and the techniques. Introduction to the Ceramic materials used for model making – clay, types and mixtures, properties. Introduction to various mediums/materials. Concepts of model making - Additive model; Subtractive model out of a given geometric form. Models with linear members to understand geometric form and structure.

**TOTAL: 60 HOURS**

**EXERCISES**

- Representing various surface finishes like Brick/Stone representation, Stucco finish.
- Various site elements contours representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing.

**COURSE OUTCOMES:**

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

**CO 1:** Gained knowledge on historical and cultural significance of ink and rendering techniques in architecture and design.

**CO 2:** Students learned how to create clear and effective visual representations of their



design ideas, students can improve their ability to communicate.

**CO 3:** Enhanced tactile skills and dexterity; gain knowledge of materials used and their properties, craft skills; visualization skills.

**CO 4:** Explore different materials in model making of small scale building components and inculcated the dynamic act of constructing the thinking process.

**TEXT BOOK:**

1. Ching Francis, Drawing a creative process, Van Nostrand Reinhold , New York,1992.
2. Alan Swann, Graphic Design School, Harper Collins,1991
3. Molva Hunty, The Artist drawing book, David & Charles, U.K.,1994.
4. John Harmilton, The complete Book of Sketching, Chancellor Press,2003.
5. Model making: Materials & Methods by David Neat, 2008, Crowood.

**E-CONTENT:**

1. Elizabeth Resnick, 2009, Design for Communication: Conceptual Graphic Design Basics 1st Edition, Kindle Edition, Wiley
2. Matt Driscoll, 2013, Model Making for Architects Kindle Edition, Crowood.
3. MOOC - <https://youtu.be/D8yw1ov3hjI> for Pen and Ink Cross Hatching Exercise.
4. NPTEL Course video on Model Making tips - <https://youtu.be/SxCYtRfCm8o>.
5. NPTEL Course video on Model Making material selection <https://youtu.be/X8u3zhDUDzE>.
6. NPTEL Course video on how to create realistic texture using ink <https://youtu.be/t0fLhi0xVIA>

**REFERENCES:**

- 1.Janssen, Constructional Drawings & Architectural models, Kari Kramer Verlag Stuttgart, 1973.
- 2.Harry W.Smith, The art of making furniture in miniature, E.P.Duttor Inc., New York, 1982.
- 3.Thames and Hudson Manual of Rendering with Pen and Ink-Robert W Gill.
- 4.Model building for Architects & Engineers by John Taylor.
- 5.Architectural Models by Rolf Janke.
6. Architectural Graphics by Ching Frank.
7. Geometrical & Building Drawing by Kelsey W.E.
8. Architectural Graphics by Martin C. Leslie.
9. Rendering with pen and ink by Gill Robert.

CourseOutcome		ProgramOutcome												ProgramSpecificOutcome		
CO'S		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Gain knowledge on the rendering techniques and presentation skills.	1	2	3	2	2	3	-	-	-	-	-	-	2	-	3
CO2	Students learned how to create clear and effective visual representations of their design ideas, students can improve their ability to communicate.	1	3	3	3	2	3	-	-	-	-	-	-	1	-	3
CO3	Enhanced tactile skills and dexterity; gain knowledge of materials used and their properties, craft skills; visualization	1	3	3	3	3	3	-	-	-	-	-	-	1	-	3



**COURSE OBJECTIVES**

- To summarize the understanding of spaces through theoretical as well as practical experience.
- To explain the standards and basics anthropometrics and its application.
- To use the understanding of qualitative and quantitative aspect of basic design of space and their relation.
- To develop the small scale project that involves simple function and experience with outcome of architectural design process.

**Measured Drawing-** Analysis and Documentation of with small buildings by using simple measuring tools like tapes, photograph.

**Basic anthropometrics-** human functions and their implications for space requirements. Spatial interpretations – various activities and their relationship with spaces. Anthropometry as related to physically handicapped and elderly persons are required to be studied. Functional furniture layout, circulation, lighting and ventilation for spaces.

**Design communication and graphics** -Importance of graphics in architectural design. Types of diagrams – graphic metaphors, are diagram, matrix diagram, network diagram, bubble diagram, circulation diagram, analytical diagram, schematic – symbol, sign, arrows – concept diagrams. Study of site plans, city plans, conceptual drawings. Interpretation of architects' conceptual sketches and the respective buildings.

**Scale and Complexity-** projects involving small span, single space, single use spaces with simple movement, predominantly horizontal, as well as simple function public buildings of small scale.

**Examples of exercises include**

- a) Toilet for a physically handicapped person. Hostel room, bed room, kitchen, living/dining,
- b) Shop, Workshop, pavilions, snack bar
- c) Residence, petrol bunk, fire station, police station, cottage for an elderly couple
- d) Architect's office, Doctor's clinic.
- e) Design of simple building elements such as Entrance portal, Garden pavilion, Memorial, edifice, Bus shelter, snack kiosk and layout of parks.
- f) nursery school

**TOTAL: 180 HOURS****COURSE OUTCOMES**

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

**CO1:** Convert the existing building into the drawing in form of plan, section and elevation.

**CO2:** Well-versed with human standards in building forms.

**CO3:** Justify their design concepts and propose design solution based on form, function, space and user.

**CO4:** Propose the small scale project with all the details.

**TEXT BOOKS:**

1. Joseph De Chiara, Michael J Crosbie, "Time Saver Standards for Building Types", McGraw Hill Professional, 2001.
2. Julius Panero, Martin Zelnik, "Human Dimension and Interior Space", Whitney Library of Design, 1975

- Joseph De Chiara, Julius Panero, Martin Zelnik, "Time Saver Standards for Interior Design and Space Planning", McGraw Hill, 2001.
- Ernst Neuferts, "Architects Data," Blackwell, 2002.
- Ramsey et al, "Architectural Graphic Standards", Wiley, 2000.
- Ching, F. D.K. (1996), Architecture: Form, Space & Order, 2nd ed, New York: Van Nostrand Reinhold

## E- CONTENT:

- NPTTEL course on Structure, Form, and Architecture: The Synergy - [Structure, Form, and Architecture: The Synergy - Course \(nptel.ac.in\)](#)
- [What Is Architectural Space? - YouTube](#)
- [Architecture Short Course: How to Develop a Design Concept - YouTube](#)
- [Developing the Architectural Concept - Architecture Short Course \(Part 2\) - YouTube](#)
- [Interior Design One | The Design Process and Space Planning - YouTube](#)
- [5 Phases of Architectural Design Explained by Architect Jorge Fontan - YouTube](#)
- [Inspiration for YOUR Design Work - Favorite books in 2021 - YouTube](#)
- [Architectural Design Process | Form, Orientation and Sunlight - YouTube](#)
- [Using a Matrix to Make Bubble Diagram - YouTube](#)
- [30 Minute Study Model - Here's How - YouTube](#)

## REFERENCES:

- Richard P. Dober, "Campus Planning" - Society for College and University Planning, 1996.
- AchyutKanvinde, "Campus design in India", American year Book, 1969
- Kevin Lynch, "Site planning", MIT Press, Cambridge, 1967
- Sam F. Miller, "Design Process: A Primer for Architectural and Interior Design", Van Nostrand Reinhold, 1995.

CourseOutcome		ProgramOutcome												ProgramSpecificOutcome		
CO'S		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Convert the existing building into the drawing in form of plan, section and elevation.	1	2	3	3	2	3	-	2	-	1	-	-	3	-	2
CO2	Well-versed with human standards in building forms.	-	3	3	1	2	-	-	-	1	1	-	-	3	-	-
CO3	Justify their design concepts and propose design solution based on form, function, space and user.	3	2	2	-	1	1	-	-	-	-	-	-	2	1	-
CO4	Propose the small scale project with all the details.	1	2	2	-	3	3	1	-	1	-	-	1	2	-	-

# ADHIYAMAAN COLLEGE OF ENGINEERING

[An Autonomous Institution Affiliated to Anna University, Chennai]

[Accredited by NAAC]

REGULATIONS 2022

CHOICE BASED CREDIT SYSTEM

B. ARCH – ARCHITECTURE

**CURRICULA AND SYLLABI FOR SEMESTER III**

**(PREREQUISITE-PASS IN FUNDAMENTAL DESIGN STUDIO)**

COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C	IA	EA	M
<b>THEORY</b>										
322ART01	Structural Analysis and Design I	ESC	3	2	1	0	3	40	60	100
322ART02	History of Architecture and Culture-II	PCC	3	3	0	0	3	40	60	100
322ART03	Climate and Built Environment	PCC	3	2	1	0	3	40	60	100
<b>THEORY CUM STUDIO</b>										
322ART04	Site Surveying and Analysis	PCC	4	2	0	2	3	50	50	100
322ART05	Building Materials and Construction III	PCC	5	1	2	2	4	50	50	100
<b>STUDIO</b>										
322ARP06	Digital Drawing, Visualization and Representation	SEC	4	1	2	2	4	60	40	100
322ARP07	Architectural Design Studio II	PCC	12	0	0	12	6	60	40	100
<b>TOTAL</b>			<b>35</b>	<b>11</b>	<b>6</b>	<b>18</b>	<b>26</b>			

**322ART01**

**STRUCTURAL ANALYSIS AND DESIGN I**

**L T P C**

**2 1 0 3**

**COURSE OBJECTIVE:**

- To relate the properties and various design methods of concrete.
- To generate reinforced concrete slab design.
- To design of singly reinforced, doubly reinforced beam and Continuous beam.
- To provide understanding of reinforced concrete columns using limit state design principles.
- To design the RCC footing, dog-legged staircase and brick masonry.

**UNIT I INTRODUCTION TO RCC AND ITS DESIGN METHODS 5 Hrs**

Introduction to RCC - Concept of elastic method, Ultimate load method and limit state method- Advantages of limit state method over other methods.

**UNIT II LIMIT STATE DESIGN OF SLABS 10 Hrs**

Design of one-way and two-way slab- Cantilever slab -Design of RCC Circular slabs - simply supported and fixed slabs with uniformly distributed loads using IS code.

**UNIT III LIMIT STATE DESIGN OF BEAMS 10 Hrs**

Analysis and Design of rectangular sections for bending- singly reinforced, doubly reinforced, and continuous beams.

**UNIT IV LIMIT STATE DESIGN OF RCC COLUMNS 10 Hrs**

Code provisions –Design of axially loaded short and long columns of rectangular and circular sections – lateral ties and spiral reinforcement.

**UNIT V LIMIT STATE DESIGN OF FOUNDATION, STAIRCASE AND BRICK**

**MASONRY 10 Hrs**

Isolated pad footings - combined footings for simple design problems. Design of dog legged staircase. Analysis and Design of brick masonry, load bearing walls - codal requirements.

**TOTAL: 45 HOURS**

**COURSE OUTCOMES:**

At the end of the course, the students will be able to understand:

**CO1:** Extract the knowledge about concrete and the methods of design.

**CO2:** Comprehend the design of one-way, two-way and circular RC slabs.

**CO3:** Interpret the concepts in the design the beams

**CO4:** Understand the concept behind designing both compact and extended RCC columns.

**CO5:** Explore how to build a RCC footings for dog-leg staircase and brick masonry.

**TEXT BOOKS:**

1. P.Dayaratnam, “Design of Reinforced Concrete Structures”, Oxford and

- IBHPublishingCo.,1983.
2. N.Krishnaraju, "Design of reinforced concrete structures", CBS; 3rd edition (1 January 2015)
  3. Dr.B.C.Punmia, "Reinforced Concrete Structures", Vol, 1 & 2, Laxmi publication, Delhi 2004.

### E-CONTENT:

1. <https://construccion.uv.cl/docs/textos/coleccion03/TEXT0.12.DesingofConcreteStructures.pdf>
2. [https://weccivilians.weebly.com/uploads/2/4/6/2/24623713/design\\_of\\_reinforced\\_concrete\\_9th\\_edition\\_-\\_jack\\_c.\\_mccormac.pdf](https://weccivilians.weebly.com/uploads/2/4/6/2/24623713/design_of_reinforced_concrete_9th_edition_-_jack_c._mccormac.pdf)
3. [https://www.youtube.com/watch?v=pIdaC\\_I6H\\_M&list=PL51300B0778FB5784](https://www.youtube.com/watch?v=pIdaC_I6H_M&list=PL51300B0778FB5784)
4. <https://www.youtube.com/watch?v=PDJPcQq3PZE>
5. <https://www.youtube.com/watch?v=wJWt0dcgafs>

### REFERENCES:

1. M.L.Gambhir, " Design of Reinforced Concrete Structures", Prentice- Hall of India Private Limited,
2. R.K.Bansal (2005), Strength of Materials, Laxmi Publications
3. IS456, "Indian Standard, Plain and Reinforced Concrete, Code of Practice, Bureau of Indian Standards,2000.
4. SP 16, Design aids reinforced concrete to IS 456-1978.
5. IS 1905 — 1987, "Code of Practice for Structural Use of Unreinforced Masonry Walls"

Course Outcomes		Program Outcomes												Program Specific Outcomes		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Extract the knowledge about concrete and the methods of design.	1	3	-	3	1	1	-	1	1	-	-	-	3	-	1
CO2	Comprehend the design of one-way, two-way and circular RC slabs.	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2
CO3	Interpret the concepts in the design the beams	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2
CO4	Understand the concept behind designing both compact and extended RCC columns.	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2
CO5	Explore how to build a dog-leg staircase, brick masonry, and footings.	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2

**COURSE OBJECTIVES:**

- To understand Indian architecture as evolving within specific cultural contexts including aspects of society, religion, politics, and climate
- To analyze the development of architectural form with reference to religious practices and culture
- To evaluate the technology, style, and character of Hindu architecture in various parts of the country
- To apply the Islamic principles, philosophy & its relevance to various built forms
- To understand the influence of Islamic architecture on Indian subcontinent and the architecture of various provinces under the sultanate rule.

**UNIT I EARLY VEDIC AND BUDDHIST ARCHITECTURE 6 Hrs**

Introduction to the Vedic period - culture, architecture, and town planning in ancient India. The rise of Buddhism, Principles, and elements of Buddhist architecture. Buddhist structures constructed under the Satavahana dynasty – E.g.: Chaitya halls, Viharas ; Mauryan dynasty – E.g.: The great Stupa at Sanchi and the Lion capital of Ashoka, Sarnath.

**UNIT II EVOLUTION OF HINDU ARCHITECTURE I 10 Hrs**

Introduction to Hindu temple architecture in India. Architectural principles and elements of Hindu temples outlining their significances. Styles of Hindu temple architecture, the evolution and forms of gopurams and shikharas. Introduction to the Sangam period, Dravidian Temple architecture, underlying architectural principles : Cholas – Brihadeeshwara temple, TanjavurPandyas – Meenakshi temple, Madurai, Pallavas – Shore temple, Mahabalipuram, Chalukyas – Durga temple, Aihole, .Vijayanagara empire - Virupaksha temple, Hampi and Vithala temple, Hampi

**UNIT III EVOLUTION OF HINDU ARCHITECTURE II 8 Hrs**

Introduction and salient features of the Nagara style of temple Architecture .Somavamshi dynasty – Lingaraja temple,Bhubaneshwar, Eastern Ganga dynasty – Sun temple, Konark, Gupta period – Tigawa temple, Madhya Pradesh, Chandella dynasty – Kajaraho temple, Madhya Pradesh

**UNIT IV EARLY ISLAMIC ARCHITECTURE IN INDIA 9 Hrs**

Introduction and brief history of Islamic architecture. Principles and characteristic elements of Islamic Architecture and Building typologies with examples (Mosques, Tombs, Madarasa, Caravanserai and markets) . Evolution of Islamic architecture under imperial rule, Salve dynasty and Khaljidynasty –Qutb complex, Tughlaq dynasty –, Khirki Masjid, Sayyid Dynasty – square and octagonal tombs, Mubarak Shah’s tomb, Delhi, Lodhi dynasty – Tomb of SikanderLodhi and Lodhi gardens, Delhi.

**UNIT V PROVINCIAL STYLE & MUGHAL ARCHITECTURE IN INDIA12 Hrs**

Introduction and development of the provincial style of architecture in India. Influence of regional Architecture of Deccan – Bijapur :EgGolgumbaz and Ibrahim Rauza, Bijapur, Gujarat : Eg Teen Darwaza, Gujarat, Jama Majid, Ahmedabad.



History and development of the Mughal architecture in India highlighting the style and examples of Akbar – Humayun’s tomb and FathehpurSikri, Jahangir – Shalimar Bagh, Shahjahan – Taj mahal and Red fort

**TOTAL: 45 HOURS**

**COURSE OUTCOMES:**

**CO1:**Remember the significance of Vedic culture and Buddhism in India and the influences in shaping the built environment.

**CO2:**Evaluate the spatial structures associated with Hindu Dravidian temples under the Sangam period

**CO3:**Understand the emergence of the Nagara style of Temple architecture with relevant examples under different dynasties

**CO4:**Applications of the Islamic architecture principles and building typologies. The architectural evolution during the slave dynasty with relevant building examples.

**CO5:**Analyze the provincial style of architecture in the regions of India and the architectural advancements under the Mughal rule.

**TEXT BOOK:**

1. Percy Brown, “Indian Architecture (Buddhist and Hindu Period)”, Taraporevala and Sons, Bombay, 1983.
2. Adam Hardy, The Temple Architecture of India
3. Simon Unwin, Analysing Architecture
4. Satish Grover, “The Architecture of India (Buddhist and Hindu Period)”, Vikas Publishing Housing Pvt. Ltd., New Delhi, 2003.
5. Christopher Tadgell, “The History of Architecture in India from the Dawn of civilization to the End of the Raj”, Longman Group U.K.Ltd., London, 1990.
6. Satish Grover, “Islamic Architecture in India”, CBS Pub, New Delhi, 2002
7. George Michell, “The Hindu Temple”, BI Pub., Bombay, 1977.
8. Stella Kramrisch, “The Hindu Temple”, Motilal Banarsidass, 1976.
9. Parameswaranpillai V.R., “Temple culture of south India”, Inter India Publications,
10. George Michell Ed, “Temple Towns of Tamil Nadu”, Marg Pubs, 1995.
11. Raphael D., “Temples of Tamil Nadu Works of Art”, Fast Print Service Pvt Ltd., 1996.

**E-CONTENT:**

1. Vedic architecture- <https://www.youtube.com/watch?v=s723-3hkUjA>
2. NPTEL-NOC IITM - [https://www.youtube.com/watch?v=m8fcpZxrkwI&list=PLyqSpQzTE6M\\_5jEwMqI2g6TwHXilMDDiF](https://www.youtube.com/watch?v=m8fcpZxrkwI&list=PLyqSpQzTE6M_5jEwMqI2g6TwHXilMDDiF)
3. Buddhist Architecture in India - <https://www.youtube.com/watch?v=DmVrU-dADwI>
4. Hindu temple Architecture - <https://www.youtube.com/watch?v=khNWzFncYrA>
5. Elements of Hindu temple Architecture - <https://www.youtube.com/watch?v=IBWnj5MtN5I>
6. Slave Dynasty Architecture - <https://www.youtube.com/watch?v=xZq1H52dpec>

7. Elements and Principles of Islamic Architecture - <https://www.youtube.com/watch?v=L1ZKXVt62dA>
8. Mughal Architecture in India - <https://www.youtube.com/watch?v=DXDmC6qGn5s>
9. Charbhag concept <https://www.youtube.com/watch?v=VUwUXcJ4vac>

#### REFERENCES:

1. George Michell, "The Hindu Temple", BI Pub., Bombay, 1977.
2. Stella Kramrisch, "The Hindu Temple", MotilalBanarsidass, 1976.
3. Parameswaranpillai V.R., "Temple culture of south India", Inter India Publications,
4. George Michell Ed, "Temple Towns of Tamil Nadu", Marg Pubs, 1995.
5. Raphael D., "Temples of Tamil Nadu Works of Art", Fast Print Service Pvt Ltd., 1996.

CourseOutcome		Program Outcome												Program Specific Outcome		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Remember the significance of Vedic culture and Buddhism in India and the influences in shaping the built environment.	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-
CO2	Evaluate the spatial structures associated with Hindu Dravidian temples under the Sangam period	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-
CO3	Understand the emergence of the Nagara style of Temple architecture with relevant examples under different dynasties	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-
CO4	Applications of the Islamic architecture principles and building typologies. The architectural evolution during the slave dynasty with relevant building examples.	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-
CO5	Analyze the provincial style of architecture in the regions of India and the architectural advancements under the Mughal rule.	3	2	3	3	1	-	-	3	-	3	-	2	2	2	-

**COURSE OBJECTIVE:**

- To Understand the classification & factors of climate and their influence in building design.
- To Analyze the solar component and its importance in building design.
- To comprehend the thermal factors and its application in the built environment.
- To Provide basic information of thermal comfort indicators and their relevance to the building design.
- To Understand and apply the ventilation aspect in and around the building.

**UNIT I INTRODUCTION TO CLIMATE****8 Hrs**

Introduction to Climate, weather, seasons –types of climates: micro and macro climate. Factors that determine climate – elements of climate - methods and representation of Climatic data -Instruments used to record data. Climatic zones: world and India; climate classification: Koppen. effects of climate: Urban heat island- local factors influencing climate. Basic information on rating systems for climate responsive buildings such as LEED, GRIHA, IGBC, ECBC.

**UNIT II SOLAR CONTROL****9 Hrs**

Apparent movement of the sun, sun path diagram, solar constant and radiation. Solar geometry - solar chart - Sun angles and shadow angles, Understanding the sun path, orientation of building, openings- sizes, position and Design of solar shading devices. Case example of climate responsive building: TERI-SRC Building, Bangalore.  
Exercise: Designing of shading devices using solar protractor & sun path diagrams.

**UNIT III HEAT TRANSFER IN BUILDING****9 Hrs**

Thermal quantities: Heat, Heat flow rate, Temperature and temperature difference, Solar-air temperature; Modes of Heat Transfer in Buildings: conduction, convection and radiation; Thermal properties of building materials [walls, floors, roofs multilayer body]: conductivity, conductance (U-Value), resistivity and Resistance (R-Value), transmittance, reflectance, absorptance; Time lag and decrement factors.

Passive design strategies for heating- Direct gain - Thermal storage wall - Sunspace -Convective air loop - Trombe wall.

Exercise: Data collection and analysis regarding the thermal properties of contemporary materials suited for various climatic zones.

**UNIT IV THERMAL COMFORT****10 Hrs**

Introduction to thermal indicators; Environmental variables influencing thermal comfort (Dry bulb-temperature (DBT), Relative Humidity (RH), Mean Radiant Temperature (MRT); Operative Temperature (OP); Subjective variables (Metabolic Activity, Clothing type); Human body response (i.e., heat loss and gain) to different indoor environmental conditions in architectural spaces.

Comfort Indices: Effective Temperature (ET), Corrected Effective Temperature (CET), Standard Effective Temperature (SET). Introduction to Thermal comfort models: ASHRAE and Adaptive Comfort Model, psychometric chart; Thermal comfort stimulation tool: CBE clima tool. Case example of climate responsive building: Chettinadu Palace, Karaikudi.

## **UNIT V AIR MOVEMENT**

**9 Hrs**

Air movement in tropical region -The effects of topography on air movement- wind rose diagram, wind pressure, wind velocity, wind shadow. Functions of ventilation - Air movement through & around buildings - factors affecting indoor air flow; Passive design strategies principles of cooling and Methods: Single sided, Cross ventilation and Stack effect, wind walls, wind catchers, earth air tunnels, Evaporative and convective cooling, stack effect due to the thermal forces, site planning consideration to facilitate wind movement. Case example of climate responsive building: Agraharam Settlement, Sri Rangam Tamil Nadu and Bhunga Houses, Kutch Gujarat.

Exercise: Conceptual understanding of Air flow in and around the buildings.

**TOTAL: 45 HOURS**

### **COURSE OUTCOMES:**

**CO1:** Understanding climatic factors and their influence on the built environment.

**CO2:** Analyse and develop solar shading techniques for buildings w.r.t climatic zones.

**CO3:** Understanding the thermal behavior in building materials and strategies adopted for overcoming the impacts.

**CO4:** Asses and attain optimal thermal comfort inside the building environment.

**CO5:** Incorporating air flow and Ventilation factors in the site level and building level planning.

### **TEXT BOOKS:**

1. O.H. Koenigsberger and Others, “Manual of Tropical Housing and Building” – Part I -Climate design, Orient Longman, Madras, India, 2010.
2. Bureau of Indian Standards IS 3792, “Hand book on Functional requirements of buildings (other than industrial buildings)”, 1987.

### **E-CONTENT:**

1. Environmental Control Systems: Heating, Cooling, Lighting - Fuller Moore - Google Books. Fuller Moore, “Environmental Control Systems”, McGraw-hill, Inc., New Delhi, 2003.
2. <https://youtu.be/AU2wTudKmX8>-- Lecture 19 Fundamentals of Climate Responsive Buildings - II
3. <https://youtu.be/n6rPyLZiqLE>- Lecture 19 Fundamentals of Climate Responsive Buildings - II
4. Climate Responsive Architecture of India: Diverse Weather, Diverse Techniques - RTF | Rethinking The Future (re-thinkingthefuture.com)
5. 15 examples of climate responsive buildings around the world - RTF | Rethinking The Future (re-thinkingthefuture.com)

- Examples of Climate responsive architecture in Indian cities - RTF | Rethinking The Future (re-thinkingthefuture.com)

## REFERENCES:

- Martin Evans, “Housing Climate and Comfort”, Architectural Press, London, 1980.
- Climate Responsive Architecture of India: Diverse Weather, Diverse Techniques - RTF | Rethinking The Future (re-thinkingthefuture.com)
- B. Givoni, “Passive and Low Energy Cooling of building”, Van Nortrand Reinhold New York, USA, 1994.
- Galloe, Salam and Sayigh A.M.M., “Architecture, Comfort and Energy”, Elsevier Science Ltd., Oxford, U.K., 1998.
- Donald Watson and Kenneth Labs., “Climatic Design” – McGraw-Hill Book Company - New York - 1983.
- Joseph de chiara and Le Copplemann– “Planning and Design Criteria” – McGraw-Hill, New York 1983.
- The climate dwelling – “An introduction to climate responsive residential” – by eoin o cofaigh, john aolley- 1996
- “Energy-efficient buildings in India” – by milimajumdas, tata energy research institute – ministry of non-conventional resources.
- Olgay, A. and Olgay, V. (1976). Solar Control and Shading Devices. New Jersey : Princeton University Press.
- “Climate Smart Buildings – Training program on Innovative construction technologies and thermal comfort in affordable Housing – Handbook” – by CARF, ministry of Housing and Urban Affairs Government of India.

CourseOutcome		ProgramOutcome												ProgramSpecificOutcome		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understanding climatic factors and their influence on the built environment.	2	3	1	3	2	-	3	-	2	-	-	2	2	-	1
CO2	Analyse and develop solar shading techniques for buildings w.r.t climatic zones.	2	3	1	3	2	-	3	-	2	-	-	2	2	-	1
CO3	Understanding the thermal behavior in building materials and strategies adopted for overcoming the impacts.	2	3	1	3	2	-	3	-	2	-	-	2	2	-	1
CO4	Asses and attain optimal thermal comfort inside the building environment.	2	3	1	3	2	-	3	-	2	-	-	2	2	-	1
CO5	Incorporating air flow and Ventilation factors within built environment.	2	3	1	3	2	-	3	-	2	-	-	2	2	-	1

**COURSE OBJECTIVES:**

- To equip students with the basic skills of Surveying and regulations related to Architecture.
- To develop the abilities needed to create thoughtful, contextually aware, and sustainable architectural designs that have a positive impact on both the built environment and the people who interact with it. To teach various techniques of site analysis and the methodology of preparing a site analysis diagram through exercises.
- To comprehend the fundamental ideas that guides the methodical investigation of topographic elements in site landform.
- To help the students comprehend the services provided on-site and the reliability of site features while arranging parking and roadways to create a welcoming atmosphere.

**UNIT I SURVEYING & PLANNING GUIDELINES 10 Hrs**

Definition of plot, site, land and region, units of measurements. Introduction to methods of surveying and context of use. Modern surveying Instruments such as Electronic Distance Measurement (EDM) and Total Stations and their application. Understanding of administrative maps, including Field Measurement Book (FMB), land use map with color code, Development control rules, F.A.R / F.S.I, Built up Area, Carpet Area. Insight to the basics application of Geographical Information Systems (GIS) at regional level.

**UNIT II GRADING AND ANALYSIS 15 Hrs**

Analysis of site landform: Identification of contours, Characteristics of contours, direct and indirect methods of contouring, interpolation, slope analysis, grading process, grading criteria considering the functional and aesthetical requirement. Zoning of open spaces and built-up areas as per site contours.

**Exercise** – Design Consideration and Contour Analysis Diagram for different landforms.

**UNIT III SITE INVENTORY AND ANALYSIS 15 Hrs**

Importance of site inventory, site selection criteria and Analysis - Ecologically sensitive areas. Importance of site analysis as offering potential and limitation to architectural design factors such as on-site/ off- site, topography, hydrology, soils, vegetation, climate and microclimate. Site analysis – Process of Site Analysis - Site Synthesis with relevant case examples.

**Exercise** - Preparation of site analysis diagrams - Maps of matrix analysis & composite analysis.

**UNIT IV SITE CIRCULATION & SERVICES 20 Hrs**

Design considerations for circulation networks. **Pedestrian circulation:** movement, material, design consideration, linkage and visual system, spatial experience. **Vehicular circulation:** types of roads, hierarchy of roads, road networks, Turning radii, street intersections and safety, parking standards and layouts. Preparation of site layout with site circulation to provide an inclusive environment. Site services - Water Supply and Sanitation - Conveyance of Water at Site Level - Conveyance of Sewage at Site Level. Principles of positive drainage and grading for drainage. Location and design of sewage treatment plants. Surface Runoff

management for different site contexts. Rain Water Harvesting -Techniques at Site Level, Fire Fighting Systems at site level. Electrical Services - Distribution from the Source to Campus, Outdoor Lighting Systems.

**Exercise** – Parking lot for different types of vehicle and turning radii for the same. Mapping of Site Level Services.

**TOTAL: 60 HOURS**

**COURSE OUTCOMES:**

At the end of the course the student should be able to

**CO1:** Understand the objectives, principles of surveying, leveling and advanced techniques of surveying. Gain the knowledge on calculating F.S.I and Built up Area.

**CO2:** Understand the process and the stages involved in site analysis and site planning through info graphical presentation.

**CO3:** Analyze the contour and understand the building surrounding analysis.

**CO4:** Design the site's circulation and spatial features to create an inclusive atmosphere. Improve and expand the student ability to prepare a site plan that takes utilities and infrastructure into account.

**TEXTBOOK:**

1. Punmia B.C, Er. Ashok K. Jain, Dr. Arun K. Jain Surveying, Volume 1, Standard Book House, New Delhi, 2016
2. Surveying and Levelling for Architects – January 2014 by Prof. Harbhajan Singh (Author).
3. Kevin Lynch, “Site planning”, MIT Press, Cambridge, MA, 1984.
4. Edward T. Q., “Site Analysis”, Architectural Media, 1983.

**E-CONTENT:**

1. <https://theconstructor.org/surveying/types-of-leveling-methods/14679/>.
2. <https://youtu.be/3jo210hWL-4> - Site Analysis - Site planning and Design.
3. <https://youtu.be/MtXKKiRgHAA> - Site planning and Building Design (Claudio Del Pero).
4. <https://youtu.be/1W54TCa8GKc> - Site Planning.
5. NPTEL Video on Landscape Architecture and Site Planning  
[https://youtu.be/7TXJV-v\\_Wa4](https://youtu.be/7TXJV-v_Wa4)
6. NPTEL Video on 7 Free website for better Site Analysis in Architecture  
<https://youtu.be/rGSHaea8jNk>
7. NPTEL Video on Architecture Site Analysis – A quick and Powerful method  
[https://youtu.be/UnBYXR\\_r1JU](https://youtu.be/UnBYXR_r1JU)
8. NPTEL Video on Site investigation, Analysis & Appraisal - 1  
<https://youtu.be/iD059IU6G-A>
9. NPTEL Video on Site investigation, Analysis & Appraisal -2  
<https://youtu.be/YtneNMDofI4>
10. MOOC - <https://www.my-mooc.com/en/mooc/site-planning-online/>

**REFERENCES:**

1. B.C. Punmia, Ashok K. Jain, Ashok Kr. Jain, Arun Kr. Jain, “Surveying”, Vol. I, Firewall Media, 2005.
2. P.B. Shahani, “Text of surveying”, Vol. I, Oxford and IBH Publishing Co, 1980, Joseph De. Chiara and Lee Coppleman, “Urban Planning Design Criteria”, Van Nostrand Reinhold Co., 1982.

3. Kevin Lynch and Gary Hack, Site planning, MIT Press, Cambridge, 2005.
4. Storm Steven, "Site engineering for landscape Architects", Johnwiley&SonsInc,2004.
5. Second Master Plan–Development Regulations–CMDA,2008.
6. Introduction to Landscape – John Moltoch

Course Outcomes		Program Outcomes												Program Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the objectives, principles of surveying, leveling and advanced techniques of surveying. Gain the knowledge on calculating F.S.I and Built up Area.	3	2	-	1	2	-	1	1	2	-	2	-	1	2	2
CO2	Understand the process and the stages involved in site analysis and site planning.	3	3	3	3	2	2	1	3	3	-	-	3	3	2	3
CO3	Analyze the contour and understand the building surrounding analysis.	2	3	3	2	2	3	2	2	2	-	-	2	2	2	3
CO4	Design the site's circulation and spatial features to create an inclusive atmosphere. Improve and expand the student ability to prepare a site plan that takes utilities and infrastructure into account.	2	3	3	2	2	-	2	2	1	-	-	1	2	1	2



**COURSE OBJECTIVES:**

- Understand the concepts of cement as a building construction material.
- Ability to apply concrete as a versatile material in different contexts and innovatively in simple projects.
- To understand and Impart drawing skills of how to integrate RCC construction effectively into their architectural designs while considering structural integrity, aesthetics, and sustainability.
- To acquaint the students with contemporary construction practices primarily pertaining to the usage of prefab construction

**UNIT I CEMENT & ITSTYPES 6 Hrs**

Cement – Overview of manufacture process, types of cement produced in India, field tests for cement, uses of cement. Grades of cement, storage and setting action of cement. Mortar mixing ratios, plastering guidelines requirements of mortar and plaster for various buildings.

**UNITII AGGREAGTE & CONCRETE 15 Hrs**

Specification of concrete - selection criteria of aggregates, grading of aggregates, Sand-Composition, strength, properties and its types. Concrete and its properties, uses, Mix proportion, water cement ratio. Special Concrete – lightweight concrete, Aerated Concrete, No-Fines Concrete, High density concrete, Self-Compacting Concrete, Polymer concrete, Concreting Methods - Ready mixed & under water concreting, Ferro-cement concrete.

**UNIT III RCC CONSTRUCTION 27 Hrs**

Types of steel reinforcement – MS bars, TMT bars, Tor-steel bars. Standard sizes of reinforcement bars. Need for cover blocks. Scaffolding and Formwork. **RCC building components – Foundation** (Isolated footing & Raft foundation, combined footing), **RCC column** – Reinforcement detailing for square, rectangular and circular columns, general column spacing. Expansion joint in RCC structures. **RCC roof slabs** – pre tension & post tension slabs, cantilever slabs, lintels, sunshades. **RCC staircase** components, types.

**Exercise:**

Model of column footing, lintel sunshade and slab.

Sketching on site to understand the spacing of column.

Drawings on

Footing: Isolated, combined, continuous and mat footing

Concrete slab: one-way slab and two-way slab, waffle slab

Concrete wall – Bank strong room, RCC Retaining wall

RCC stairs – Single straight flight stairs, cantilever stairs, spiral & helical stairs.

**UNIT IV PREFABRICATION 27 Hrs**

Principles of prefabrication–Need for prefabrication, Modular coordination, Standardization, Materials, Systems, Production, Transportation, Erection. Prefabricated Components -

Behavior and types of structural components – Large panel systems – roof and floor slabs – Walls panels - Beams - Columns - Shear walls. Joints and connections in structural members - Types of Joints – based on action of forces - compression joints - shear joints - tension joints - based on function - construction, contraction, expansion.

**Exercise:**

Model of expansion joints.

Drawings on Beam to Column - Column to Column - Beam to Beam - Column to foundation,

**TOTAL: 75 HOURS**

**COURSE OUTCOMES:**

**CO1:** Gained knowledge on cement and its types, properties and application to buildings.

**CO 2:** Exposed the students to the importance and use of concrete in the modern Construction industry.

**CO3:** Ability to design and detail the basic components of a RCC building through drawings.

**CO 4:** Summarize the application of prefabrication through drawings.

**TEXT BOOKS:**

1. M.S.Shetty, “Concrete Technology”, S.Chand & Co.ltd, New Delhi, 2005.
2. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
3. Dr. B.C.Punmia, “A Text book of Building Construction”, Laxmi Publications Pvt. Ltd., New Delhi, 2005.
4. T.D Ahuja and G.S. Birdie, “Fundamentals of Building Construction”, Dhanpat Rai Publishing Company Pvt.Ltd., New Delhi, 1996
5. Gambhir.M.L., “Concrete Technology”, 3rd Edition, Tata McGraw Hill Education, 2004 S.P Arora and S.P Bindra, “A Text Book of Building Construction”, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1990
6. Engineering Materials-Material Science by S.C.Rangwala, Charotar Publishing House Pvt. Ltd. 2014 ed.
7. Building Materials-P.C.Varghese, Prentice Hall of India Pvt.Ltd. New Delhi 2005 ed.

**E-CONTENT:**

1. <http://www.easyads.co.2a/yellow/india/construct>
2. <http://www.concrete.t.v-tokyo.ac.jp>
3. [www.larsentoubro.com](http://www.larsentoubro.com)
4. <https://civiltoday.com/civil-engineering-materials/concrete/230-precast-concrete>
5. [Types of Slabs in Construction \(20 Different Types\) \(constructionor.com\)](http://www.constructionor.com)
6. [Concrete Slab Types - Construction, Cost, and Applications - The Constructor](http://www.constructionor.com)
7. <https://www.iqsdirectory.com/articles/modular-building/prefabricated-building.html>
8. [Principles of Prefabrication \(brainkart.com\)](http://www.brainkart.com)
9. [principles of prefabrication and modular coordination - Bing images](http://www.bing.com)
10. [prefabricated Structures](http://www.prefabricatedstructures.com)
11. [Prefabricated components | PPT](http://www.ppt.com)
12. <https://www.youtube.com/live/fysIAYNB0e4?feature=share> – Building Material & Construction - Cement – 1.
13. <https://www.youtube.com/live/YMvtPHvfwT4?feature=share> - Building Material & Construction - Cement – 2.
14. NPTEL Video on Introduction to construction material – Part 1  
<https://youtu.be/ULt4aEst4mM>

15. NPTEL Video on Introduction to construction material – Part 2  
<https://youtu.be/9qqV8hF7B88>
16. NPTEL Video on Introduction to construction material – Part 3  
<https://youtu.be/yrAdEaLzIK4>
17. NPTEL Video on Advanced Concrete Technology  
<https://youtu.be/SdWh05agJtg>

**REFERENCES:**

1. Francis D.K. Ching, "Building Construction Illustrated", John Wiley & Sons, 2002
2. W.B. McKay, "Building Construction", Vol. 1, 2, 3- Longmans U.K. 1992.
3. Barry, "Construction of Buildings", Volume 1 & 2, Blackwell Publishing Ltd., Oxford, 2005
4. Barry, "Introduction to Construction of Buildings" Vol. 3, Blackwell Publishing Ltd., Oxford, 2005
5. Pamphlet and Manuals supplied or published by SERC, BMPTC, HUDCO and Other research organization
6. R.M. Davis, "Plastics in Building Construction", Battersea College of Technology, Blackie, London, 1966
7. S.C. Rangwala, Engineering Materials - Material Science, Charotar Publishing House Pvt. Ltd. 2014
8. Alan Banc, Stairs, Steps and Ramps, Butterworth Heinemann, 1996

Course Outcome		Program Outcome												Program Specific Outcome		
CO'S		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Gained knowledge on cement and its types, properties and application to buildings.	1	2	2	1	3	3	3	3	3	2	-	2	3	2	3
CO2	Exposed the students to the importance and use of concrete in the modern Construction industry.	1	2	2	1	3	3	3	3	3	2	-	2	3	2	3
CO3	Ability to design and detail the basic components of a RCC building through drawings.	1	2	2	1	3	3	3	3	3	2	-	2	3	2	3
CO4	Summarize the application of prefabricated construction through drawings	1	2	2	1	3	3	3	3	3	2	-	2	3	2	3

## **322ARP06 DIGITAL DRAWING, VISUALIZATION AND REPRESENTATION**

**L T P C**  
**0 2 2 3**

### **COURSE OBJECTIVE:**

- To understand the fundamental concepts of the computer application pertinent to Architecture.
- To develop and acquire proficiency in 2D drafting.
- To perceive 3D drafting & rendering principles.
- To interpret 2D & 3D drawing in the presentation format.

### **UNIT I INTRODUCTION TO COMPUTER 10 Hrs**

Introduction to Computer, graphic system, use of printers, scanner, plotter, File management. Introduction to Various Software related to Architecture. Basic Setting of the Software.

### **UNIT II BASICS OF 2D DRAFTING 20 Hrs**

Understanding the tools like – Draw, Modify, Annotation, Layers, Block, Properties, group making, Utilities, Clean up, etc. Learning all the shortcut commands.

#### **Exercise:**

Create the architectural drawings for a building type utilizing all the tools.

### **UNIT III INTRODUCTION TO COMPUTER AIDED 3D 25 Hrs**

Introduction to 3D tools like – Modeling, Mesh, Solid editing, Boolean, Section, Surface editing. Understanding the tools like – View- viewport, Manage, Plot- plot style, Export to PDF.

#### **Exercise:**

Generate a 3D model of the same and then place it onto the sheet for plotting.

### **UNIT IV PRESENTATION 20 Hrs**

Understanding the tools like Edit, Layers, and Properties. Learning the Rendering technique of Plan and 3D Views.

#### **Exercise:**

Design a poster for a particular event.

**TOTAL: 75 HOURS**

### **COURSE OUTCOMES:**

**CO1:**Acquisition of a foundational understanding of the computer application essential for Architects.

**CO2:**Ability to skillfully create and work with 2D drafts for various purposes.

**CO3:**Potential to apply principles related to 3D rendering effectively.

**CO4:**Demonstrate the 2D & 3D drawing with presentation skills.

### **TEXT BOOKS:**

1. “Auto CAD 2023 for Beginners” by CADfolks.
2. “Auto CAD 2023 complete guide” by SachidanandJha
3. “Introduction to Auto CAD 2023: A Modern perspective” by paul Richard & Jim Fitzgerald

4. “Adobe Photoshop Classroom in a Book (2023 release)” by Andrew Faulkner & Conrad Chavez
5. “Adobe Photoshop for Architects & Designers” by Rafiq Elmansy

### E-CONTENT:

1. <https://www.autodesk.in/campaigns/autocad-tutorials?wchannelid=lbxfle7xmq&wmediaid=dvufhba113> – Basics of 2D drafting
2. <https://www.autodesk.in/campaigns/autocad-tutorials?wchannelid=lbxfle7xmq&wmediaid=cf2wf8zv6d> – Tools in 2D drafting
3. [https://www.youtube.com/watch?v=c4dIIVvy\\_yU&list=PLrOFa8sDv6jdAf4GeaHROUEn\\_BbZC8SMW](https://www.youtube.com/watch?v=c4dIIVvy_yU&list=PLrOFa8sDv6jdAf4GeaHROUEn_BbZC8SMW) – 3D rendering
4. <https://www.youtube.com/watch?v=AkTebVx8Byc> – Photoshop presentation

### REFERENCES:

1. Sham Tickoo, Advance Technique in AutoCAD Re.14 - 1997
2. V.Rajaraman, Principles of Computer Programming - Prentice Hall of India.
3. Byron S.Gottfried, Theory and problems of programming with C.Schaum's outline series, McGraw-Hill Publishing Co.
4. AutoCAD reference manual - Autodesk UNC, 1998.
5. AutoCAD architectural users guide - Autodesk Inc., 1998.
6. Sham Tickoo, Understanding AutoCAD - 14 (Windows) - 1997.
7. Deke McClelland, “Photoshop 7 Bible Professional Edition”, Wiley John & Son INC, New York, 2000.
8. A. Watt, “Fundamentals of Three-Dimensional Computer Graphics”, Addison Wesley, Massachusetts, 1989.
9. Aouad, “Computer Aided Design guide for Architecture, Engineering and construction”, Spon process, 2012

Course Outcomes		Program Outcomes												Program Specific Outcomes		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Acquisition of a foundational understanding of the computer application essential for Architects.	2	1	-	1	-	3	-	2	-	-	-	1	2	-	3
CO2	Ability to skillfully create and work with 2D drafts for various purposes.	3	1	-	2	-	3	-	2	1	-	-	1	2	-	3
CO3	Potential to apply principles related to 3D rendering effectively.	3	1	-	1	-	3	-	2	1	-	-	1	2	-	3
CO4	Demonstrate the 2D & 3D drawing with presentation skills.	3	1	-	1	-	3	-	2	1	-	-	1	2	-	3

**322ARP07**

**ARCHITECTURAL DESIGN STUDIO– II**

**L T P C**

**0 0 12 6**

**COURSE OBJECTIVES:**

- To enable student to familiarize with the given design topic by choosing relevant and appropriate case studies.
- To develop design programs that align with user needs and site requirements and the role of climate and environment as a context in shaping building design.
- Recognizing the relevant concepts, materials and building techniques suitable for that region and exploring their applicability in design.
- To develop innovative design solution for the given project with relevant drawings, details and presentation.

**UNIT I INTRODUCTION & BACKGROUND STUDIES**

**45 Hrs**

Designing a built environment requires the development of individual capacity for thought with respect to subjective and objective aspects. The study and project exploration will be involving literature studies, live case studies and theory on human behavior, activities and needs for various purpose, role of spatial organization and environment behavior aspects. Exploring historical and contemporary examples of multi-functional design.

**UNIT II SITE ANALYSIS AND DESIGN PROGRAMMING**

**30 Hrs**

Develop design program based on user needs and site requirements. Conducting comprehensive site analysis to identify site potentials and constraints. site selection parameters for a multi-functional design. Space planning strategies for optimizing user experience.

**UNIT III CONCEPT AND DESIGN**

**45 Hrs**

The qualitative and quantitative attributes of design are elaborated in the design exercise focusing on a specific site and its user requirements for evolution of concept. Understanding the concept of multi-functional spaces and its relevance in modern architecture.

**UNIT IV DESIGN PRESENTATION**

**60 Hrs**

The design presentation with relevant details of cognitive maps, sketches, drawings, physical models with material specifications are presented. Demonstrating how the architectural solution meets user needs and responds to the site's characteristics.

The scale and complexity of project will be commensurate with simple circulation, passive energy, facilities for people with special requirement.

**Examples of some suggestive projects:** Motel, Recreation club, Farm House, Primary school, Neighborhood shopping complex, old age home, small time problem for user experience.

**TOTAL: 180 HOURS**

## **COURSE OUTCOME:**

**CO1:** Examine multifunctional spaces through real-world cases, evaluating design intent, user needs, and successful function integration.

**CO2:** Apply site-specific knowledge to propose innovative design solutions that cater to diverse user activities and harmonize with the site context.

**CO3:** Comprehend the design process, its components, and evolution to effectively communicate and enhance barrier-free elements within building spaces.

**CO4:** Showcase adept visual communication via precise architectural drawings that effectively convey design concepts, spatial relationships, and construction details.

## **TEXTBOOK:**

1. Joseph DeChiara, Michael J Crosbie, "Time Saver Standards for Building Types", McGraw Hill Professional 2001.
2. Julius Panero, Martin Zelnik, "Human Dimension and Interior Space", Whitney Library of Design, 1975
3. Joseph DeChiara, Julius Panero, Martin Zelnik, "Time Saver Standards for Interior Design and Space Planning", McGraw Hill, 2001.
4. Ernst Neufert "Architects Data", Blackwell 2002
5. Ramsey et al, "Architectural Graphic Standards", Wiley, 2000.

## **E-CONTENT:**

1. [https://issuu.com/alexandru.munteanu/docs/alexandru\\_munteanu\\_part\\_a\\_bsc](https://issuu.com/alexandru.munteanu/docs/alexandru_munteanu_part_a_bsc)
2. <https://www.scribd.com/presentation/420656360/Synopsis>
3. <https://core.ac.uk/download/pdf/15569318.pdf>
4. [https://www.researchgate.net/figure/The-main-concept-in-classifying-the-cases-Source-Author\\_fig3\\_355042836](https://www.researchgate.net/figure/The-main-concept-in-classifying-the-cases-Source-Author_fig3_355042836)

## **REFERENCES:**

1. Richard P. Dober, "Campus Planning", Society for College and University Planning, 1996.
2. Kanvinde, "Campus design in India", American Year Book, 1969
3. De Chiara and Callender, Time Saver Standards Building Types, McGraw-Hill Co., 2nd Edition, 1980.
4. Edward D. Mills, Planning- The Architects Handbook - 10th Edition, British Library Cataloguing in Publication Data, 1985. P&D Act 1995.
5. Neufert Architect's Data, Rudolf Herg, Crosby Lockwood and Sons Ltd., 1970.
6. Wakita/Linde, The Professional practice of Architectural working, drawing John Wiley & Sons, 1984.
7. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGraw Hill Book Co., 1982.
8. Julius Panero & Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design Publication, 1979.

Course Outcome		Program Outcome												Program Specific Outcome		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Examine multifunctional spaces through real-world cases, evaluating design intent, user needs, and successful function integration.	2	3	3	3	3	-	3	3	3	3	1	-	-	-	1
CO2	Apply site-specific knowledge to propose innovative design solutions that cater to diverse user activities and harmonize with the site context.	3	3	3	3	3	-	2	2	3	1	1	-	-	-	1
CO3	Comprehend the design process, its components, and evolution to effectively communicate and enhance barrier-free elements within building spaces.	3	3	3	3	1	-	1	1	3	-	-	-	-	-	1
CO4	Showcase adept visual communication via precise architectural drawings that effectively convey design concepts, spatial relationships, and construction details.	3	3	3	3	1	3	1	1	-	-	-	-	-	-	1



# ADHIYAMAAN COLLEGE OF ENGINEERING

[An Autonomous Institution Affiliated to Anna University, Chennai]

[Accredited by NAAC]

REGULATIONS 2022

CHOICE BASED CREDIT SYSTEM

B. ARCH – ARCHITECTURE

## CURRICULA AND SYLLABI FOR SEMESTER IV

### (PREREQUISITE–PASS IN ARCHITECTURAL DESIGN STUDIO II)

COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C	IA	EA	M
<b>THEORY</b>										
422ART01	Structural Analysis and Design II	ESC	3	2	1	0	3	40	60	100
422ART02	History of Architecture and Culture - III	PCC	3	3	0	0	3	40	60	100
	Professional Elective - I	PE	3	3	0	0	3	40	60	100
<b>THEORYCUMSTUDIO</b>										
422ART03	Building Materials and Construction - IV	PCC	5	1	2	2	4	50	50	100
422ART04	Building Services I (Plumbing )	PCC	5	1	2	2	4	50	50	100
<b>STUDIO</b>										
422ARP05	Rural Habitat Design Studio	PCC	15	1	2	12	9	60	40	100
<b>TOTAL</b>			<b>34</b>	<b>11</b>	<b>7</b>	<b>16</b>	<b>26</b>			

### COURSES WHICH CAN BE CHOSEN DURING IV SEMESTER IN CBCS UNDER PROFESSIONAL ELECTIVE I

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	422ARE01	Art Appreciation	PE	3	0	0	3	3
2.	422ARE02	Energy Efficient Architecture	PE	3	0	0	3	3
3.	422ARE03	Design Process and Thinking	PE	3	0	0	3	3
4.	422ARE04	Vernacular Architecture of India	PE	3	0	0	3	3

**422ART01**

**STRUCTURAL ANALYSIS AND DESIGN II**

**L T P C**  
**2 1 0 3**

**COURSE OBJECTIVES:**

- To introduce the basic structural members in steel.
- To explore the types, efficiency, advantages, and drawbacks of bolted and welded joints in steel.
- To facilitate the comprehension of the design considerations for steel tension members across different scenarios.
- To enable students in understanding the design of compression steel members such as columns and column bases.
- To comprehend the design of flexural steel members

**UNIT I INTRODUCTION TO STRUCTURAL STEEL 5 Hrs**

Introduction to steel structures - properties of steel, Standard sections, advantages and disadvantages of steel as construction material - Introduction to IS 800:2007 – properties of steel – limit state philosophy for the design.

**UNIT II BOLTED AND WELDED JOINTS 10 Hrs**

Assumptions in the design of connections- Types of Joints and Failure–Advantages and Disadvantages. Design of bolted and welded joints for axially loaded members using limit state method (excluding eccentric connections).

**UNIT III TENSION MEMBERS 10 Hrs**

Introduction to steel tension members. Net sectional area. Permissible stresses. Design of axially loaded tension member using limit state method. Concepts of Lug angle and Tension splice.

**UNIT IV COMPRESSION MEMBERS 10 Hrs**

Introduction to steel compression members and different types of sections - Built up section. Design of columns using limit state method - concepts of lacing and battening - column base - types - design of slab base and gusseted base.

**UNIT V FLEXURAL MEMBERS 10 HRS**

Introduction to Laterally supported and unsupported beams- Design of laterally supported beams using limit state method.

**TOTAL: 45 Hours**

**COURSE OUTCOMES:**

At the end of the course, the students will be able to understand:

**CO1:** Develop a comprehensive understanding of the design principles governing various steel components utilized in building structures.

**CO 2:** Analyze and evaluate the different types of bolted and welded joints in steel, considering their efficacy, durability, advantages, and disadvantages.

**CO 3:** Demonstrate proficiency in comprehending and applying design considerations for tension steel members across a spectrum of scenarios.

**CO 4:** Understand the design principles and considerations associated with compression steel members, enabling informed decision-making across varied conditions

**CO 5:** Acquire the necessary skills to analyze and design flexural members effectively under diverse environmental and loading conditions

**TEXTBOOKS:**

1. S.S. Bhavikatti, “Design of Steel Structures” by Limit State Method as per IS800-2007, I.K.International Publishing House Pvt, Ltd, 2012Duggal, S. K. (2000). Design of Steel Structures. Tata McGraw Hill Education.
2. Ram, K. S.S. (2010). Design of Steel Structures. Pearson Education India.
3. Shiyekar, M. R. (2011). Limit State Design in Structural Steel. PHI Learning Pvt
4. N. Subramanian (2017) Design of Steel structures limit states method, 2 Ed by, Oxford University press
5. S.K. Duggal (2019) “Limit State Design of Steel Structures|3rd Edition” - McGraw-Hill

**REFERENCES:**

1. Dr. V. L. Shah, Prof. Veena Gore, “Structures Publications”, Pune, 2012.
2. Ramachandra S., Design of Steel Structures, Standard Book House, Delhi, 1984.
3. Gurucharan Singh, Design of Steel Structures, Standard Publishers, New Delhi, 1982.
4. Negi “Design of steel Structures”, Tata McGraw-Hill Book Company, New Delhi 1997.
5. IS 800:2007 - General Construction in Steel - Code of Practice
6. SP 6 – Steel structural sections

**E- CONTENT:**

1. <https://youtu.be/FeAlg1loe8U?si=t7XFVPC3P03Lq0JL> – NPTEL course video from IIT Hyderabad.
2. <https://youtu.be/HdSQWj17AEI?si=5ME6a-1JUUn-a5yB> – NPTEL –PMRF interaction course video.
3. [https://youtu.be/kfVO8XH\\_3Vg?si=yNI9dLB8z2KXC8o3](https://youtu.be/kfVO8XH_3Vg?si=yNI9dLB8z2KXC8o3)
4. <https://youtu.be/Jp2ROSNpY1A?si=N1n5t9NuSrwJbDtE>
5. [Design Of Steel Structures Bhavakkati By Easy Engineering.net : Free Download, Borrow, and Streaming : Internet Archive](#)
6. <https://youtu.be/if8BM61mBfw?si=plG1Rirb3EJH4f40> – NPTEL – PMRF interaction course video.

Course Outcomes		Program Outcomes												Program Specific Outcomes		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Develop a comprehensive understanding of the design principles governing various steel components utilized in building structures.	1	3	-	3	1	1	-	1	1	-	-	-	3	-	1
CO2	Analyze and evaluate the different types of bolted and welded joints in steel, considering their efficacy, durability, advantages, and disadvantages.	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2
CO3	Demonstrate proficiency in comprehending and applying design considerations for tension steel members across a spectrum of scenarios.	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2
CO4	Understand the design principles and considerations associated with compression steel members, enabling informed decision-making across varied conditions	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2
CO5	Acquire the necessary skills to analyze and design flexural members effectively under diverse environmental and loading conditions	2	3	1	3	3	3	-	3	3	-	-	-	3	-	2

**COURSE OBJECTIVES:**

- To understand Church architecture as evolving within specific cultural contexts including aspects of society, religion, politics and climate
- To gain knowledge of the development of architectural form with reference to technology, style and character in the Western World through the evolution of the church from early Christian times up to the Renaissance period.
- To enable the student to understand as to how, in the gothic period in France structure and Aesthetics were synthesized by study of select buildings.
- To study how social and cultural influences contributed to Renaissance architecture in Italy, France and England through philosophy of renaissance architects with select examples.
- To educate significance and philosophy of baroque and rococo architecture style through world renowned buildings.

**UNIT I EARLY CHRISTIAN****9 Hrs**

Birth and spread of Christianity – transformation of the Roman Empire – early Christian worship and burial. Church planning – basilican concept: St. Clement, Rome; St. Peters Rome, - Centralized plan concept: S. Vitale, Ravenna; S. Hagia Sophia, Constantinople; St. Marks, Venice.

**UNIT II EARLY MEDIEVAL PERIOD - ROMANESQUE****9 Hrs**

The medieval ages - Factors influencing architecture - outline of architectural character of Italy, France and England– feudalism & rural manorial life – papacy – monasticism - craft & merchant guilds – medieval domestic architecture – medieval monasteries – Romanesque churches – development of vaulting.

Examples: Pisa group, Italy Abbey aux Hommes, Tower of London.

**UNIT III LATE MEDIEVAL PERIOD - GOTHIC****9 Hrs**

Religious and social influences: Re-emergence of the city – Crusades - Scholasticism. Development of Gothic architecture -evolution of vaulting, Church plan, development of structural systems in France, England and Italy- outline of Architectural character.

Examples: Notre Dame, Paris, Westminster Abbey, Hampton Court Palace, London, Doges Palace, Venice, Milan Cathedral.

**UNIT IV RENAISSANCE ARCHITECTURE****12 Hrs**

The idea of rebirth and revival of art – Factors influencing renaissance architecture -Outline of Architectural character during the early Renaissance, High Renaissance and Mannerism -Italian Renaissance - Palazzo Ricardi - Study of the contributions of the following architects: Brunelleschi, Michelangelo and Andrea Palladio - Factors influencing French renaissance - Architectural character during the classical - Factors influencing English renaissance - Study of the works Inigo Jones.

Examples - St. Peters basilica at Rome, Villa capra in Vicenza, Palazzo Medici Riccardi, Chateau de Chambord

## UNIT V      **BAROQUE AND ROCOCO**

**6 Hrs**

Protestantism – Counter Reformation – French Revolution – Monarchy and growth of nations. Roman Baroque churches: The central plan modified, Vienna city plan – French Baroque: Versailles – English baroque – Sir Christopher wren; St. Paul’s London – villas in England. Rococo Architecture – Interiors.

**TOTAL: 45 Hours**

### **COURSE OUTCOMES:**

- CO 1:** Comprehending the historical progression of church planning through illustrative examples.
- CO 2:** Assessing the features and characteristics of Romanesque architectural style.
- CO 3:** Understating the spatial and stylistic characteristics of Gothic Architecture.
- CO 4:** Evaluating the works of Renaissance architects in defining the style and character of the medieval period.
- CO 5:** Applying knowledge of Baroque and Rococo architecture through the examination of European examples.

### **TEXT BOOKS:**

1. Sir Banister Fletcher, “A History of Architecture”, CBS Publishers, 1996.
2. Spiro Kostof, “A History of Architecture - Setting and Rituals”, Oxford University Press, London, 1995.

### **REFERENCES:**

1. Pier Luigi Nervi, General Editor, “History of World Architecture” - Series, Harry N.Abrams, Inc.Pub., New York, 1972.
2. S.Lloyd and H.W.Muller, “ History of World Architecture” - Series, Faber and Faber Ltd., London, 1986.
3. Leland M Roth; “Understanding Architecture”: Its elements, history and meaning; Craftsman House, 1994.
4. White J.F, White S.J., “Church Architecture: Building and Renovating for Christian worship”, OSL Publications, 2008

### **E CONTENT:**

1. <https://youtu.be/qRlzlB2frMw> - Romanesque Architecture
2. <https://youtu.be/tVmVnW4rL4s> - Renaissance Architecture
3. <https://youtu.be/2DX1Y-5gdpo?si=0vCH6JwNvyfnMko> - Renaissance Architecture
4. <https://youtu.be/wbd1TeFZKNI> - Gothic Architecture
5. [\(PDF\) Baroque and Rococo Art and Architecture | Robert Neuman - Academia.edu](#)
6. [\(PDF\) The Baroque in Architectural Culture, 1880-1980 \(2015; pb 2017\) | Andrew Leach, Maarten Delbeke, and John Macarthur - Academia.edu](#)
7. [EARLY CHRISTIAN ARCHITECTURE ★ Archi-Monarch](#)
8. [\(PDF\) History of World Architecture r Baroque Architecture | Cynthia Figueroa - Academia.edu](#)
9. [EARLY CHRISTIAN ARCHITECTURE: ORIGIN, CHARACTERISTICS AND WORKS - ART - 2024 \(sperohope.com\)](#)
10. [French Baroque Architecture | History, Motifs & Examples - Video & Lesson Transcript | Study.com](#)

Course Outcomes		Program Outcomes												Program Specific Outcomes		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	A detail understanding of early Christian Architecture	3	2	3	1	1	-	-	3	-	3	-	2	2	2	-
CO2	An understanding of the Romanesque Architecture as an outcome of various social, political and economic upheavals, and as a response to the cultural and climate conditions.	3	2	3	1	1	-	-	3	-	3	-	2	2	2	-
CO3	An understanding about the spatial and stylistic qualities associated with Gothic Architecture.	3	2	3	1	1	-	-	3	-	3	-	2	2	2	-
CO4	A detail knowledge about the characteristic with Renaissance Architecture.	3	2	3	1	1	-	-	3	-	3	-	2	2	2	-
CO5	An understanding of Baroque and Rococo Architecture style through example in Europe region	3	2	3	1	1	-	-	3	-	3	-	2	2	2	-

**COURSE OBJECTIVES:**

- Provide students with an overview of steel as a versatile building material, its properties, advantages, and application of materials such Ferrous metals and Non-Ferrous metals.
- To understand in detail through drawings, the types of sections in steel, joints, application in columns, beams, steel components and trusses.
- To understand in detail through working drawings, the various types of aluminum doors, windows, ventilators and roofing system as applied in construction industry.
- To explore and apply various design strategies and techniques for integrating glass effectively into architectural projects, including considerations of transparency, light transmission, privacy, and aesthetics.

**UNIT I FERROUS AND NON FERROUS METALS****12 Hrs**

Properties and uses of cast iron, wrought iron, pig iron and steel. Market forms of steel: structural steel, stainless steel, steel alloys – properties and uses- Current development - Outline of prefabrication in steel. Preco beams, cellular beams, composite slim floor beam. Steel curtain wall glazing. Recent trends in roofing materials like corrugated GI Sheets, corrugated hyper shells, pre-coated metal sheets. Cable Structures.

Properties and uses of Aluminum and Aluminum Alloys. Market forms of Aluminum: extrusions, foils, castings, sheets - Study of protection to non- Ferrous metals and product such as anodizing, powder coating and chromium plating - current developments.

**UNIT II STEEL SECTIONS JOINTS AND STEEL CONSTRUCTIONS****26 Hrs**

Structural steel sections - types of connections in steel - steel in foundations, columns and beams - different types of steel roof trusses including north light truss – geodesic dome, space frames, diagrid, etc., Steel stairs: (spiral stair), and handrails, balusters - Doors and windows - operable, sliding - collapsible gates - rolling shutters.

**Exercise:**

Model on Steel joints and connections: Bolt, Weld, Lap Joint & Butt Joint

Site visits for steel gates, grill design for windows with documentation in the form of sketches/ photos.

Drawings on

Steel sections for column and beam Connections.

Steel components: Steel doors: (Framed & Sliding)

Steel windows: (Casement window & Sliding window) Steel grill designs for windows,

Steel stairs: (spiral stair), and steel hand rails and balustrade.

Steel Roof trusses - simple trusses in steel. (King post truss, Queen Post truss).

Gates: collapsible gates, rolling shutter.



### **UNIT III ALUMINIUM CONSTRUCTIONS**

**25 Hrs**

Drawings: Design exercises using Aluminum doors and windows - design details for doors: openable, sliding, pivoted and fixed - Design details for windows: openable, sliding, fixed, louvered – Design details for Ventilators (top hung, pivoted and louvered). Aluminum roofing: North lighting, glazing bar, roofing sheets and construction details for gutter. Composite materials design details for Aluminum and Glass.

#### **Exercise:**

Site visits for Aluminum door and windows with documentation in the form of sketches/photos.

Drawings -

Aluminum doors - operable, sliding, pivoted and fixing.

Aluminum windows - operable, sliding, fixed, louvered

Aluminum ventilators - top hung, bottom hung, pivoted, louvered

Aluminum roofing - north light glazing bar, aluminum roofing sheets.

Model on-

Aluminum partitions, false ceiling, shop front handrails, curtain walling.

### **UNIT IV GLASS**

**12 Hrs**

Glass as a building material. Brief history of its use through examples. Manufacture, properties and uses of glass. Types of glass - float glass, cast glass, glass blocks, foamed glass, decorative glass, solar control, toughened glass, wired glass, laminated glass, fire-resistant glass, glass blocks, structural glass. Glass and energy efficiency in buildings. Current innovations Plastic as a building material. Brief history of their use through examples. Manufacture. properties, types, uses and application of plastics in building industry. Different types of adhesives and sealants. Plastic joints. Plastic based materials for roofs such as fibre glass, etc., Specific materials such as polycarbonate sheet and teflon. Current innovations.

#### **Exercise:**

Understanding of product literature and site visits with documentation in the form of sketches/photos for all the above.

**TOTAL: 75 Hours**

#### **COURSE OUTCOMES:**

**CO 1:** Acquired knowledge on the characteristics and properties of ferrous and non-ferrous metals used as building materials, including steel, iron, aluminum, copper, and their alloys.

**CO 2:** Integrate aluminum elements effectively into architectural designs, considering factors such as structural stability, energy efficiency, acoustic insulation, and visual aesthetics.

**CO 3:** Applying knowledge of glass properties and performance characteristics to select suitable glass types and configurations for specific building applications, such as facades, windows, doors, and interior partitions.

**CO 4:** Explored the emerging trends, technologies, and innovations in architectural glass, including advancements in coatings, laminates, insulation, and smart glass technologies.

**TEXT BOOKS:**

1. Gorenc, Tinyou, Syam, 'Steel Designer's Handbook', CBS Publishers and Distributors, New Delhi, Bangalore, 2012.
2. P.C Vargheese, 'Building Materials', Prentice Hall of India, 2015.
3. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
4. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
5. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

**REFERENCES:**

1. Alan Blanc, 'Architecture and Construction in Steel', E and FN Spon, London, 1993
2. Allan Brookes, 'Cladding of Buildings', Taylor and Francis, 2008.
3. Mark Lawson, Peter Trebilcock, 'Architectural Design in Steel', Taylor and Francis, 2004.
4. Terri Meyer Boake, 'Understanding Steel Design', Birkhauser, 2011.
5. R.M. Davis, 'Plastics in Building Construction', Battersea College of Technology, Blackie, London, 1966
6. Ralph Monletta, 'Plastics in Architecture– A Guide to acrylic and Polycarbonate', Marcel Dekker Inc, New York, 1989
7. 'IS 7883. Code of Practice for the Use of Glass in Buildings ', Bureau of Indian Standards, 2013.
8. Billie Faircloth, 'Plastics Now: On Architecture's Relationship to a Continuously Emerging Material', Routledge, 2015.
9. Engineering Materials-Material Science by S.C.Rangwala, Charotar Publishing House Pvt. Ltd. 2014 ed.
10. Building Materials by Duggal S.K., New Age international, New Delhi 2009.

**E-CONTENT:**

1. [Ferrous and non-ferrous metals | PPT \(slideshare.net\)](#)
2. [Steel Structure Design Principles: 3 Comprehensive Guide \(havitsteelstructure.com\)](#)
3. [Aluminium doors and Windows | PPT \(slideshare.net\)](#)
4. [Glass As A Building Material | PDF | Glasses | Window \(scribd.com\)](#)
5. [\(PPT\) BUILDING MATERIAL- glass | Neha Sawant - Academia.edu](#)
6. [Glass as building material by Anas Khan | PPT \(slideshare.net\)](#)
7. [Glass : A Building Material | PPT \(slideshare.net\)](#)
8. <https://youtu.be/n1shlO6TUho> - Non Ferrous Metals, Types, Properties
9. <https://youtu.be/cgLnADEfm6E> - Structural Steel
10. <https://youtu.be/KJdIbCn4NuE> - How Truss works.
11. <https://youtu.be/dW1RKuNWxik> - Aluminium Composite Panels-ACP
12. <https://youtu.be/BGPaywY1wvs?si=QaX74cdX-WINPqq7> - Glass Manufacturing, Properties, Use & Types
13. <https://youtu.be/PkS52CMU8Gs?si=Icloc4Vqr5FarVrj>,  
<https://youtu.be/PkS52CMU8Gs?si=QKBh4ljuWlsHhfYP> – Type of glass used in construction.
14. <https://youtu.be/mHvHWwKbrrE?si=sVscqfJmNRR1MVuy> - Types of Glass

Course Outcome		Program Outcome												Program Specific Outcome		
CO'S		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Acquired knowledge on the characteristics and properties of ferrous and non-ferrous metals used as building materials, including steel, iron, aluminum, copper, and their alloys.	-	1	1	1	2	3	3	3	3	3	-	3	3	3	2
CO2	Integrate aluminum elements effectively into architectural designs, considering factors such as structural stability, energy efficiency, acoustic insulation, and visual aesthetics.	2	1	2	1	2	3	3	3	3	3	-	3	3	3	2
CO3	Applying knowledge of glass properties and performance characteristics to select suitable glass types and configurations for specific building applications, such as facades, windows, doors, and interior partitions.	2	1	2	1	2	3	3	3	3	3	-	3	2	3	2
CO4	Explored the emerging trends, technologies, and innovations in architectural glass, including advancements in coatings, laminates, insulation, and smart glass technologies.	2	2	2	1	3	3	3	3	3	3	-	3	3	3	1

**COURSE OBJECTIVES:**

- To provide students with a comprehensive understanding of the principles, components, and functions of water supply systems, including sources, treatment, and distribution networks.
- To explore the different types of sewerage systems and their components, including collection, conveyance, treatment, and disposal.
- To gain a comprehensive understanding of the principles and fundamentals of storm water management.
- To understand the methods and technologies for efficient waste collection, including segregation, storage, and transportation systems.
- To acquire an in-depth knowledge of the concepts, jargon, and parts of building plumbing systems.

**UNIT I WATER SUPPLY AND DISTRIBUTION****12 Hrs**

Water Supply system at macro level – Sources, pumping, reservoirs, water treatment, tanks, materials, piping systems - in low, medium, high-rise buildings & residential layouts. Estimation of water requirement for all type of residential, commercial, Industrial buildings and for town - per capita demand, storage, distribution systems. Overhead tanks, underground sumps, firefighting storage, water meter, shower panel and jacuzzi system. Types of fixtures and fittings. Design calculations for the same and related mechanical equipment. Sustainable practices and systems.

**UNIT II SEWERAGE****8 Hrs**

Sanitation: Purpose & Principles; Systems of sanitation; House drainage (sewage, sullage) - collection & disposal fittings for low, medium & high rise Buildings; Community drainage – STP as per NBC, oxidation pond, leach pits. Sewer line fixtures and traps, septic tank, manhole, inspection chamber. Sewage effluent disposal.

**UNIT III STORM WATER MANAGEMENT****8 Hrs**

Basic Principles of storm water drainage. Importance of SWM, Storm water drains at city level. Types of pipe. Run-off and Storm water gutter. Drainage systems in small building/campus. Roof drainage. Rain water harvesting and storage sumps. Sustainable practices and systems – Automated water management.

**UNIT IV SOLID WASTE MANAGMENT****7 Hrs**

Solid waste - types, segregation and refuse collection. Disposal - Incinerator, composting, vermicomposting, sanitary land filling, bio gas system, modern renewable energy system. Best

practices; Economic benefits. Case studies - disposal for a housing colony and small neighborhood.

## **UNIT V PLUMBING SYSTEMS IN BUILDINGS**

**10 Hrs**

Basic principles of plumbing. Plumbing, sanitary fittings and their requirements for a small building - wash basins, water closets, urinals, sinks, gate valve, float valve, flap valve, ball valve, flush valve, etc, different types of taps, faucets, stop cocks, bib cocks, 'P', 'Q', 'S', floor/bottle traps. Understanding of products, product catalogues. System of plumbing in all type of buildings. Types of Plumbing system in buildings - one pipe/ two pipe plumbing systems. Modern plumbing system - layout & design considerations. Case studies & design problems; Codes & standards; Symbols for representation. Plumbing drawing.

**TOTAL: 45 Hours**

### **COURSE OUTCOMES:**

**CO1:** Analyzing the efficiency and performance of existing water source and distribution systems.

**CO2:** Understanding the fundamental principles of sewerage systems, including design, construction, and maintenance.

**CO3:** Identifying storm water management techniques to control erosion on a hypothetical site and applying the calculation of runoff coefficients for different surfaces.

**CO4:** Discussing the principles and concepts of solid waste management, including generation, collection, transportation, treatment, and disposal and developing innovative solutions for reducing waste generation.

**CO5:** Applying the plumbing codes and regulations in designing plumbing systems for all types of buildings.

### **TEXT BOOKS:**

1. Manual of Water supply and Treatment, Second Edition, CPHEEO, Ministry of Works and Housing, New Delhi, 1977.
2. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Works and Housing, New Delhi, 1980.
3. AFE Wise, JA Swaffied Water, 'Sanitary and Waste Services in buildings', V Edition, Mitchell Publishing, Co. Ltd., 2002.
4. Punmia B.C., "Waste Water Engineering", Laxmi Publications, 2009.
5. S.C.Rangwala, Water Supply and Sanitary Engineering, Charotar Publishing House, Anand 388 601, 1989.
6. G.M.Fair, J.C.Geyer and D.Okun, Water and Waste Water Engineering, Vol. II, John Wiley & Sons, Inc., New York, 1968.
7. National Building Code', Bureau of Indian Standards.
8. Uniform Plumbing Code (UPC)
9. ASME A112 Plumbing Materials and Equipment Standards
10. Indian Standard Code of Practice for Water Supply in Buildings, IS :2065 – 1983.
11. "Solid Waste Management: Principles and Practice" by Tchobanoglous, G., Theisen, H., & Vigil, S. A.
12. "Integrated Solid Waste Management: Engineering Principles and Management Issues" by George Tchobanoglous, Hilary Theisen, and Samuel Vigil.

13. "Handbook of Solid Waste Management" by George Tchobanoglous, Frank Kreith.
14. "Handbook of Urban Drainage and Stormwater Management Practices" by the Environmental and Water Resources Institute (EWRI).
15. "Stormwater Management for Smart Growth" by Tom Schueler, Karen Cappiella, and Sarah E. Wright
16. "Modern Plumbing" by E. Keith Blankenbaker and Julius Ballanco.
17. "Plumbing: Mechanical Services" by Peter Smith

## REFERENCES:

1. G.M. Fair, J.C. Geyer and D.Okun, "Water and Waste water engineering", Volume II, John Wiley & Sons, Inc. New York, 1968.
2. Manual on sewerage and sewerage treatment, CPHEEO – Ministry of works and housing, NewDelhi, 1980.
3. Charangith shah, Water supply and sanitary engineering, Galgotia publishers.
4. A.Kamala & DL Kanth Rao, Environmental Engineering, Tata McGraw – Hill publishing company Limited. Technical teachers Training Institute (Madras), Environmental Engineering, Tata McGraw Hill publishing Company Limited.
5. Marrimuthu et al., Environmental Engineering, Pratheeba publishers.
6. International Solid Waste Association (ISWA): ISWA offers publications, guidelines, and best practices on solid waste management.
7. Storm water Management Manual - Many municipalities and government agencies publish storm water management manuals that provide guidelines, regulations, and best practices for managing storm water runoff.

## E-CONTENT:

1. [CH2 Part 2 & CH3 Part 1 Water Supply Engineering \(youtube.com\)](#) – Water supply engineering.
2. [Water Distribution | System Design and Layout \(youtube.com\)](#) – Water distribution – system design and layout
3. <https://youtu.be/4rFmOxanzow?si=I-kpTEPF5noLMe-X> – Storm water management.
4. [https://youtu.be/nL354fxAfBk?si=YteEs\\_cZPzXaBT1i](https://youtu.be/nL354fxAfBk?si=YteEs_cZPzXaBT1i) – Solid waste management.
5. [Municipal Solid Waste Management \[Intro Video\] \(youtube.com\)](#) – NPTEL, IIT Guwahati.
6. [Water and Waste Water Treatment \(youtube.com\)](#) – NPTEL, IIT Roorkee.
7. <https://youtu.be/wpQD4XzjKDM?si=wUUp4DivtzmeLXV> – Plumbing system for buildings.
8. Coursera: Various courses on water supply, treatment, and distribution offered by universities and organizations worldwide.
9. edX: Courses like "Water Supply and Sanitation Policy in Developing Countries Part 1" offered by the University of Manchester.
10. MIT OpenCourseWare: Materials from courses like "Introduction to Environmental Engineering Science" covering water treatment and supply principles.
11. [https://youtu.be/kQ871qgdsm4?si=OfI\\_Ma94JBk8LXP](https://youtu.be/kQ871qgdsm4?si=OfI_Ma94JBk8LXP) - Plumbing Design/ Plumbing system.

Course Outcome		Program Outcome												Program Specific Outcome		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Analyzing the efficiency and performance of existing water source and distribution systems.	2	3	3	2	2	3	3	3	3	-	1	3	2	3	1
CO2	Understanding the fundamental principles of sewerage systems, including design, construction, and maintenance.	2	3	3	2	2	3	3	3	3	-	1	3	3	3	-
CO3	Identifying storm water management techniques to control erosion on a hypothetical site and applying the calculation of runoff coefficients for different surfaces.	2	3	3	1	3	3	3	3	3	-	1	3	2	1	-
CO4	Discussing the principles and concepts of solid waste management, including generation, collection, transportation, treatment, and disposal and developing innovative solutions for reducing waste generation.	2	3	2	1	3	3	2	3	3	-	1	3	2	2	1
CO5	Applying the plumbing codes and regulations in designing plumbing systems for all types of buildings.	1	2	2	1	3	3	3	3	3	-	2	3	2	2	-

**COURSE OBJECTIVES:**

- To create a holistic understanding of the socio-cultural, geographic and economic aspects that shape the built environment as well as to expose the students towards the design of simple community oriented buildings.
- To make a comprehensive study of a rural settlement that is an exemplar of collective design evolved organically over a period of time.
- To expose the students on the methodology of conducting various surveys covering, physical, visual characteristics and demographic aspects.
- To understand the vernacular / traditional architecture involving local materials and construction techniques.
- To emphasis on the importance of designing built form and open spaces that meet the aspirations of the community.

**UNIT I UNDERSTANDING THE RURAL CONTEXT 40 Hrs**  
Understanding the rural settlement pattern of the village in a hierarchical manner. Village types according to their structure, Problems of rural system.

**UNIT II DOCUMENTATION 50 Hrs**  
Visit to selected village - surveys on visual, socioeconomic and environmental behavior studies – Physical & technical aspects of rural design elements & Planning methods - study existing conditions - Spatial mapping and digitization. - preparation of report.

**UNIT III ANALYSIS AND IDENTIFICATION OF ISSUES 40 Hrs**  
Comprehensive analysis of survey data related to rural precincts - Identification of issues - quantitative and qualitative analysis. Preparation of Strategies for housing & community facilities w.r.t the issues.

**UNIT IV DESIGN INTERVENTION 50 Hrs**  
Micro & Macro level intervention – Envisage future changes or demands on a large-scale policy or infrastructural proposals or recommendations benefitting the entire community. Proposals include disaster management, rural road infrastructure, solid and liquid waste management plan, energy management plan, etc. Single level planning in small scale- presentation of report & design.

Suggestive typologies/ projects : Rural projects that involve studies and design at settlement and building level- noon meal centre, market, primary health centre; department store, higher secondary school, campus students centre, Co-operative societies, community centre.

**TOTAL - 180 Hrs**

**COURSE OUTCOMES:**

**CO 1:** Student's ability to understand the concept of community and settlement evolution and the built environment as influenced by Socio-economic, Cultural, Environmental and



Technical factors.

**CO 2:** Examine the existing structure through documentation of housing and community amenities.

**CO 3:** Analyze the process of design in identifying the issues by choosing relevant quantitative and qualitative methods

**CO 4:** develop design solution addressing S the physical, technical and visual characteristics of a settlements

**TEXT BOOK:**

1. Joseph De Chiara, Michael J Crosbie, “Time Saver Standards for Building Types”, McGraw Hill Professional 2001.
2. Julius Panero, Martin Zelnik, “Human Dimension and Interior Space”, Whitney Library of Design, 1975
3. Joseph De Chiara, Julius Panero, Martin Zelnik, “Time Saver Standards for Interior Design and Space Planning”, McGraw Hill, 2001.
4. Ernst Neufert “Architects Data”, Blackwell 2002
5. Ramsey et al, “Architectural Graphic Standards”, Wiley, 2000

**REFERENCES:**

1. Richard P. Dober, “Campus Planning”, Society for College and University Planning, 1996.
2. Kanvinde, “Campus design in India”, American year Book, 1969
3. Kevin Lynch, “Site planning”, MIT Press, Cambridge, 1984
4. Sam F. Miller, “Design Process: A Primer for Architectural and Interior Design”, Van Nostrand Reinhold, 1995

**E- CONENT:**

1. <https://youtu.be/t7GpYvyQoEs?si=a36p1aecXAw6O5KX>
2. [https://youtu.be/URHyphM61Fs?si=0A\\_aIPFEmNNuZ-bW](https://youtu.be/URHyphM61Fs?si=0A_aIPFEmNNuZ-bW) - How to make architectural presentation
3. [How to draw Textures | Part1 \(youtube.com\)](https://www.youtube.com/watch?v=...) - ink and rendering - architectural sketching

Course Outcomes		Program Outcomes (PO's)												Program Specific Outcomes PSO's		
		PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Student's ability to understand the concept of community and settlement evolution and the built environment as influenced by Socio-economic, Cultural, Environmental and Technical factors.	1	3	3	3	3	-	1	-	3	1	-	-	3	1	-
CO 2	Examine the existing structure through documentation of housing and community amenities.	2	3	3	3	2	1	1	-	3	-	-	-	3	1	-

CO 3	Analyse the process of design in identifying the issues by choosing relevant quantitative and qualitative methods	3	3	3	3	2	1	-	-	3	-	1	-	3	2	-
CO 4	develop design solution addressing S the physical, technical and visual characteristics of a settlements	2	2	3	3	2	2	-	-	3	-	-	-	3	2	-

**COURSE OBJECTIVES**

- To introduce art as a fundamental human activity, its characteristics and ways in which it can be understood.
- To introduce the vocabulary of art and the principles in art.
- To discuss the modern art and the new directions that evolved in the 19th and 20th centuries.
- To analyze the amalgamation of various art forms in the postmodern era.
- To inform the production of art in the Indian context through history and the contemporary manifestations.

**UNIT I INTRODUCTION TO ART 8 Hrs**

Definition of art - need for art – role of art – art reality, perception, representation- categories of art in terms of media and technique - appreciating art: form (means, types, tools and techniques), content (story conveyed, meaning) and context (the situation and time of production of art).

**UNIT II VOCABULARY OF ART 8 Hrs**

Introducing the vocabulary of art constituted by elements (line, shape, form, space, colour, light, value, texture) and principles (unity, variety, harmony, rhythm, balance, proportion, emphasis, contrast, movement)

**UNIT III APPRECIATING ART – PREHISTORY TO MODERN ART 8 Hrs**

Appreciating art through the study of art production in the West from the beginnings to the birth of modern art. Important works from the following art traditions will be studied and analysed in terms of their form, content and context Prehistoric Art - Egyptian and Mesopotamian art Greek and Roman art– Medieval art - Renaissance and Baroque art - Neoclassicism - Romanticism – Realism

**UNIT IV APPRECIATING ART- POSTMODERN 15 Hrs**

Appreciating art through the study of art production in the West over history from modern art till the present. Important works from the following art traditions will be studied and analysed in terms of their form, content and context: Context for new directions in art in the late 19th and early 20th century - Impressionism – post Impressionism – Fauvism- Expressionism- Cubism – Dadaism – Surrealism - abstract art – Futurism - Constructivism – Suprematism – De Stijl - Abstract Expressionism - Pop art –forms and media of art.

**UNIT V APPRECIATING ART- INDIAN ART 6 Hrs**

Appreciating art through the study of art production in India over history. Important works from the following art traditions will be studied and analysed in terms of their form, content and context Indus Valley Art - Hindu Buddhist and Jain art - Mughal and Rajput miniatures - art during the colonial period - modern Indian Art.

**TOTAL: 45 Hours**

## **COURSE OUTCOMES:**

- CO 1:** Ability to understand and appreciate art as a fundamental human expression.
- CO 2:** Understanding and appreciation of the vocabulary of art related to cognition and experience.
- CO 3:** Criticize the important art productions from prehistoric to modern art forms.
- CO 4:** Analyze the implications of postmodern to present art work.
- CO 5:** Appreciate the Indian art and Sensitivity towards individual and collective human cultural productions as unique expressions of historical and geographic context.

## **TEXT BOOKS:**

1. Fred, S. Kleiner, 'Gardener's Art through Ages', Harcourt College Publishers, 2001.
2. Bernard S. Myers, 'Understanding the Arts', Holt Rinehart and Winston Inc, 1964.
3. H.H. Arnason, 'History of Modern Art', Thames and Hudson, 1977.
4. ParthaMitter, 'Indian Art', Oxford University Press, 2001.
5. Edith Tomory, 'A History of Fine Arts in India and the West', Orient Blackswan, 1989

## **REFERENCES:**

1. Peter and Linda Murray, 'The Penguin Dictionary of Art and Artists', Penguin, 1989.
2. E.H. Gombrich, 'The Story of Art', Phaidon, 2002.
3. E.H. Gombrich, 'Art and Illusion', Phaidon, 2002.
4. 'Indian Art since the early 1940s- A Search for Identity', Artists Handicrafts Association of Cholamandal Artists Village, Madras, 1974.
5. A.K.Coomaraswamy, Fundamentals of Indian Art, Historical Research Documentation Programme, Jaipur, 1985.

## **E-CONTENT:**

1. <https://www.youtube.com/playlist?list=PLUqm7Uq0GjECh3TJ4YKgdoC8LkmX1IM8K>
2. [https://youtu.be/vnV\\_S2z1ZMs?si=SdaI8pxHQkzKnFUH](https://youtu.be/vnV_S2z1ZMs?si=SdaI8pxHQkzKnFUH)
3. <https://youtu.be/Q9YNLHUvhE4?si=CbRfaE10bXPESNnc>
4. <https://youtu.be/MYV9aGu7Bzc?si=AmXgHhyfA2XJvsgp>
5. <https://youtu.be/F1IaMgha9fk?si=JyyFOvkz4ABZkeC9>

Course Outcome		Program Outcome												Program Specific Outcome		
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Ability to understand and appreciate art as a fundamental human expression.	-	-	2	-	-	2	-	-	-	3	-	-	2	-	-
CO2	Understanding and appreciation of the vocabulary of art related to cognition and experience.	-	-	3	-	-	2	-	-	-	3	-	-	2	-	-
CO3	Awareness of important art productions in the Western and Modern.	-	-	2	-	-	2	-	-	-	3	-	-	2	-	-
CO4	Recognition of postmodern to present art work	-	-	2	-	-	2	-	-	-	3	-	-	2	-	-
CO5	Appreciate the Indian art and Sensitivity towards individual and collective human cultural productions as unique expressions of historical and geographic context.	-	-	2	-	-	2	-	-	-	3	-	-	2	-	-

**COURSE OBJECTIVES:**

- To trace the development of historically significant energy-conscious structures and methods according to global climate zones.
- To provide students with an understanding of solar geometry, building heat transfer techniques, and energy conservation.
- To explore solar passive heating system integration approaches for buildings using a few case studies, focusing on materials and methods.
- To study solar passive cooling system integration using a few case studies, focusing on materials and methods.
- To learn through application; the understandings of climatic design in form of design exercises.

**UNIT I CLIMATE AND SHLETER****6 Hrs**

Climate responsive design features with respect to the different climatic zone - Examples of traditional architecture of various places and design considerations involving Site Conditions, Land form, Vegetation types, pattern & orientation.

**UNIT II SOLAR ENERGY AND BUILDINGS****8 Hrs**

General principles and techniques of Solar passive architecture. Components and operation of solar water heating systems. Fundamentals of Heat transfer. Methods for evaluating thermal performance of walls and roofs. Future trends in solar energy – integration of photovoltaic cells into building system and application of thermal energy storage in building.

**UNIT III PASSIVE SOLAR HEATING****10 Hrs**

General principles of passive solar heating – Various methods of Maximizing exposure to solar radiation in cold & temperate climate. Direct gain systems - Glazed walls, Bay windows, Attached sun spaces. Indirect gain systems – Trombe wall, Water wall, Solar Chimney, Trans wall, Roof pond, Roof radiation trap, Solarium. Isolated gain systems – Natural convective loop. Case studies on buildings designed with passive heating techniques.

**UNIT IV PASSIVE COOLING****7 Hrs**

General principles of passive cooling – Various techniques of shading to reduce heat gain in tropical climate Evaporative cooling, Nocturnal radiation cooling, Passive Desiccant cooling, Induced ventilation, Earth sheltering, Earth Berming, Wind Towers, Earth Air tunnels, Curved Roofs & Air Vents, Insulation. Case studies on buildings designed with passive cooling techniques.

**UNIT V CLIMATIC DESIGN OF BUILDING ELEMENTS****14 Hrs**

**Wall opening varieties.** Wall opening design considering wind, light and heat gain. Orientation, Size, Position; its climatic significance. Protection and Control of wall openings. **Sunshade and Louver design;** its varieties, its performance optimization considering wind, light and heat. Daylight Factor and Analysis Exercises on design and detailing of wall openings

for different of climatic conditions. **Courtyards** and its effect on heat gain and heat loss in building interiors. Form, scale and proportion of courtyards; their climatic effect. Courtyards and ventilation inside building. Exercises on design of courtyards for applying the understanding of above aspects. **Verandahs, corridors** and other **transition spaces** and their roles. Different varieties of **roof openings**; their climatic significance. **Water bodies** in building and evaporative cooling. Contemporary Trends in Energy Efficient Architecture.

**TOTAL: 45 Hours**

### **COURSE OUTCOMES:**

**CO1:** Identifying the unique challenges and opportunities presented by various climatic zones in terms of building design, energy efficiency, and occupant comfort.

**CO2:** Understanding the fundamentals of solar energy, including photovoltaics (PV), solar thermal systems, and passive solar design principles.

**CO3:** Designing a passive solar heating system incorporating advanced materials and technologies.

**CO4:** Interpreting the relationship between building orientation, ventilation, and passive cooling efficiency.

**CO5:** Applying the climate-responsive design principles to specific building elements in architectural plans.

### **TEXT BOOKS:**

1. Solar Energy: The Physics and Engineering of Photovoltaic Conversion, Technologies and Systems" by Olindo Isabella, Klaus Jäger, Arno Smets, and René van Swaaij.
2. "Passive Solar Architecture: Heating, Cooling, Ventilation, Daylighting, and More Using Natural Flows" by David A. Bainbridge.
3. "Passive Solar Design and Construction Handbook" by Michael J. Crosbie and Steven Winter Associates.
4. "Advance in passive cooling", by Mat Santamouris.
5. "Passive Cooling of Buildings" by T. Agami Reddy, Jan F. Kreider, and Peter S. Curtiss.
6. "Passive Solar Architecture: Heating, Cooling, Ventilation, Daylighting and More Using Natural Flows" by David A. Bainbridge.
7. MiliMajunder, Teri – Energy – Efficient Bldg in India – Thomson Press , New Delhi – 2001
8. J.K Nayak&Others , Energy Systems Energy Group,- Isa Annal Of Passive Solar Architecture.
9. Manual on Solar Passive Architecture, IIT Mumbai and Mines New Delhi, 1999
10. Arvind Krishnan & Others, " Climate Responsive Architecture", A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2001
11. Majumdar M, "Energy-efficient Building in India", TERI Press, 2000.

12. Givoni .B, “ Passive and Low Energy Cooling of Buildings”, Van Nostrand Reinhold, New York, 1994

#### **REFERENCES:**

1. Fuller Moore, “Environmental Control Systems”, McGraw Hill INC, New Delhi - 1993
2. Sophia and Stefan Behling, Solpower, “The Evolution of Solar Architecture”, Prestel, New York, 1996
3. Patrick Waterfield, “The Energy Efficient Home: A Complete Guide”, Crowood press ltd, 2011.
4. Dean Hawkes, “Energy Efficient Buildings: Architecture, Engineering and Environment”, W.W. Norton & Company, 2002
5. David Johnson, Scott Gibson, “Green from the Ground Up: Sustainable, Healthy and Energy efficient home construction”, Taunton Press, 2008
6. “Climatically Responsive Energy Efficient Architecture”, PLEA/SPA, New Delhi 1995.
7. Ms.Sudha, N.K.Bansal and M.A.S.Malik, “Solar Passive Building”, Pergamon press.
8. James D. Ritchie – Successful Alternate Energy Methods – Structures Publishing Co . Michigan 1980.
9. George Basid& Others – Energy Performance of Bldg – CRC Press, Florida 1984.
10. Ralph M .Lebens – Passive Solar Architecture in Europe – 2, Architecture Press, London 1983.

#### **E-CONTENT:**

1. [\(PDF\) An overview of passive cooling techniques in buildings: Design concepts and architectural interventions \(researchgate.net\)](#) – An overview of passive cooling techniques in buildings: design concepts and architectural intervention.
2. [Energy Efficiency in Buildings - Course Introduction \(youtube.com\)](#) – Energy Efficiency in Building.
3. [Passive Cooling Techniques. \(youtube.com\)](#) – Passive cooling technique.
4. [Passive Design Techniques I Sustainable Architecture I the 361BIT \(youtube.com\)](#) – Passive design techniques.
5. <https://youtu.be/AU2wTudKmX8?si=lsWyEm3o8WTITZkl> – Fundamentals of Climate responsive building – I.
6. <https://youtu.be/n6rPyLZiqLE?si=46KcgBnaEbY6vB8S> – Fundamentals of Climate responsive building – II.
7. <https://youtu.be/Ouvk9t5T9X4?si=jIQ9zXF1UGpEzTyb> – Roofs and Wall design by climatic zone (mass, insulation, solar protection).
8. [How Does a Solar Chimney Help Ventilate Your Home? \(youtube.com\)](#) – Passive Design.



Course Outcome		Program Outcome											Program Specific Outcome			
CO's		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Identifying the unique challenges and opportunities presented by various climatic zones in terms of building design, energy efficiency, and occupant comfort.	1	2	2	3	1	3	3	3	3	1	-	3	2	2	3
CO2	Understanding the fundamentals of solar energy, including photovoltaics (PV), solar thermal systems, and passive solar design principles.	-	2	2	3	-	3	3	3	3	-	-	3	3	3	3
CO3	Designing a passive solar heating system incorporating advanced materials and technologies.	-	2	-	1	-	3	3	3	3	-	-	3	3	2	3
CO4	Interpreting the relationship between building orientation, ventilation, and passive cooling efficiency.	3	2	2	3	1	3	3	3	3	1	1	3	3	2	3
CO5	Applying the climate-responsive design principles to specific building elements in architectural plans.	2	3	2	3	2	3	2	2	3	1	-	3	3	2	3

**COURSE OBJECTIVES:**

- To understand design and the role of the designer in changing society.
- To expose student to design process, the various stages, considerations in design, methodology that generate ideas for architectural design.
- To familiarize the students on the design solution based on intuition, creativity and goals.
- Acquaint students with the processes of design thinking, emphasizing its relevance and application in architectural practice.
- To empathize with end-users, clients, and stakeholders to gain insights into their needs, behaviors, and aspirations in the context of architectural design projects.

**UNIT I INTRODUCTION TO DESIGN 6 Hrs**

Definition of design, understanding of design, purpose of design, nature of good design and evaluation of design, types of design classifications, role of designer, design in history.

**UNIT II DESIGN PROCESS 6 Hrs**

Context for architectural design problems, design process, stages in the design process from different considerations, different ideas of design methodology.

**UNIT III DESIGN PROBLEMS AND SOLUTIONS 9 Hrs**

Different approaches to design, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design. Concept of pattern language- participatory approach to design

**UNIT IV DESIGN THINKING 12 Hrs**

Understanding the terms creativity, imagination, etc. Theories on thinking, convergent and divergent thinking, lateral and vertical thinking, creative techniques like checklists, brainstorming, syntactic, reversal, metaphor, analogy, generation of alternatives, role playing, attribute listing and morphological analysis. etc. design puzzles and traps, blocks in creative thinking,

**UNIT V TOOLS FOR DESIGN THINKING 12 Hrs**

Listening and Empathizing Techniques – observation – structured open ended approach, Design Thinking Frameworks, Ideation tools – brainstorming, innovation heuristics, behaviour models, overcoming cognitive fixedness, Storytelling – improvisation, scenario planning, development of scenarios, evaluation tools, frog design and prototyping. Role of inspiration in creativity, channels to creativity in architecture with examples of renowned Architects.

**TOTAL: 45 Hours****COURSE OUTCOMES:**

**CO 1:** Acquire foundational knowledge and skills in architectural design and design thinking.

**CO 2:** Develop and generate design concepts that respond creatively to programmatic requirements, site conditions, environmental considerations, and cultural contexts, while expressing architectural intent and vision.

**CO 3:** Approach architectural design problems with creativity, rigor, and sensitivity, and develop innovative solutions that address the needs of users, enhance the built environment, and contribute to the advancement of the architectural profession.

**CO 4:** Developed strong critical thinking skills and the ability to analyze, evaluate, and synthesize information to develop innovative design solutions that address user needs and project constraints.

**CO 5:** Explore core principles of design thinking, including empathy, problem definition, ideation, prototyping, and testing, and their relevance to architectural design practice.

### **TEXT BOOKS:**

1. Geoffrey Broadbent, "Design in Architecture, Architecture and the Human sciences", John Wiley & Sons, New York, 1981.

2. Bryan Lawson, "How Designers Think", Architectural Press Ltd., London, 1980.

3. Anthony Antoniades, "Poetics of architecture", Theory of design, John Wiley & sons, 1992.

4. Paul - Alan Johnson, "Theory of Architecture: Concepts, Themes", Wiley 2008 VNR, 1994

5. Christopher Alexander, "Pattern Language", Oxford University Press, 1977

6. C. Thomas Mitchell, 'Redefining Designing: From Form to Experience', Van Nostrand Reinhold, 1992.

7. James L. Adams, 'Conceptual Blockbusting', Basic Books, 2001.

### **REFERENCES:**

1. Edward De Bono, "Lateral Thinking", Penguin books, 1990.

2. Christopher Jones "Design methods", Wiley, 1992.

3. Tom Heath, "Method in Architecture, John Wiley & Sons, New York, 1984.

4. Nigel Cross, "Developments in Design Methodology", John Wiley & Sons, 1984.

5. Helen Marie Evans, Dumesnil, Carla Davis, "An Invitation to Design", Macmillan

6. Publishing Co., New York, 1982

7. James C.Snyder, Anthony J.Catarex-, Timothy L. McGinty, "Introduction to Architecture", McGraw-Hill Inc., 1979.

8. Allen Mave Evans &Caula David Dumes Nil, An Invitation to Design, Macmillan Publishing Co., New York, 1982.

9. Helen Marie Evans, Dumesnil, Carla Davis, "An Invitation to Design", Macmillan Publishing Co., New York, 1982

10. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.

11. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve– Apply", Springer, 2011 Idris Mootee,

12. "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013
13. Andrew King, Kevin Bennett, "Book - Solving Problems with Design Thinking - Ten Stories of What Works" (Columbia Business School Publishing), 2013

**E-CONTENT:**

1. [https://youtu.be/zHbmS1Qne0A?si=GoStEbtVEZ\\_SFTtS](https://youtu.be/zHbmS1Qne0A?si=GoStEbtVEZ_SFTtS) - Design Thinking Decoded: A Step-by-Step Process | Architecture | Novatr
2. <https://youtu.be/wOrmr5kT-48?si=EEixmwXmc3ajEehe> – How to solve problem like a designer.
3. [https://youtu.be/GeUXQ\\_L-35M?si=62Aj388yx\\_gs-KW](https://youtu.be/GeUXQ_L-35M?si=62Aj388yx_gs-KW) – Design Thinking: What is it and Why should I care.
4. <https://youtu.be/sKq9OxrV1Y8?si=gV3vDRxT9lod-ODj> – Design Thinking for Creating Innovations
5. [https://youtu.be/\\_r0VX-aU\\_T8?si=dovCsyKJIy04aR4i](https://youtu.be/_r0VX-aU_T8?si=dovCsyKJIy04aR4i) – The design thinking process
6. <https://youtu.be/q654-kmF3Pc?si=eD0qneBy6rlrzsHP> – Design thinking – Emphathize
7. <https://youtu.be/4nTh3AP6knM?si=bbs0OowmFkRgsCrB> – Design thinking process for beginners
8. <https://youtu.be/1WWwWp4Q-AA?si=1pRPww960neo3R99> – Design and Architectural thinking

Course Outcome		Program Outcome												Program Specific Outcome		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Acquire foundational knowledge and skills in architectural design and design thinking.	1	2	3	-	-	-	-	-	2	-	-	-	-	-	1
CO2	Develop and generate design concepts that respond creatively to programmatic requirements, site conditions, environmental considerations, and cultural contexts, while expressing architectural intent and vision.	1	3	2	1	1	-	-	-	2	-	-	-	-	-	1
CO3	Approach architectural design problems with creativity, rigor, and sensitivity, and develop innovative solutions that address the needs of users, enhance the built environment, and contribute to the advancement of the architectural profession.	1	2	-	1	3	-	1	-	3	-	-	-	-	-	1
CO4	Developed strong critical thinking skills and the ability to analyze, evaluate, and synthesize information to develop innovative design	1	3	-	1	3	-	-	-	3	-	-	-	-	-	1

	solutions that address user needs and project constraints.															
CO5	Explore core principles of design thinking, including empathy, problem definition, ideation, prototyping, and testing, and their relevance to architectural design practice.	-	2	-	1	2	-	-	-	3	-	-	-	1	2	2

**COURSE OBJECTIVES:**

- To grasp the concept of vernacular architecture, including its definition, characteristics, and significance in various cultural and geographical contexts.
- To delve into the architectural styles, typologies, and historical evolution of buildings and structures within the Western Region.
- To learn the physical form, layout, and spatial organization of settlements in the northern and eastern regions.
- To explore how settlement patterns and architectural styles vary across different regions within the southern area, considering factors such as geography, history, culture, and economy.
- To examine innovative design approaches that reinterpret and adapt vernacular concepts to address contemporary architectural challenges and adaptive reuse of traditional materials and building techniques.

**UNIT I INTRODUCTION TO VERNACULAR ARCHITECTURE 8 Hrs**

Vernacular architecture as a process and responsive design. Concepts, approaches, survey and study of vernacular architecture -aesthetic, architectural, anthropological, etc., Determinants of morphology of human settlements – climate, culture, socio-economic aspects, and geography. Overview of settlement evolution in India. Relation between settlement morphology and architecture.

**UNIT II SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF WESTERN REGION 6 Hrs**

Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Sustainable building materials and construction techniques. **Western Region: Rajasthan-** Rural Jat /Bhunga houses and Havelis. **Gujarat-** Deserts of Kutch, Pol houses of Ahmedabad, Wooden Havelis. **Goa** – Traditional Goan houses. (Portugese influence).

**UNIT III SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF NORTHERN AND EASTERN REGION 12 Hrs**

Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Sustainable building materials and construction techniques. **Northern and Eastern Region: Kashmir** – Typical Kutcha houses, Dhoongas (Boathouses), Ladakhi houses, bridges. **Himachal Pradesh** – Kinnaur houses, Town planning principles of the towns of Jodhpur, Jaipur, Jaisalmer, Gwalior. **Punjab** – Rural Houses, **Bengal** –Rural house form- Aat Chala houses, Thakur Bari (Mansions), **Odisha** – Rural houses of coastal areas.

**UNIT IV SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF SOUTHERN REGION 12 Hrs**

Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Sustainable building materials and construction techniques. **Southern Region: Kerala** – Nalukettu, Houses of Nair & Namboothri's, Koothambalam, Tarawads, Kerala Muslim houses (Mappilah houses) **Tamil**

**Nadu** –Toda Huts, Chettinad Houses (Chettiars). **Karnataka** – Gutthu houses (land owning community), Kodava ancestral home (Aynmane), **Andhra Pradesh** –Rural Kaccha houses.

**UNIT V ADAPTATIONS IN CONTEMPORARY ARCHITECTURE 7 Hrs**

Analyses and understanding of vernacular architecture concepts in contemporary architecture through the Works of Laurie Baker, Hasan Fathy, Anil Lul, Gerard Da Cunha, Building Centres- Auroville, Anangpur, Nizamuddin Building centre.

**TOTAL: 45 Hours**

**COURSE OUTCOMES:**

**CO1:** Understanding the principles and significance of vernacular architecture in various contexts.

**CO2:** Describing historical events and cultural influences that have shaped settlement patterns in the western region.

**CO3:** Comparing and contrasting the different typologies of settlements, building forms, and architectural traditions across sub-regions of the northern and eastern regions.

**CO4:** Identifying the historical events, cultural influences, and environmental factors that have shaped settlement patterns in the northern and eastern regions.

**CO5:** Critiquing architectural designs based on their adherence to vernacular principles and their appropriateness for the intended context in the current trend.

**TEXT BOOKS:**

1. Paul Oliver, 'Encyclopedia of Vernacular Architecture of the World', Routledge, 2007.
2. Carmen Kagal, 'Vistara- The Architecture of India', The Festival of India, 1986.
3. Amos Rapoport, House, Form & Culture, Prentice Hall Inc. 1969.
4. R W Brunskill: Illustrated Handbook on Vernacular Architecture, 1987.
5. "The Vernacular Architecture of Kerala" by Benny Kuriakose.
6. "Indian Vernacular: The Folk Architecture of India" by George Michell and Snehal Shah.
7. Carmen Kagal, 'Vistara- The Architecture of India', The Festival of India, 1986.

**REFERENCES:**

1. R W Brunskill, 'Illustrated Handbook on Vernacular Architecture', Faber and Faber, 2000.
2. G.H.R. Tillotson, 'The Tradition of Indian Architecture: Continuity, Controversy, Change since 1850', Oxford University Press, Delhi, 1989.
3. Weber. W and Yannas. S, 'Lessons from Vernacular Architecture', Routledge, 2014.
4. Brunskill, R. W. (1987). Illustrated Handbook of Vernacular Architecture. Castle Rock : Faber & Faber.
5. Carmen, K. (1986). VISTARA – The Architecture of India. The Festival of India Publications.
6. Cooper%\_ \_\_and Dawson%\_\_. (1998). Traditional buildings of India. London : Thames & Hudson.
7. Jain, K. and Jain, M. (1992). Mud Architecture of the Indian Desert. Ahmadabad : Aadi Centre.
8. Kenneth, F. (1983). Towards a Critical Regionalism: Six points for an architecture of

- resistance,
9. In The Anti-Aesthetic: Essays on Postmodern Culture. (Ed.) Hal, F. Seattle : Bay Press.
  10. Muthiah, S., Meyappan, M., Ramswamy, V. and Muthuraman, V. (2000). The Chettiar Heritage. Chennai : Chettiar Heritage.
  11. Oliver, P. (1997). Encyclopedia of Vernacular Architecture of the World. Cambridge : Cambridge University Press.
  12. Pramari, V. S. (1989). Haveli-Wooden Houses and Mansions of Gujarat, Ahmadabad : Mapin Publishing.
  13. Rapoport, A. (1969). House, Form & Culture. Eaglewood : Prentice Hall Inc.
  14. Tillotsum, G. H. R. (1989). The tradition of Indian Architecture: Continuity, Controversy and Change since 1850. Delhi : Oxford University Press.

### E-CONTENT:

1. [https://youtu.be/m-leUMOaic4?si=kj7x\\_ZEUJ5ALpJq3](https://youtu.be/m-leUMOaic4?si=kj7x_ZEUJ5ALpJq3) - Vernacular Architecture: The Path to Sustainability | Benny Kuriakose | TEDxAnantU
2. [https://youtu.be/a-QGF4p\\_c?si=bEzZVLp2ufq3k5Vb](https://youtu.be/a-QGF4p_c?si=bEzZVLp2ufq3k5Vb) – Vernacular Architecture-I, NPTEL, IIT Roorkee.
3. [https://youtu.be/5tywxc5\\_4F0?si=x7M0pqrRJ5KM3olp](https://youtu.be/5tywxc5_4F0?si=x7M0pqrRJ5KM3olp) - Vernacular Architecture-II , NPTEL, IIT Roorkee.
4. <https://youtu.be/meeQmCXo29k?si=73gddi6qdRqB2JSI> – Vernacular Architecture and Sustainable Architecture.
5. [https://youtu.be/Pu1le\\_jEZR0?si=vyuT-dGRse50bLMY](https://youtu.be/Pu1le_jEZR0?si=vyuT-dGRse50bLMY) - Vernacular Architecture and Traditional Architecture.
6. <https://youtu.be/uwans1haljE?si=3nMthypJnww-DFvr> – Vernacular Planning Concepts.
7. <https://youtu.be/zFrQ0wy-yTo?si=ehkCoYuAshzlfXTr> – Architects work.
8. [https://youtu.be/kyqPZ5CL\\_SI?si=J5Q47751WOfdZLqt](https://youtu.be/kyqPZ5CL_SI?si=J5Q47751WOfdZLqt) - Architects work.

Course Outcome		Program Outcome												Program Specific Outcome		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understanding the principles and significance of vernacular architecture in various contexts.	2	2	1	2	3	3	3	3	3	3	-	3	3	2	-
CO2	Describing historical events and cultural influences that have shaped settlement patterns in the western region.	1	1	1	2	3	2	3	3	3	3	-	3	2	3	-
CO3	Comparing and contrasting the different typologies of settlements, building forms, and architectural traditions across sub-regions of the northern and eastern regions.	1	1	1	2	3	2	3	3	3	3	-	3	2	3	1
CO4	Identifying the historical events, cultural influences, and environmental factors that have shaped settlement patterns in the northern and eastern regions.	1	2	2	2	3	2	3	3	3	3	-	3	2	3	1



CO5	Critiquing architectural designs based on their adherence to vernacular principles and their appropriateness for the intended context in the current trend.	3	3	2	2	3	3	3	3	2	3	-	3	2	3	1
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