

**VINAYAKA MISSIONS RESEARCH FOUNDATION,  
SALEM**

**FACULTY OF ARCHITECTURE**

**REGULATION – 2017**

**SYLLABUS**

## **SEMESTER - I**

**17AR110 HISTORY OF ARCHITECTURE – I**

<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>S</b>	<b>CREDIT</b>
<b>PC</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>CONTACT HOURS : 45</b>				

### **Objectives**

To inform about the development of architecture in the Ancient Western World and the cultural and contextual determinants that produced that architecture. To understand architecture as evolving within specific cultural contexts including aspects of politics, society, religion and climate. To gain knowledge of the development of architectural form with reference to Technology, Style and Character in the prehistoric world, Ancient Egypt, West Asia, Greece, Rome, Medieval times and Renaissance period.

### **MODULE I WISDOM OF THE ANCIENTS THRO RIVER VALLEY CIVILIZATION**

Response to culture and context in building shelter in the Neolithic period- R. Nile and the architecture of Egypt with relevant examples – Urban form in the Indus Valley and the Tigris and Euphrates basin and relevant examples of architecture.

### **MODULE II CLASSICAL WORLD**

Landscape and culture of Greece –Greek character – Greek polis and democracy – Domestic architecture– Evolution of the Greek temple and the building of the Acropolis –Public architecture: Theatre and Agora-optical illusions in architecture- City Planning. Roman history: Republic and Empire –Religion, culture, lifestyle - Roman character – Roman urban planning –architecture as imperial propaganda: forums and basilicas – structural forms: materials and techniques of construction spanning large spaces with relevant examples - domestic architecture.

### **MODULE III EARLY CHRISTIANITY AND CHRISTIAN KINGDOMS**

Birth and spread of Christianity – transformation of the Roman Empire – early Christian worship and burial. Church planning – Basilica concept and Centralized plan concept with relevant examples in the West and in the Byzantine. The Carolingian Renaissance – Feudalism and rural manorial life – Papacy – Monasticism – Craft and merchant guilds. Medieval domestic architecture – Romanesque churches with relevant examples in Europe – Development of vaulting.

**MODULE IV THE AGE OF CHURCH BUILDING** Development of Gothic architecture Church plan, structural developments in France and England with using relevant examples of church architecture in Europe – wooden roofed churches.

### **MODULE V IDEA OF RE-BIRTH AND RENAISSANCE IN EUROPE**

Idea of rebirth and revival – Humanism –Development of thought – Reformation- the Renaissance patron – Urbanism Renaissance architecture: Brunelleschi and rationally ordered space – ideal form and the centrally planned church using relevant examples– palace and villa architecture with relevant examples – Mannerist architecture- The Renaissance in transition – works of Michelangelo; Sir Christopher Wren, Andrea Palladio, Inigo Jones- Baroque and palace building in France.

### **TEXT BOOKS**

Sir Banister Fletcher, A History of Architecture, CBS Publications (Indian Edition), 1999. 2. Spiro Kostof – A History of Architecture – Setting and Rituals, Oxford University Press, London, 1985. 3. Leland M Roth; Understanding Architecture: Its elements, history and meaning; Craftsman House; 1994.

### **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. Samdstrom, Man the Builder, McGraw Hill Book Company, New York, 1970.
4. Webb and Schaeffer; Western Civilization Volume I; VNR: NY: 1962.
5. Vincent Scully: Architecture; Architecture – The Natural and the Man Made : Harper Collins Pub: 1991.
6. Leland M Roth; Understanding Architecture: Its elements, history and meaning; Craftsman House; 1994.

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

To make the students learn the theoretical aspects of design and understand how it could be manifested in architectural design.

To understand the ideologies from works of architects and planners.

To learn the design communication skills to enable to put forth the design ideas in graphics and literature.

**UNIT I ELEMENTS OF DESIGN IN NATURE**

Points, lines and shapes found in nature. Role of elements to emphasize the location, as landmark, for direction and dominance, etc. Patterns in nature and building design. Chaos and Order. Study : examples of nature inspired man made design.

**UNIT II PRINCIPLES OF ORGANIZATION FROM NATURE**

Fractals – patterns, proportion, repetition, harmony- Proportion-Examples from historical buildings and Works of architects. Analysis and form generating exercises.

**UNIT III COMPOSITION OF SHAPES / FORMS**

Composition. Two dimension to three dimension .Figure and ground, positive and negative spaces. Axis, Symmetry/Asymmetry, Massing, Form generating exercises to approach site planning in small scale and large scale projects. Examples and Analysis.

**UNIT IV CONCEPTS IN ARCHITECTURAL DESIGN**

Concept – types- Ideas and Intent in design - Intuitive, contextual, Iconic, Experiential, Environmental, Energy based, Symbolic, Modular, etc. Ideologies and philosophies of architects. Exercises.

**UNIT V DESIGN COMMUNICATION AND GRAPHICS**

Importance of graphics in architectural design. Study of site plans, city plans, conceptual drawings. Interpretation of architects' conceptual sketches and the respective buildings. Exercises on writing articles on design projects.

**TEXTBOOKS:**

1. Francis D.K.Ching, Architecture-Form, Space and Order, Van Nostrand Reinhold Company, New York, 2007.
2. Simon Unwin, Analysing Architecture, Routledge, London, 2003.
3. V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi, 1973.

**REFERENCES:**

1. Leland M. Roth - Understanding Architecture, its experience history and meaning, Craftsman house, 1994.
2. Steen Eiler Rasmussen - Experiencing architecture, MIT Press, 1964.
3. Peter von Meiss -Elements of architecture - from form to place, Spon Press 1992.
4. Rudolf Arnheim- The dynamics of architectural form, University of California Press 1977. 5. Neils Prak, The language of Architecture; Mounton & Co 1968.
5. Paul Alan Johnson - The Theory of Architecture - Concepts and themes, Van Nostrand Reinhold Co., New York, 1994. 7. Helen Marie Evans and Carla David Dunneshil, An invitation to design, Macmillan Publishing Co. Inc., New York, 1982.

CATEGORY	L	T	S	CREDIT
BS & AE	1	1	0	2
<b>CONTACT HOURS : 30</b>				

**OBJECTIVES**

- Identifying Eigenvalue problems, obtain solution and acquired the technique of diagonalizing a matrix
- Studying the properties of lines and plans in space, along with sphere and providing a tool to understand 3D material.
- Understand geometrical aspects of curvature and elegant application of differential calculus.
- Understand function of more than one variable, along with differentiation under integral sign.
- Solving differential equation of certain type

**MODULE 1 - PLANE AND LINES**

Direction ratios and cosines of a line - Equations of a plane and intersecting planes – Symmetric form of a straight line - Angle between lines and planes - Coplanar lines - skew lines - shortest distance.

**MODULE 2 - CURVED SURFACES**

Equations of sphere - section by a plane – Tangent plane - standard equations of cone, cylinder and conoid - properties

**MODULE 3 - MATRICES**

Characteristic equation, Eigen values and Eigenvectors of a real Matrix, Cayley - Hamilton Theorem without proof; Reduction of a real symmetric matrix to diagonal form.

**MODULE 4 - ORDINARY DIFFERENTIAL EQUATIONS AND INTEGRATION**

Linear second order and higher order Differential equations with constant coefficients. Differential equations with variable coefficients of Euler type. Integration of rational, trigonometric and irrational functions, properties of definite integrals, Reduction formulae for trigonometric functions.

**MODULE 5 - FUNCTIONS OF TWO VARIABLES**

Partial differentiation, total derivative, approximations, Taylor's Theorem with remainder Maxima and Minima, envelope.

**Text Book:**

- 1.B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi, 1998.
- 2.P.Kandasamy, K.Thilagavathy and K.Gunavathy, EnggMathematics VolI & II,S.Chandan Publishers - 1998
- 3.Narayanan S, Manikavachagam Pillai T.K. & Ramanaiah G -Advanced Mathematics for Engineering Students - Vol I&II S. Viswanathan Printers 1993

**Reference Book**

- 1.Kappraff Jay ,Connections;The Geometric bridge between art and science.MacGraw Hill Inc.Ltd.,USA,1991

CATEGORY	L	T	S	CREDIT
SEC	1	1	0	2
<b>CONTACT HOURS : 30</b>				

**OBJECTIVES**

To impart quality training to the students which will enable them to acquire the skills to meet the demands of the job market.

**MODULE 1**

Verbal Communication: received pronunciation; how to activate passive vocabulary; technical/non-technical and business presentations; questioning and answer skills; soft skills for professionals; role of body postures, movements, gestures, facial expressions, dress in effective communication; Information/Desk/ Front Office/Telephone conversation; how to face an interview/press conference; Group discussions, debates, elocution.

**MODULE 2**

Reading Comprehension: skimming and scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; use and interpretation of visuals and graphics in technical writing.

**MODULE 3**

Written Communication: note making and note taking; summarizing; invitation, advertisement, agenda, notice and memos; official and commercial letters; job application; resume and curriculum vitae; utility, technical, project and enquiry reports; paragraph writing: General – Specific, Problem – Solution, Process – Description, Data – Comment.

**MODULE 4**

Short essays: description and argument; comparison and contrast; illustration; using graphics in writing: tables and charts, diagrams and flow charts, maps and plans, graphs; how to write research paper; skills of editing and revising; skills of referencing; what is a bibliography and how to prepare it.

**Text Books:**

1. Adrian Doff and Christopher Jones: *Language in Use* – Upper intermediate, self-study workbook and classroom book. (Cambridge University Press)[2000]
2. Sarah Freeman: *Written Communication* (Orient Longman)[1978]
3. Mark Ibbotson: *Cambridge English for Engineering* (Cambridge University Press) Nov 2008
4. T. Balasubramanian: *English Phonetics for Indian Students: A Workbook* (Macmillan publishers India) 2000

**References:**

1. Chris Mounsey: *Essays and Dissertation* (Oxford University Press) February 2005.
2. Sidney Greenbaum: *The Oxford English Grammar* (Oxford University Press) March 2005
3. Krishna Mohan and Meera Banerji: *Developing Communication Skills* (Mac Millan india Ltd)[2000]
4. Krishna Mohan and Meenakshi Raman: *Effective English Communication* (Tata Mc-Graw Hill)[2000]

**17AR150 BUILDING MATERIALS AND  
CONSTRUCTION TECHNOLOGY - I**

CATEGORY	L	T	S	CREDIT
BS& AE	2	0	2	4
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES:**

- To study the principles of designing components of load bearing structures – foundation, plinth, wall, roofing systems, flooring, spanning of openings, fins and projections.
- To understand the need for and study the principles and practices of monolithic and masonry construction, arches, lintels/ beams, corbelling, cantilever etc.
- To understand the details of construction using the stone and soil as well as products derived from them.

**MODULE I - INTRODUCTION**

Planning and design of simple load bearing structures- typical parts of the load bearing structure- types of foundations – methods of spanning openings (lintel, arches, corbelling, beams) - types of roofs.

**MODULE II - MUD CONSTRUCTION**

Cob, Rammed earth, Wattle and daub construction- Principles of Masonry construction using Adobe, Compressed Stabilized Earthen Blocks; Foundation and plinth for mud structures, Design of openings (arches, corbelled arches), Mud plaster, mud mortar, Damp and weather proofing of mud structures, Mud flooring ‘ Construction of thatched roof.

**MODULE III - CONSTRUCTION USING STONE** Principles of stone masonry construction- types of stone masonry- stone finishes- jointing- types of mortar for stone construction- Stone masonry for foundation, plinth and wall, retaining wall, arches and lintels in stone, coping, steps, Stone Flooring, Stone cladding, Application of Artificial stone.

**MODULE IV - CONSTRUCTION USING BRICK AND OTHER CLAY PRODUCTS**

Principles of brick masonry construction- types of brick masonry- joints, pointing and finishing- types of mortar & mortar mix for brick construction- Plastering - Brick masonry for foundation plinth and wall, arches and lintels in brick, coping, steps, Brick paving- Roof using pan/ pot tiles, Mangalore pattern tiles- Flooring using clay tiles, ceramic tiles and vitrified tiles.

**MODULE V - COMPOSITE/ ALTERNATE CONSTRUCTION TECHNIQUES AND INNOVATIVE PRACTICES**

Composite walls, Cavity walls in stone and brick, jack arch flooring, domes/ vaults, prefabricated brick panels, precast curved brick arch panels, reinforced brick/ reinforced brick concrete slabs, Prefabricated floor/ roof using structural clay units, Hourdi block roofing, Guna tile roofing.

**TEXTBOOKS:**

1. Arora S.P. and Bindra S.P., “Text book of Building Construction”, Dhanpat Rai & Sons, New Delhi, 2012.
2. Klans Dukeeberg, Bambus – Bamboo, Karl Kramer Verlag Stuttgart Germany, 2000.
3. National Building Code Of India 2005- Part 6 Structural Design- Section 3 Timber and Bamboo.
4. Francis D.K. Ching, Building Construction Illustrated John Wiley & Sons 2000.

**REFERENCES:**

1. Ghanshyam Pandya, M.P. Ranjan, Nilam Iyer Bamboo and Cane Crafts of Northeast India; National Institute of Design (2004).
2. Don A. Watson Construction Materials and Processes McGraw Hill 1972.
3. WB Mckay Building construction, Vol 1,2, Longman UK 1981. 4. Barry, The Construction of Buildings; Affiliated East West press put Ltd New Delhi 1999

CATEGORY	L	T	S	CREDIT
PC	1	0	3	2
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES**

- To understand drawing as a medium to visualize and communicate design ideas.
- To understand the concepts of Architectural Drawing with the introduction of drafting fundamentals.
- To understand the language of Architectural representations through Architectural Drawing systems.
- To introduce the basics of measured drawing.

**MODULE 1 : GEOMETRICAL DRAWING: INTRODUCTION TO DRAFTING**

Introduction to fundamentals of drawing/ drafting: Construction of lines, line value, line types, lettering, dimensioning, representation, format for presentation, use of scales etc. Construction of lines and angles, construction of triangles, circles, tangents, curves and conic sections.

**MODULE 2: PLANE GEOMETRY AND SOLID GEOMETRY**

Construction and development of planar surface – square, rectangle, polygon etc. Introduction of multi- view projection – projection of points, lines and planes. Multi- view projection of solids – cube, prism, pyramids, cones, cylinders etc. Sections of solids, true shape of solids.

**MODULE 3: ARCHITECTURAL DRAWING SYSTEMS**

Communicating Architectural Design Ideas from Concept to Construction - Case studies of Architect's Sketches translated as Drawing systems – Types of Projection systems and Pictorial systems – Types of Pictorial systems such as Multi view, Para line and Perspective drawings.

**MODULE 4: MULTIVIEW AND PARALINE DRAWINGS**

Principles of Orthographic views – Reading multi view drawings - Representing materials in Architectural Design and Construction drawings – Drafting of Building Components in Plans –Elevations – Sections through Case studies of Architects' drawings – Construction of Para line drawings – Isometric and Axonometric.

**MODULE 5: MEASURED DRAWING**

Introduction to fundamentals of measured drawing, format for presentation methods - Techniques of measuring buildings and their details –Measured drawing of simple objects like furniture, ornamentation, measured drawing of building components like column, door, window, cornice, etc. isometric projections of simple construction details of the building components.

**REFERENCES:**

1. I.H.Moris, Geometrical Drawing for Art Students; Universities Press 2012.
2. Francis D. K. Ching, "Architectural Graphics", John Wiley and Sons, 2009.
3. Francis D.K.Ching with Steven P.Juroszek, "Design Drawing" John Wiley & Sons, Inc. Second edition, reprint 2012.
4. Fraser Reekie, Reekie's, "Architectural Drawing", Edward Arnold, 1995.
5. Scidler & Korte; Hand drawings for Designers - Communications ideas through area graphics; Four child books NY; 2012.

CATEGORY	L	T	S	CREDIT
PC	1	0	2	2
<b>CONTACT HOURS : 30</b>				

## 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 familiarize students with the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc.
- To involve students in a series of exercises which look at graphic and abstract representations of art. Involving them in a series of exercises which will help them experiment with form and volume.

### MODULE 1: DRAWING FROM OBSERVATION

Introduction to Drawing - 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.

### MODULE 2: PAINTING I

Introduction of painting – Colour – Properties of colour – Colour schemes – Types of colours - Application and visual effects of colour. Exercise involving Study of colour – Properties of paper, brush and other tools – Basic washes – 3D effects from still-life, nature and built environment using mono chromatic and multi colour.

### MODULE 3: PAINTING II

Indoor and out door painting – Rendering techniques Exercise involving Water colour – Water soluble colour pencil – Tempra – Acrylic – Water soluble oil colour – Oil colour – Pen and ink – Brush – Air brush – Mixed mediums – Study of multi colour and 3D effects from nature and built environment.

### MODULE 4: SCULPTURE

Introduction of sculpture –Sculpture using various materials such as clay, plaster of Paris, paper mache, and wire.

### MODULE 5: APPLIED ART

Graphic representations – Visual composition and Abstraction- Exercises involving Logo design, collage, calligraphy and printing.

### REFERENCES:

1. Drawing a Creative Process”, Ching Francis, Van Nostrand Reinhold, New York, 1990.
2. Ruzaimi Mat Rani; Sketching Masterclass; Page One; 2010.
3. Moivahuntly, “The artist drawing book”, David & Charles, U.K., 1994.
4. Arundell (Jan) Exploring sculpture, Mills and Boon, London/Charles, T. Brand Ford Company, U.S.A. 1971.
5. The art of drawing trees, heads, colours, mixing, drawing, landscape and painting, water 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.

CATEGORY	L	T	S	CREDIT
PC	0	0	7	10
<b>CONTACT HOURS : 165</b>				

## OBJECTIVES

The objective of this course is to make student understand about appreciation of visual form, grammar of visual language, appreciation of art, vocabulary of design, principles of composition, appreciation of massing and study of anthropometrics.

## COURSE CONTENTS:

Principles of Visual perception, the grammar of visual language, principles of composition and relationship between the human activities and anthropometrics: learning about taking independent decisions or analyse their observations with a sound background of basic principles of visual perception and the principles of composition: continuous exposure of the student to the hypothetical as well as the real situations in which students are expected to work: individual discussion about the project of work with students and on application of the principles in process of design; instilling attitude of exploring different dimensions of composition without any restrictions and limitations; understanding single user space.

### 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.
3. Joseph De Chiara, Julius Panero, Martin Zelnik, Time Saver Standards for Interior Design and Space Planning, McGraw Hill 2001.
4. Ernst Neuferts Architects Data, Blackwell 2002.
5. Ramsey et al, Architectural Graphic Standards, Wiley 2000.

### References:

1. Hideaki Hareguchi, A Comparative analysis of 20th century houses, Academy Editions, 1988.
2. Robert Powell, Tropical Asian House, Select Books, 1996.
3. Terence Conran; The Essential House Book, Conran Octopus, 1994.
4. Sam F.Miller, Design Process: A Primer for Architectural and Interior Design, VNR; 1995.
5. Broomer F.Gerald, (174), Elements of Design: Space, Davis Publications Inc., Worcester, Massachusetts
6. Wong Wucius, (1977), Principles of three dimensional Design, Van Nostrand Reinhold, NY
7. Wrong Wucius, (1977), Principles of two dimensional Design Van Nostrand Reinhold, NY
- Maier Manfred, (1977), Basic Principles of Design, Vol.1, 2, 3 & 4, Van Nostrand Reinhold, NY

## **SEMESTER - II**

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

### **17AR210 HISTORY OF ARCHITECTURE - II**

#### **OBJECTIVES:**

To understand the influence of social, political influences on the evolution of various styles of Architecture.  
To gain knowledge of the development of architectural form with reference to technology, style and character

#### **MODULE I - ANCIENT INDIA AND THE EVOLUTION OF BUDDHIST ARCHITECTURE**

Indus Valley Civilization: culture and pattern of settlement - Vedic culture - Vedic village and the rudimentary forms of bamboo and wooden construction and its influence on subsequent forms of Buddhist architecture – Origins and evolution of Buddhism - Hinayana and Mahayana Buddhism and evolution of building typologies - Chaitya halls and Viharas with relevant architectural examples of built and rock cut architecture.

#### **MODULE II - EVOLUTION OF HINDU TEMPLE ARCHITECTURE**

Hindu forms of worship – Evolution of temple form - meaning, symbolism, ritual and social importance- Categories of early temple architecture- With relevant architectural examples from Gupta and Chalukya periods- South Indian history and the relation between Bakthi period and temple architecture.

#### **MODULE III - TEMPLE ARCHITECTURE – DRAVIDIAN AND INDO ARYAN**

Dravidian Architecture – Evolution of Dravidian order and Architecture under the rule of Pallavas, Cholas Nayakas and Vijayanagar kingdoms with relevant examples - Evolution of temple complex and temple towns - Evolution of the temple gateways with relevant examples. Indo Aryan temple architecture of Gujarat, Orissa, Madhya Pradesh and Rajasthan - their salient features - with relevant architectural examples - architecture of step wells and their social importance.

#### **MODULE IV - ISLAMIC ARCHITECTURE AND THE INFLUENCE OF DELHI SULTANATE RULE IN INDIA**

A short history of Islam- Islamic architecture as rising from Islam as a socio cultural and political phenomenon - evolution of building types in terms of forms and functions under Delhi Sultanate: mosque, tomb, minaret, madarasa - Character of Islamic architecture understood through relevant architectural examples.

#### **MODULE V - ISLAMIC PROVINCIAL STYLE AND MUGHAL ARCHITECTURE**

The development of the Islamic Provincial styles in various provinces of Gujarat, Punjab, Bengal and the Deccan with relevant architectural examples. Contribution of the Mughals under Humayun, Akbar and Shajahan to the architecture (tombs, mosques and forts) and city planning with relevant architectural examples.

#### **TEXTBOOKS:**

1. Percy Brown, Indian Architecture (Buddhist and Hindu Period), Taraporevala and Sons, Bombay, 2014.
2. 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.
3. Robert Hillenbrand, Islamic Architecture- Form, Function and Meaning, Edinburgh University Press 1994.
4. Christopher Tadgell, The East - Buddhists, Hindus and The Sons of Heaven, Routledge 2008.

#### **REFERENCES:**

1. George Michell, The Hindu Temple, BI Pub., Bombay, 1977.
2. Christopher Tadgell, The History of Architecture in India, Penguin Books (India) Ltd, New Delhi 1990.
3. R. Nath - History of Mughal Architecture Vols I to III - Abhinav Publications - New Delhi, 1985.
4. Catherine Asher, Architecture of Mughal India, Cambridge University Press 2001.

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To study human heat balance and comfort.
- To familiarize students with the design and settings for buildings for daylight and factors that influence temperature
- To inform about the air pattern around buildings and the effect of wind on design and siting of buildings
- To expose the students to the various design strategies for building in different types of climatic zones.

**MODULE 1**

Climate & Weather. Scales of climate - macro-climate, meso-climate and micro climate. Climatic variables: temperature, humidity, precipitation, cooler radiation, wind, etc. Tropical Climate. Climatic Zones of India & their characteristics.

**MODULE 2**

Geometry of solar movement. Altitude & azimuth angles. Sunpath diagram/Solar chart. Horizontal and vertical shadow angles. Use of shadow angle protractor. Design of shading devices. Performance evaluation of shading devices.

**MODULE 3**

Air flow/wind movement around and through buildings. Natural ventilation. Mahoney Tables and their application. Climatic design recommendations for various climatic zones in India.

**MODULE 4**

Thermal comfort. Indices of thermal comfort - Tropical Summer Index & Effective Temperature. Thermal effects in buildings. Basic concepts of heat transfer in buildings, units & terminology.

**MODULE 5**

The sky as a source of light, Daylight factor, Lighting - Windows, Room proportions and other building elements, Daylight penetration, Calculation of daylight factor.

**References:**

1. Boutet, T.S., (1987), Controlling Air Movement, McGraw Hill Book Co.
2. Carson, R., (1950), The Sea Around Us, Paladin Books
3. Crutchfield, H.J., (1983), General Climatology, Prentice Hall of India
4. Givoni, B., (1994), Passive and Low Energy Cooling of Buildings, Van Nostrand Reinhold Co.
5. Gribbin, J., and Gribbin, M. (1997), Watching the Weather, Universities Press
6. Koeningsberger, et.al. (1974), "Manual of Tropical Housing and Building (Part-II)", Climate Design, Longman, London
7. Mather, J.R., Climatology: Fundamentals and Applications, McGraw Hill Book Co.
8. Menon, P.A., (1989), Our Weather, National Book Trust, India
9. Nayak J.K. et.al, (1999), Manual on Solar Passive Architecture, Solar Energy Center, Ministry of Non-Conventional Energy Sources, Government of India, New Delhi

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To enable a student to understand the effect of action of forces on a body and the concept of equilibrium of the body through exercises.
- To determine the internal forces induced in truss members due to external loads by working out problems.
- To calculate the sectional properties (centroid, moment of inertia, section modulus and radius of gyration) for various sections by working out problems.
- To study the stress – strain behaviors of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action through select problems.
- To derive the relationship between elastic constants and solving problems.

**MODULE 1 - FORCES AND STRUCTURAL SYSTEMS**

Introduction to fundamentals of structures for Buildings – Classification - Natural structures - Building loads - Types of force systems - Resultant of parallel forces - Lami's theorem–parallelogram law.

**MODULE 2 - EQUILIBRIUM OF BODIES**

Principle of moments – principles of equilibrium - types of loads - types of supports — support reactions - examples.

**MODULE 3 - ANALYSIS OF PLANE TRUSSES**

Introduction to Determinate and Indeterminate plane trusses - Analysis of simply supported and cantilevered trusses by method of joints and method of sections

**MODULE 4 - PROPERTIES OF SECTION**

Centroid - Moment of Inertia - Section modulus – Radius of gyration - theorem of perpendicular axis - theorem of parallel axis – Product of inertia.

**MODULE 5 - ELASTIC PROPERTIES OF SOLIDS**

Types of stress and strains - Stress strain diagram for mild steel, high tensile steel and concrete - stresses in composite sections - Concept of axial and volumetric stresses and strains –elasticity.

**MODULE 6 - ELASTIC CONSTANTS**

Modulus of Elasticity - Modulus of rigidity – Bulk modulus - Relation between elastic constants - application to problems.

**References:**

1. Mariam and Craige (1987), Statics John Wiley, New York
2. Prasad I.B., Applied Mechanics, Khanna Publishers, Delhi
3. R.K.Bansal: "Strength of Materials", - Laxmi Publications, Delhi, 2007.
4. S.Ramamrotham: "Strength of Materials", - Dhanpat rai & Sons, Delhi, 1990.
5. R.K. Rajput: "Strength of Materials", S.Chand & Company Ltd., New Delhi 1996

CATEGORY	L	T	S	CREDIT
BS & AE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

**OBJECTIVES:**

- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

**MODULE 1**

Introduction to fundamentals of environmental studies, definitions and need for public awareness – types of natural resources and associated problems – means of conserving various resources – role of an individual in conserving natural resources.

**MODULE 2**

Introduction to concept and components of ecosystem – food chains, food webs and ecological pyramids – types of various ecosystems – biodiversity and need for its conservation

**MODULE 3**

Types of environmental pollutions – cause, effects and controlling measures – associated global climatic problems – role of individual in prevention of pollution – natural hazardous including landslides, cyclone, floods, earthquake.

**MODULE 4**

Introduction to concepts of sustainable development – equitable use of resources for sustainable lifestyles.

**MODULE 5**

Various urban problems – population growth and associated problems – environment and human health – different environment protections acts – environmental ethics.

**References:**

1. Text book for environmental studies for undergraduate courses by Erach Barucha for University Grants Commission (available online at UGC website)
2. Environmental Pollution analysis by Khopkar S.M.
3. Dying Wisdom by Aggarwal Anil
4. Environmental Pollution analysis by Khopkar S.M.
5. Handbook of Environmental Health and Safety by Koren Herman, Bisesi Michael
6. Forest Policy by Nair Sathis Chandran; Jayan N D
7. Crisis of the upper Damoder Valley by India International Center.
8. Ecology and sustainable development by Ramakrishnan PS
9. Environmental Pollution by Hedges Laurent
10. Health aspects of environmental pollution control by WHO
11. Urban Environmental management planning for pollution control by Berry Brian JL; Horton Frank E
12. Man and Environment by Macabe RH; Mines RE
13. Environmental Impact assessment by Clark and others
14. Environment management in India by Sapru RK
15. Environmental Analysis by Saxena MM
16. Urban environment issues by TERI

CATEGORY	L	T	S	CREDIT
BS & AE	2	0	2	4
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES**

- To study the principles of designing components of load bearing structures – foundation, plinth, wall, roofing systems, flooring, spanning of openings, fins and projections.
- To understand the need for and study the principles and practices of monolithic and masonry construction, arches, lintels/ beams, corbelling, cantilever etc.

**MODULE 1**

The properties and uses of materials for simple construction such as mud, bamboo, timber, brick, stone, cement, lime, mortars, thatch tiles, asbestos, galvanised, iron and reinforced concrete.

**MODULE 2**

Principles of construction of simple foundation for load bearing wall in stone and brick, Plinth fillings, steps.

**MODULE 3**

Standard terms in brick and stone masonry. English, Flemish and Rat trap bond, types of stone walls, Composite wall and piers.

**MODULE 4**

Principles of construction of various types of arches, lintels and brick jallies.

**MODULE 5**

Wood and wood products, classification of trees, understanding of timber, its structure, characteristics, seasoning methods, defects, preservation, fire resistance, various tests, suitability for various uses; properties of wood products; Ceramics-various types; glass as a building material-various types, properties and uses. Door panels in timber, flush doors, Joints in frame, styles, rails, panels, fixture and fastenings.

**References:**

1. McKay, G.B. (1972), Building Construction (Metric), Longman, London
2. Foster, Stroud, (1963), Mitchell's Advanced Building Construction, Allied Publishers Private Limited, Bombay
3. Gurucharan Singh, (1981), Building Construction Engineering, Standard Book House, New Delhi
4. Dr.T.S.Balagopal Prabhu (1987), Building Drawing and Detailing, Spades Publishers Pvt. Ltd., Calicut.
5. Sushil Kumar, (1991), Building Construction, Standard Publishers and Distributors, New Delhi
6. Garg, N. K. (2007). Use of Glass in Buildings, New Age International (P) Limited, Publishers, 4835/24 Ansari Road, Daryaganj, New Delhi – 110002. ISBN: 81-224-2065

CATEGORY	L	T	S	CREDIT
PC	1	0	3	2
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES:**

- To involve students in a number of exercises that will help them develop the skill of representation in advance drawing techniques involving perspective and sciography.
- To involve students in a number of exercises that will help to understand the measured drawing method to document buildings of architectural interest using simple and advance techniques of representation.

**MODULE1: PERSPECTIVE METHODS**

Introduction to the concept of perspective drawing. One point and two point perspective of simple geometrical shapes like cube, prism, combination of shapes using picture plane method and measuring point method. Introduction to three point perspective.

**MODULE 2: PERSPECTIVE: BUILDING INTERIOR**

Construction of one, two and three-point perspective grids - Construction of one and two point perspective of building interiors. Understanding the basic human proportion and scale. Adding of human figures, planters, furniture etc. in an interior perspective scene. Basic applications of shade and shadows and rendering techniques.

**MODULE 3: PERSPECTIVE: BUILDING EXTERIOR**

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

Introduction to short cut perspective method. Construction of one, two and three point perspective of building exterior. Adding of human figures, trees etc., Application of light and shadow and rendering techniques of building materials.

**MODULE 4: MEASURED DRAWING: HISTORIC DOCUMENT STUDY**

Documentation and drawing of a simple historic building along with the relevant study of the building based on its history, morphology and context. Measured drawing using pen and ink rendering technique.

**MODULE 5: MEASURED DRAWING: BUILDING DOCUMENTATION**

Complete documentation of a building of special interest in terms of building construction, architectural excellence or technology using photographs, tapes etc. Measured drawing of plans, elevations, sections, isometric projections of building details etc. using pen and ink rendering technique.

**REFERENCES:**

1. Francis D. K. Ching; Design Drawing; John Wiley & Sons; 2010
2. Rerdow Yee; Architecture Drawing - A Visual Compendium of Types & Methods; John Wiley & Sons; 2012
3. John Montague; Basic Perspective Drawing - A Visual Approach; John Wiley & Sons; 5<sup>th</sup> edition 2010.
4. Mo Zell; The Architecture Drawing Course - Understand the principles & master the practices; Thames & Hudson; 2014

CATEGORY	L	T	S	CREDIT
PC	0	0	2	1
<b>CONTACT HOURS : 30</b>				

**Materials for Model Making:** Paper, Handmade paper / Handmade board, Cardboard, Mount boards, Balsa wood, soft wood, Plywood, cork sheets, plaster of paris, Perspex sheets, expanded polystyrene (Thermacole), Plastic sheets, etc.

Exercises in straight and curved cutting and preparation of simple geometrical objects. Exercises in preparing block models of groups of buildings including roads and landscaped open spaces.

Exercises in preparing detailed models of buildings from given set of drawings. The subject teacher shall co-ordinate with the Architectural Design Studio in-charge while working out / Setting out the various exercises in model

CATEGORY	L	T	S	CREDIT
PC	0	0	9	10
<b>CONTACT HOURS : 135</b>				

**OBJECTIVE:**

- The objectives of this course is to understand the process of appreciating and designing built forms, understanding the concept of shelter, study of user circulation, the measure of space, designing simple building typologies in a presentable form.

**COURSE CONTENTS:**

Extension of the compositional principles already taught in the earlier design studio; ideal design methodology; Understanding user circulation and space requirements; Taking up design of small uncomplicated spaces using the ideal-design methodology; Exploration of various methods of presentation; including the construction of 3-dimensional scaled models; Emphasis on visual design.

**References:**

1. Sausmarez Maurice De, (1987), Basic Design – The dynamics of Visual Design, Herbert Press, London
2. Rochon Richard and Linton Herald, (1991), Colour in Architectural Illustration, Van Nostrand Reinhold, NY
3. Itten Johanes, (1973), The art of colour, Van Nostrand Reinhold, NY
4. Hillyer VM, Huey EG, (1996), Story of Sculpture, Nelson, Meredith Publishing Company, NY
5. Wagenknecht Kay, Herte, (1989), Site+Sculpture – A collaborated design Process, Van Nostrand Reinhold, NY
6. Burden Ernest, (1987), Design Communication, McGrawHill, USA

## **SEMESTER - III**

### **17AR310 HISTORY OF ARCHITECTURE - III**

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

#### **OBJECTIVES**

- To introduce the condition of modernity and its impact on society, including architecture and urbanism.
- To introduce and give an understanding of modern architecture as comprising of many new directions rising from different aspects of modernity.
- To create an overall understanding of the architectural developments in India rising out of colonial modernity and nationalism.

#### **UNIT I- MODERNITY AND ARCHITECTURE**

Overview of modernity as a historical phenomenon and its various aspects and manifestations, encompassing social, cultural, technological, economic and political changes. Outline of various strands of modernity in architecture. Enlightenment ideals. Neo Classical architecture and its types. Outline of Industrial Revolution and associated changes. Urban transformations in Europe and America. Mass Housing. New building types and spaces. Industrial material of steel, glass and concrete. New construction techniques and standardisation. Split of design education into architecture and engineering streams. Industrial exhibitions. Chicago School and skyscraper development.

#### **UNIT II REACTIONS TO INDUSTRIALISATION**

Reactions to industrialisation in design. Arts and Crafts in Europe and America including Morris and Webb. Art Nouveau including Horta, Van De Velde, Gaudi, Guimard and Mackintosh. Vienna secession.

#### **UNIT III IDEOLOGIES OF MODERN ARCHITECTURE AND ART**

Critique of ornamentation and Raumplan of Adolf Loos. Peter Behrens and Werkbund. Modern art and architecture - Expressionism, Futurism, Constructivism, Cubism, Suprematism and De-Stijl. Bauhaus. CIAM I to X and its role in canonising architecture. Outline of architects and works related to all the above.

#### **UNIT IV MODERNIST ARCHITECTS AND THEIR WORKS**

Ideas, works and evolution of Gropius, Corbusier, Aalto, Mies, Wright. Outline of spread and later directions of modern architecture including International Style and Brutalism. Ideas, works and evolution of Louis Kahn, Paul Rudolph, Eero Saarinen, Philip Johnson.

#### **UNIT V ARCHITECTURE OF COLONIALISM, MODERNITY AND NATIONALISM IN INDIA**

Colonialism in the Indian subcontinent. Ambiguous modernity through colonialism. Early colonial architecture including forts, bungalows, cantonments. Colonial urbanism, buildings of infrastructure, education, power and other typologies. Neo-Classicism, Gothic Revival and Indo-Saracenic as styles encompassing specific characteristics for specific intent. Influence of colonial modernity on Indians and their architecture. Building of New Delhi showcasing imperial power. Diverse directions and searches in early 20<sup>th</sup> century architecture of India. Pre-independence modern architecture in India.

#### **TEXTBOOKS**

1. Kenneth Frampton, 'Modern Architecture: A Critical History', Thames & Hudson, London, 2007.
2. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
3. Manfredo Tafuri., 'Modern Architecture', Harry N. Abrams Inc, 1980.
4. Leonardo Benevolo, 'History of Modern Architecture', 2 Vols. reprint, MIT Press, 1977.
5. G. H. R. Tillotson, 'The Tradition of Indian Architecture: Continuity, Change, and the Politics Of Style since 1850', Yale University Press, 1989.
6. Miki Desai et. al., 'Architecture and independence', Oxford University Press, 2000.

#### **REFERENCES**

1. Thomas Metcalf, 'An Imperial Vision', Oxford University Press, 2002.
2. Christian Norburg-Schulz., 'Meaning in Western Architecture', Rizzoli, Revised Edition, 1993.
3. Bill Risebero, 'Modern Architecture and Design: An Alternative History', MIT Press, 1985.
4. Norma Evenson, 'The Indian Metropolis: A View Toward the West', Yale University Press, 1989.
5. K.R.Sitalakshmi, 'Architecture of Indian Modernity- The Case of Madras', Palaniappa Brothers, 2015.

17AR320

**THEORY OF DESIGN**

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- The objective of this course is Introduction to evolution of design thinking, process and methodology, principles of Architectural composition, critical appraisal of buildings and design for the design philosophy and aesthetic principles involved.

**MODULE 1**

Origin and development of architecture. Different types of arts and their philosophical relationships with societies in history. Art and their principles of composition from various eras and societies which defines their relationship of their philosophies of aesthetics common to all art forms including architecture and understanding them through analysis of paintings, sculpture, furniture, photography, etc.; for example: Greek, Vedic Indian, Bauhaus, etc.

**MODULE 2**

Observation and rational analysis: Graphics of analysis and designing process. Discussion on aspects of creative thinking. Definition of art, artist, engineer, craftsmen, designer and where does architect fit. Design process experiments in history, and chart of design methodologies followed by various architects and designers.

**MODULE 3**

Formal aesthetics related to volume, space: Perception of space, various definitions of space in history and its implication in the aspects of design. Elements of design like color, texture, light and shade, pattern in design, geometry of various shapes and their meaning in design.

**MODULE 4**

Tools of composition like unity, mass and form, contrast, harmony, symmetry and asymmetry, positive and negative spaces, scale and proportions, which could be understood by analyzing Indian and foreign buildings in history and its comprehensive analysis. Finally understanding the relationship of philosophy, design process, design methodology, and application of elements and tools of composition by studying various forms of design.

**References:**

1. Robertson, H & Arkinson, R (1924), The Principles of Architectural Composition, The Architectural Press, London
2. V.S.Parmar, (1990), Design Fundamentals, Somaiya Publications Private Limited, New Delhi
3. John Lang, (1987), Creating Architectural Theory, Van Nostrand Reinhold Company, New York
4. Christian Norberg – Schulz, (1971), Existence, Space and Architecture, Studio Vista Limited, London
5. Simon Unwin, (1997), Analysing Architecture, Routledge London & New York
6. Francis D.K.Ching, (1979), Architecture-Form, Space and Order, Litton Educational Publishing Inc., Van Nostrand Reinhold Company, London
7. Richard Padoram, E & FN SPON, (1999), Proportion, Science Philosophy Architecture, Taylor and Francis Group, Routledge, New York and London
8. Baker, Geoffrey, (1989), Design Strategies in Architecture an approach to the analysis of Form, E & FN spon, N.Y.
9. Iengar, Keshavram M (1996), Composing Architecture, Academy of Art and Architecture, Mysore.

10. Jencks Charles ;Kropf Karl, (2003), Theories and manifestoes of contemporary architecture, New York
11. Frampton Kenneth; Glusberg Jorge (2000), World Architecture 1900-2000, Springer Wien, New York
12. Ballantyne Andrew, (2002), What is Architecture? New York
13. Unwin Simon, (2000), Architecture Note Book, Routledge, London
14. Pandya Yatin, (2007), Elements of Space Making, Mapin Publications, Ahmedabad
15. Pandya Yatin, (2005), Concepts of Space in Traditional Indian Architecture, Mapin Publications, Ahmedabad.

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To enable a student to understand the basic concepts of shear force and bending moment acting on beams subjected to various loading conditions through exercises.
- To determine the stresses in beams and strength of sections by working out problems.
- To calculate deflection of beams using methods and to study the theory of columns by working out problems.
- To understand the concept of indeterminate structure and its analysis.

**MODULE 1 BENDING OF BEAMS**

Beams and supporting conditions - Types of supports – Shear force and bending moment for Simply supported, Cantilever and Over hanging beams - Theory of simple bending - Stress distribution at a cross section due to bending moment and shear for Rectangular, I and T sections - concept of Flitched beams (no mathematical calculation).

**MODULE 2 DEFLECTION OF BEAMS**

Relation between slope, deflection and curvature-Determination of deflection and slope for simply supported and Cantilever beams using Double Integration Method, Macaulay's method and Moment Area Method.

**MODULE 3 THEORY OF COLUMNS**

Columns- Concept of Axial and eccentric loads on columns- Combined bending and axial load – Euler's and Rankine formulae for columns - simple problems.

**MODULE 4 STATICALLY INDETERMINATE BEAMS**

Introduction-Determination of degree of statical indeterminacy for beams and frames advantages and disadvantages-method of consistent deformation-application to simple problems.

**MODULE 5 CONCEPTS IN ANALYSIS OF STRUCTURES**

Method of Moment distribution for continuous beams and Single portal frames - Concept of load distribution for structural systems and overall stability like a) One way b) Two way c) Arches e) portal frames f) Space Structures.

**TEXTBOOKS:**

1. R.K. Bansal, A Text Book on Strength of Materials – Laxmi Publications, New Delhi, 2006.
2. B.C. Punmia, SMTS-I, Strength of Materials – Laxmi Publications, New Delhi, 1994.
3. POPOV, E.P., Mechanics of solids, Prentice - Hall Inc, Englewood Cliffs, New Jersey – 1976.
4. S. Ramamrutham and Narayanan R., Strength of Materials, Dhanpat Rai Publications, New Delhi, 2002.

**REFERENCES:**

1. Timoshenko, C.P., and Gere., Mechanics of materials, McGraw - Hill Book Company, New York, 1984.
2. Khurmi R.S., A text book of Engineering Mechanics, S. Chand and Co, New Delhi, 1999.
3. M.M. Ratwani & V.N. Vazirani, Analysis of Structures, Vol. 1, Khanna Publishers – Delhi, 1987.
4. A.R. Jain and B. K. Jain, Theory and analysis of structures, Vol. 1, Nemchand and Bros, Roorkee; 1987.

CATEGORY	L	T	S	CREDIT
BS & AE	2	0	2	4
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES**

- To give an introduction to metal as a material for building construction.
- To give knowledge about the principles, methods of construction and applications of metals for structural and non-structural building components.
- To provide familiarity with market forms of metals and finishes for them.
- To enable design and detail using metals in buildings.

**UNIT I FERROUS METALS IN BUILDING CONSTRUCTION**

Introduction to iron and steel as building materials including their history, early context of usage, evolution and current scenario. Brief study of steel in terms of manufacture, properties, types, uses, protection and finishes. Corrosion of ferrous metals and its prevention. Fire protection of steel. Steel alloys, properties and uses. Introduction to steel products for structural and non structural use. Introduction to steel joints such as welding, riveting. Stainless steel. Outline of current developments and innovation in the field.

Assignments on the above.

**UNIT II STEEL IN NON STRUCTURAL BUILDING COMPONENTS**

Understanding steel in non structural building components through sketching or drawing the principles and studying/documenting projects through assignments/ models/ sketches/ drawings. Components to include door, window, ventilator, rolling shutter of different types as applicable - openable, sliding, pivoted, fixed, louvred. Glazing, hardware and fixing for components.

Simple design exercises in the application of steel in non structural building components through models/ drawings.

**UNIT III STEEL IN STRUCTURAL BUILDING COMPONENTS**

Understanding steel in structural building components through sketching or drawing the principles and studying/documenting projects through assignments/ models/ sketches/ drawings. Components to include steel in foundations, columns and beams, staircases, roofs (trusses, space frames, etc), total structures such as geodesic dome. Connections between the different components and fixing. Materials for glazing, cladding, roof covering, etc., as required for particular components and their fixing.

Simple design exercises using structural steel in appropriate context/projects through models/drawings.

**Unit IV NON FERROUS METALS IN BUILDING CONSTRUCTION**

Introduction to aluminium and aluminium alloys including their history, early context of usage, evolution and current scenario. Their manufacture, properties, durability, and uses. Aluminium products such as extrusions, foils, castings, sheets. Finishes for Aluminium. Outline of current developments and innovation in the field.

Understanding aluminium in non structural building components through sketching or drawing the principles and studying/documenting projects through assignments/ models/ sketches/ drawings. Components to include door, window, ventilator of different types- openable, sliding, pivoted, fixed, louvred, etc., as applicable. Use of aluminium for interior components such as panelling, partitions and false ceiling. Glazing, hardware and fixing for components. Introduction to Aluminium curtain wall glazing.

Simple design exercises in the application of aluminium in appropriate projects through models/ drawings.

Introduction to other non-ferrous metals such as copper, lead, zinc. Their manufacture, properties, uses and finishes.

## **UNIT V      DESIGN AND DETAILING USING METALS**

A design and detailing exercise involving metals as primary construction material in a small project as considered appropriate. The project will integrate knowledge from all the previous units. The design and construction details will be submitted in the form of models/ drawings.

### **TEXTBOOKS**

1. P.C Vargheese, 'Building Materials', Prentice Hall of India Pvt. Ltd., New Delhi, 110001
2. S.K. Duggal, 'Building materials', Oxford and IBH publishing Co, put, Ltd, New Delhi 110001, 1997.
3. Dr. B.C.Punmia, 'A Text book of Building Construction', Laxmi Publications Pvt. Ltd., New Delhi, 2001.

### **REFERENCES**

1. Gorenc, Tinyou, Syam, 'Steel Designer's Handbook', CBS Publishers and Distributors, New Delhi, Bangalore, 2005
2. Alan Blanc, 'Architecture and Construction in Steel', E&FN Spon, London, 1993
3. Allan Brookes, 'Cladding of Buildings', E&FN Spon, London, 1998.

CATEGORY	L	T	S	CREDIT
SEC	1	0	2	2
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- The objective of this course is to impart training in the use of computer aided design and drafting techniques in Architectural design and detailing.

**COURSE CONTENTS:**

- Introduction to computer fundamentals, file management
- Overview of CAD in Architecture – Introduction to various CAD software for architectural application
- Getting started with AutoCAD – Drawing setup – units, limits, precision
- Drawing simple objects – sign convention, point, line arc, circle, polyline, polygon, use of other draw commands – spline, block, hatch, text
- Dimensioning
- Modify commands – editing of objects such as erase, copy, mirror, scale, move, rotate etc.
- Formatting – concept of layer, layer management, color, text style, line type, dimensioning style, multiline
- Surface modeling
- Concept of 3D modeling – primitives, boolean techniques
- View ports, 3D view point preset views, isometric views, model space, paper space
- Commands for printing – page set up, print preview, print
- Architecture related exercises such as drawing plan, elevation, sections of buildings

**REFERENCES:**

1. AutoCAD reference manual
2. Omur George, (1999), Mastering AutoCAD, BPB Publications
3. Architectural Desktop reference manual.

CATEGORY	L	T	S	CREDIT
BS & AE	1	0	2	2
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES**

- To inform about the ways in which the characteristics of sites can be understood.
- To enable an understanding of the macro and micro impact of buildings on it.
- To give understanding of the potential/limitations site offers to the design of the built environment.
- To give exposure to different terminologies and techniques associated with site, site surveying, site analysis and site planning.

**MODULE I INTRODUCTION TO SITE AND SITE SURVEYING**

Definition of plot, site, land and region, units of measurements. Introduction to survey and need for surveying. Methods of surveying and context of use. Chain survey and Triangulation - instruments used, method of survey and plotting into survey drawing. Plain table, Compass and theodolite surveys - method, instruments used and application. Modern surveying Instruments such as EDMs and Total Stations and their application.

Outline of how to measure and draw out a site plan from measurements and compute area by geometrical figures and other methods. Introduction to marking plans, layout plans and centerline plans. Importance and procedure for making these drawings and dimensioning. Outline of procedure and precautions of setting out a plan on site.

Field exercises in measuring and drawing a site.

**MODULE II SITE ANALYSIS**

Introduction to site as offering potential/limitations to the designed environment. Importance of site analysis. On site and off site factors. Analysis of natural, cultural and aesthetic factors. To include topography, hydrology, soils, vegetation, climate and microclimate, surface drainage, accessibility, size and shape, infrastructure, sources of water supply and means of disposal system, visual aspects, context of built environment. Preparation of site analysis diagram for any real site for a particular project.

**MODULE III DETAILED ANALYSIS AND TECHNIQUES**

Study of contours, slope analysis, grading process, grading criteria, functional and aesthetic considerations. Preparation of maps of matrix analysis & composite analysis methods. Site selection criteria for housing development, commercial and institutional projects.

Assignments/ case studies of any real project/site.

**MODULE IV SITE CONTEXT AND REGULATIONS**

Context of the site. Introduction to existing master plans, land use for cities, development control rules. Impact of proposed developments on the surroundings especially with reference to large scale projects. Aspects such as increase in traffic, noise and pollution to surroundings.

Assignments/ case studies of any real project/site.

**MODULE V SITE LAYOUT AND DEVELOPMENT**

Organization of vehicular and pedestrian circulation and geometric calculation for movement. Types of roads, hierarchy of roads, networks, road widths and parking regulations. Principles of positive drainage and grading for drainage. Location and design of sewage treatment plants. Methods to control soil erosion. Location of utility lines to simplify maintenance. Planning for rain water harvesting. Incorporation of services such as drinking water pipelines, fire hydrants, communication and networking facilities at site. Vegetation, landforms and water as modifiers of microclimate.

Assignments/case studies of any real project/site. Conceptual design exercises involving site planning for a particular hypothetical/real project with an actual site through analysis/sketches/drawings.

**TEXTBOOKS**

1. Kevin Lynch, 'Site planning', MIT Press, Cambridge, MA, 1967.
2. Edward. T. Q, 'Site Analysis', Architectural Media, 1983.
3. B.C.Punmia, 'Surveying Vol.I', Standard Book House, New Delhi 1983.

**REFERENCES**

1. Joseph De.Chiarra and Lee Coppleman, 'Urban Planning and Design Criteria', Van Nostrand Reinhold Co., 1982.

**17AR380 ARCHITECTURAL DESIGN - I**

CATEGORY	L	T	S	CREDIT
PC	0	0	9	11
<b>CONTACT HOURS : 135</b>				

**OBJECTIVES:**

- To enable a firsthand understanding of the basic aspects of architecture and interrelationships among them through personal exploration- experiential form/space, space planning and activities, user perception and behavior.
- To supplement this understanding through theoretical studies.
- To understand the characteristics of site and the importance of site planning.
- To understand the potential of materials and construction in architectural experience
- To enable the presentation of concepts through 2D drawings, sketches and model.

**CONTENT:**

**Scale and Complexity:**

Projects involving organization of multiples of single unit space with predominantly horizontal movement as well as single use public buildings of small scale; passive energy

**Areas of concern/ focus:**

Individual development of subjective and objective capacity for thought in study and design. Built form-open space relationships, spatial organization Environment behavior studies, especially those relating to children Site planning Appropriate materials and construction

**Suggestive Typologies/ Projects:**

residential buildings, small institutional, civic and public buildings- nursery/ primary schools, schools for children with special needs, primary health center, banks, neighborhood market, neighborhood library, other projects- gate complexes including security kiosk and entry / exit gates.

**TEXTBOOKS:**

1. Joseph De Chiara, Michael J Crosbie, Time Saver Standards for Building Types, McGrawHill Professional 2001.
2. Julius Panero, Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design, 1975.
3. Steen Eiler Rasmussen, Experiencing Architecture; MIT Press; 1959. 4. Kevin Lynch, Site planning, MIT Press, Cambridge, 1967.

**REFERENCES:**

1. Richard P. Dober, Campus Planning - Reinhold Book Corporation, 1963.
2. Sam F.Miller, Design Process: A Primer for Architectural and Interior Design, Van Nostrand Reinhold, 1995.
3. Dudek M, Schools and Kindergartens, Birkhauser 2007.

## **SEMESTER - IV**

### **17AR410 CONTEMPORARY ARCHITECTURE OBJECTIVES**

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

- To introduce the large scale changes from 1960s as context for new thought in architecture.
- To give exposure to the critiques of modern architecture and subsequent action.
- To study in detail the different post modern directions in architecture.
- To give an outline of architectural approaches across the world from late 20<sup>th</sup> century.
- To give an understanding of the trajectory of post independence architecture of India till the present.

### **MODULE I POSTMODERNITY AND ARCHITECTURE**

Outline of changes in society after the 1960s characterised as condition of postmodernity, to include the realms of economics, technology, culture, society and environment. Critique of modernism and writings on architecture and the built environment by Jane Jacobs, Robert Venturi, Aldo Rossi and Christopher Alexander. Team X.

### **MODULE II POSTMODERN DIRECTIONS IN ARCHITECTURE**

Semiology and Postmodernism, works of Graves, Venturi, Moore. High Tech architecture, works of Stirling, Rogers and Piano. De-constructivist theory and practice, ideas and works Eisenmann, Hadid, Gehry, Libeskind, Tschumi. Urban ideas/works of Soleri, Archigram and Metabolism. Neo rationalism. Critical Regionalism, ideas and works of Fathy, Ando, Bawa, Barragan, Siza.

### **MODULE III POST INDEPENDENCE ARCHITECTURE OF INDIA**

Modern architecture and national identity - Chandigarh. Outline of post-independence architecture of India with emphasis on national building and institutions as well as PWD architecture. Works of Kanvinde, Habib Rehman. Outline of evolution of the architectural profession in India, influences on architects, transformations in architecture from modernism to more contextual approaches. Evolution and works of Raje, Doshi, Correa, Nari Gandhi, Raj Rewal, Laurie Baker. Outline of new directions after 1960s.

### **MODULE IV CONTEMPORARY ARCHITECTURE OF THE WORLD**

Overview of larger changes in society from late 20<sup>th</sup> century and their influence on architecture. Outline of architecture related to parametric design and digital processes, sustainability, globalisation, phenomenology, complexity. Ideas and works of ZHA, contemporary Dutch architecture, Bjarke Engels and BIG, OMA and Rem Koolhaas, Steven Holl, McDonough, Yeong, Zumthor, Pallasma, Murcutt. Outline of contemporary architecture in the non Western world.

### **MODULE V CONTEMPORARY ARCHITECTURE IN INDIA**

Large scale changes in India from the 90s. Outline of post 1990s architecture of India.

### **TEXTBOOKS**

- Kenneth Frampton, 'Modern Architecture: A Critical History', Thames & Hudson, London, 2007.
- William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
- Diane Ghirardo, 'Architecture after Modernism', Thames & Hudson, London, 1990.
- Bhatt and Scriver, 'Contemporary Indian Architecture- After the Masters', University of Washington Press, 1991
- Bahga et al, 'Modern Architecture in India - Post Independence Perspective', Galgotia, 1993
- Miki Desai et. al., 'Architecture and Independence', Oxford University Press, 2000.
- Harry Francis Malgrave and David Goodman, 'An Introduction to Architectural Theory 1968 to the Present', Wiley Blackwell, 2011.
- Rahul Mehrotra, 'Architecture in India since 1990', Hatje Cantz, 2011.

## REFERENCES

- Jane Jacobs, 'Deaths and Life of Great American Cities', Vintage, 2003.
- Christopher Alexander, 'Pattern Language', Oxford University Press, Oxford, 1977.
- Robert Venturi , 'Complexity and Contradiction in Architecture', 1977.
- Kate Nesbitt, Ed, 'Theorising a New Agenda for Architecture', Princeton University Press, 1996.
- K.R.Sitalakshmi, 'Architecture of Indian Modernity- The Case of Madras', Palaniappa Brothers, 2015
- Bipin Chandra et al, 'India After Independence', Penguin, 1999.

CATEGORY	L	T	S	CREDIT
BS & AE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

**OBJECTIVES:**

- To study the water quality control and treatment and its distribution within a building.
- To understand the fundamentals of waste disposal from a building and the guidelines for planning a sewerage system.
- To expose the students to water and waste management concepts.
- To familiarize the students with equipment for management of usable water and waste water.

**MODULE 1 WATER QUALITY CONTROL AND DISTRIBUTION SYSTEM**

Sources of water- Quality of water for domestic and other uses. Water treatment. Distribution to facility. Choice of pipes – Materials and sections – applications. Storage of water for domestic use and fire safety – up feed and down feed distribution systems-Layout of plumbing systems. water management- Calculation of water tank capacity - Rain water harvesting, water efficient fixtures/ fittings.

**MODULE 2 SANITARY WASTE AND SEWERAGE SYSTEM**

Sewage and sewerage – source, collection and disposal – types of pipes – sanitary fixtures, fittings, connectors / joints, traps and seals. Treatment plant – sizes and spatial requirements for installation in site.

**MODULE 3 MECHANICAL SYSTEMS**

Pumps, motors- types and applications in water supply and sanitation- location in the site and the facility- Automation systems. Energy efficient systems.

**MODULE 4 CASE STUDIES**

Visit to residences/ apartments, Sewage treatment plant, hospital, hotel, office and institutions. Documentation and Analysis of water supply and plumbing systems – sources of water, water tank capacity, distribution and water management –Standards related to water supply - NBC 2005.

**MODULE 5 EXERCISES**

Design of water tank, plumbing systems and prepare drawings of plumbing layout-Plan, section-drawn to scale. Specification of pumps, pipes, motors, water tanks & treatment plants. TOTAL: 60 PERIODS

**TEXTBOOKS:**

1. Manual of water supply and treatment, Second edition, CPHEEO, Ministry of works and housing, New Delhi 1977.
2. AFE Wise, JA Swaffied Water, Sanitary & Waste Services in buildings – Mitchell Publishing Co. Ltd. – 2002, V Edition.
3. National Building Code 2005. 4. Indian Standard CODE OF PRACTICE FOR WATER SUPPLY IN BUILDINGS, IS : 2065 – 1983.

**REFERENCES:**

1. G.M. Fair, J.C. Geyer and D.Okin, 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, New Delhi, 1980.
3. S.C.Rangwala, Water supply and sanitary engineering, Chartar publishing house, Anand 3888601, Lecture notes compiled by Chaman.L.Gupta, 1989.
4. Renewable energy, basics and technology, supplement volume on integrated energy systems) Solar Agni systems, Sri Aurobindo Ashram, Pondicherry 605002.

**17AR430 DESIGN OF STRUCTURES - I**

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To enable the design of different types of masonry walls and retaining walls.
- Also, to teach the students the design of different types of timber structures and steel members.

**MODULE 1 DESIGN OF WALLS**

Retaining walls - Types of retaining walls -design of R.C.C cantilever retaining walls Masonry walls- Analysis and design of masonry walls-use of nomograms for design.

**MODULE 2 DESIGN OF TIMBER STRUCTURES-BEAMS AND COLUMNS**

Grades of timber –design of timber beams and columns- madras terrace roof design.

**MODULE 3 CONNECTIONS IN STEEL STRUCTURES**

Assumptions-Failure of bolted joints-strength and efficiency of bolted joints-types-design of bolted joints for axially loaded members excluding eccentric connections- Types of welded joints-advantages and disadvantages-design of fillet welds (excluding eccentric connections).

**MODULE 4 STEEL TENSION MEMBERS**

Introduction-net sectional area-permissible stresses- design of axially loaded tension member-lug angle-tension splice.

**MODULE 5 COMPRESSION MEMBERS AND BEAMS**

Introduction-various sections-built up sections-design of columns excluding lacing and battening and other connections-Introduction to steel beams-laterally supported and unsupported beams-design of laterally supported beams.

**TEXTBOOKS:**

1. B.C. Punmia, Reinforced Concrete Structures, Vol. 1 & 2, - Laxmi Publications, Delhi, 2004.
2. IS 456:2000, Indian Standard, Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standards.
3. IS 1905:1987, Indian standard for design of masonry walls-Code of Practice, Bureau of Indian Standards.
4. L.S. Negi, Design of Steel Structures – Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
5. S. K. Duggal - Limit State Design of Steel Structures, Publications, Tata McGraw Hill Education 2005.
6. S.S Bhavikatti -Design of steel structures (as per IS 800:2007),I.K International, 2015.
7. N. Subramanian- Design of steel structures ,Oxford Higher Education, India, 2008.

**REFERENCES:**

1. A.S.Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971.
2. National Building Code of India, Part VI, Structural Design,1983.
3. Gurucharan Singh, Design of Steel Structures, Standard Publishers, New Delhi, 1982.
4. Dayaratnam.P, Design of Steel Structures, Oxford and IBH Publishing Co.
5. IS 883 – Code of Practice for Design of Structural Timber in Buildings.
6. IS 800 - 2007 – Code of Practice for use of Structural Steel in General Building Construction.

**17AR450 BUILDING MATERIALS AND  
CONSTRUCTION TECHNOLOGY - IV**

CATEGORY	L	T	S	CREDIT
BS & AE	2	0	2	4
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES**

- To give an introduction to cement and concrete as materials for building construction.
- To help understand the principles, types, methods of construction and applications of concrete for structural and non-structural building components.
- To enable design and detail using concrete in buildings.

**MODULE - I INTRODUCTION TO CEMENT AND CONCRETE**

Introduction to cement and concrete as building material including their history, early context of usage, evolution and listing of types. Composition, manufacture, properties, types and uses of cement. Tests for cement. Introduction to cement mortar and plastering and their composition. Concrete and its composition. Mix design. Nature of aggregates for mix including classification, sources, shape, size, grading, sampling and analysis. Proportioning, water-cement ratio, workability. Stages in concrete construction- formwork, mixing, placing, curing. Cement and concrete finishes including roughcast, dry dash, textured, stucco. Water proofing and damp proofing of concrete. Understanding all the above through sketching/ drawing the principles and studying/documenting projects through assignments.

**MODULE - II CAST IN-SITU CEMENT CONCRETE IN BUILDING CONSTRUCTION**

Understanding cast in situ cement concrete (plain and reinforced) in building components through sketching/drawing the principles and studying/documenting projects through assignments/ models/ sketches/ drawings. Components to include different types of foundations, columns and beams, lintel and sun shade, sump, water tank, staircase. Concrete in flooring. Concrete finishes. Damp proofing, waterproofing treatment for components. Design exercises involving concrete staircase of different types through models/drawings.

**MODULE - III PRECAST CONCRETE PRODUCTS IN BUILDING CONSTRUCTION**

Introduction to different types of simple precast concrete products in structural and non structural building components. Components to include different types of blocks/tiles for walls, floors and roof, jali, parapet, paving. Study of their manufacture, laying, finishing. Understanding all the above through sketching/drawing the principles and studying/documenting projects through assignments/ models/ sketches/ drawings. Simple design exercises using precast concrete products as structural and non structural components in appropriate projects through models/drawings.

**MODULE - IV SPECIAL CONCRETES AND INNOVATIONS IN CONCRETE**

Introduction to special concretes, to include lightweight concrete, aerated concrete, no-fines concrete, polymer concrete, pre-stressed concrete, fibre-reinforced concrete, ready-mixed concrete, ferrocement. Introduction to building materials and components developed by research organisations like CBRI, SERC, NBO, and BMTPC. Understanding special concretes and innovations in building components through sketching/drawing the principles and studying/documenting projects through assignments/ models/ sketches/ drawings.

**MODULE - V DESIGN AND DETAILING USING CONCRETE**

A design and detailing exercise involving concrete as primary construction material in a small project as considered appropriate. The project will integrate knowledge from all the previous units. The design and construction details will be submitted in the form of models and/or drawings.

## **TEXTBOOKS**

- M.S.Shetty, 'Concrete Technology', S.Chand, 2005.
- S.K Duggal, 'Building Materials', Oxford and IBM Publishing Co, Pvt Ltd, 1997.
- Dr. B.C.Punmia, 'A Text book of Building Construction', Laxmi Publications Pvt. Ltd., New Delhi, 2005.
- T.D Ahuja and G.S. Birdie, 'Fundamentals of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1996
- S.P Arora and S.P Bindra, 'A Text Book of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1990
  - Publishing Company Pvt. Ltd., New Delhi, 1990

## **REFERENCES**

- Arthur Lyons, 'Materials for Architects and Builders - An Introduction', Arnold, London, 1997.
- Don A.Watson, 'Construction Materials and Processes', McGraw Hill Co., 1986.
- S.N Sinha, 'Reinforced Concrete Design', Tata-McGraw Hill, New Delhi, 2002
- Howard Kent Preston, 'Prestressed concrete for Architects and Engineers', McGraw Hill, New York, 1964
- Alan Blanc, 'Stairs, Steps and Ramps', Butterworth, Heinemann Ltd., 1999
- R. Chudley et al, 'Construction Technology', Heinemann, 2011.
- 'Standards and Specifications for Cost Effective Innovative Building Materials and Techniques', BMPTC Publication, New Delhi.
- Pamphlet and Manuals supplied or published by SERC, BMPTC, HUDCO and other research organisations.

**17AR460**

**COMPUTER APPLICATIONS IN  
ARCHITECTURE - II**

CATEGORY	L	T	S	CREDIT
SEC	1	0	2	2
<b>CONTACT HOURS : 45</b>				

**CONTENTS**

Attributes – understanding object linking and embedding – Importing objects into AutoCAD using OLE working with OLE objects. Understanding 3D coordinate system - Using View ports – 3D drawing & Editing commands – Interactive Viewing in 3D.

Surfacing in 3D, working with advanced surfacing commands – Solid modeling – Advanced solid modeling commands – Editing Solids

Introduction to rendering in 3D – Rendering process – Enhancing digital images from CAD application using Adobe Photoshop, Paint Shop Pro & other graphic programs.

**References:**

1. Ron House "AutoCAD 2000"
2. Omura George, "Mastering AutoCAD 2000", BPB Publications, New Delhi, 1988.

CATEGORY	L	T	S	CREDIT
PC	0	0	11	12
<b>CONTACT HOURS : 165</b>				

**OBJECTIVES:**

- To understand the built environment as a holistic, living, entity shaped by historic sociocultural, geographic and economic aspects.
- To make a comprehensive study of rural settlement as exemplar of collective design that evolved organically over time.
- To understand vernacular/traditional architecture and their details, including local materials and construction techniques.
- To expose the students to various methods of recording/getting information, including surveys and documentation, covering physical, visual and demographic aspects.
- To expose the students to ways of analysing, organising, interpreting and presenting information and analysis.
- To emphasise on the importance of designing built form and open spaces that meet the aspirations of the community.

**CONTENT:**

**Scale and Complexity:** Study projects involving rural settlement; Design projects involving public and community oriented buildings within the context of human settlements -multi room, single use, small span, maximum G+2 storeyed, simple horizontal and vertical movement; active passive energy.

**Area of concern/ focus:** rural settlements and architecture community oriented design simple public buildings set within community

**Suggestive Typologies/ projects:** Rural projects that involve studies and design at settlement and building level- noon meal centre, market, community centre, local buildings for economic activities, primary health centre; small community/ need oriented urban projects such as department store, campus students centre.

**TEXTBOOKS:**

1. Amos Rapoport, House, Form and Culture; Prentice hall; 1969.
2. Bernard Rudovsky, Architecture without Architects; Cost reduction; Architectural Press; 1964.
3. Joseph De Chiara, Michael J Crosbie, Time Saver Standards for Building Types, McGraw Hill Professional 2001.

**REFERENCES:**

1. Ramachandran H, Village Clusters and Rural development, Concept Publications 1980.
2. Thorbeck D, Rural design, Routledge 2002.
3. Hassan Fathy, Architecture for the Poor, University of Chicago press, 1973.

## **SEMESTER - V**

**17AR510**

**LANDSCAPE DESIGN**

CATEGORY	L	T	S	CREDIT
PC	2	0	0	2
<b>CONTACT HOURS : 30</b>				

### **OBJECTIVES:**

- To introduce the various aspects of outdoor design and site planning in enhancing and improving the quality of building environs, functionally and aesthetically.
- To familiarize students with the various elements of landscape architecture and the principle of landscape design.
- To develop and strengthen the competence in dealing with the analytic, artistic and technical aspects of designing open spaces at different scales.
- To stress on the role of Landscape design in sustainability, to provide an overview of ecological balance and impacts of human activities and the need for environmental protection and landscape conservation.

### **MODULE 1 INTRODUCTION**

Introduction to landscape architecture, Basic concepts of ecology and the impact of Human activities on them – Bio, Geo, chemical cycles including water cycle, carrying capacity of an ecosystem. Environmental impact assessment. Reclamation and restoration of derelict lands.

### **MODULE 2 ELEMENTS IN LANDSCAPE DESIGN**

Hard and soft landscape elements; Hard landscape elements, Plant materials, Water and Landform - classification, characteristics, use and application in landscape design.

### **MODULE 3 GARDEN DESIGN**

Landscape and garden design in Indian history – Gardens depicted in Sanskrit literature, Nandavanams and residential gardens of South India, Moghul gardens, public parks and residential gardens of the colonial period and contemporary public landscape projects. Study of notable examples, Spatial development in landscape design.

### **MODULE 4 SITE PLANNING**

Organisation of spaces in the outdoor environment – Role of circulation and built form in shaping the environment. Role of Landscape design in design of neighbourhood parks, children's play area and campus development.

### **MODULE 5 LANDSCAPING OF FUNCTIONAL AREAS**

Urban open spaces and principle of urban landscape; Street landscaping, landscape design for waterfront areas and functional areas in urban centers. Green infrastructure including green roofs and walls.

### **TEXTBOOKS:**

1. Motloch, J.L., An Introduction to Landscape Design, US: John Wiley and sons, 2001.
2. Michael Laurie, Introduction to Landscape Architecture, Elsevier, 1986.
3. Sauter D; Landscape Construction; Delmar Publishers; 2000.

### **REFERENCES:**

1. T S S for Landscape Architecture, McGraw Hill, Inc, 1995.
2. Grant W Reid, From Concept to Form in Landscape Design, Van Nostrand Reinhold Company, 1993.
3. Albert J. Rutledge, Anatomy of a Park, McGraw-Hill Book company, 1971.
4. Richard P. Dober, Campus Landscape, John Wiley and Sons; 2000.
5. Strom Steven, Site engineering for landscape Architects, John Wiley and sons Inc., 2004.
6. Brian Hacket, Planting Design, Mc Graw Hill, Inc, 1976.
7. T.K. Bose and Chowdhury, Tropical Garden Plants in Colour, Horticulture And Allied Publishers, Calcutta, 1991.
8. Rahoul B Singh, Gardens of Delight- Indian gardens through the ages, Lustre Press, Roli books, 2008.

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To inform the students of the laws and basics of electricity and wiring systems within domestic and commercial buildings.
- To expose the students to the fundamentals of lighting and lighting design.
- To expose the student to the standards and byelaws related to electrical and lighting design.

**MODULE 1 ELECTRICAL SYSTEMS: GENERATION**

Generation of electricity- Ohms and Kichoffs Laws – units : watt, volt, amps - distribution from grid to facilities- Two phase and three phase systems -substation, transformers, generators- Types-wire, conduits-types –Applications. Lightning conductors and earthing.

**MODULE 2 ELECTRICITY DISTRIBUTION IN BUILDINGS**

Distribution boards, Meters, switch boards, earthing. Electrical layout drawings for low rise buildings. Energy efficient systems and renewable energy resources.

**MODULE 3 INTRODUCTION TO LIGHTING**

Source of light. Electromagnetic spectrum- day light, electric light,. Quality and Quantity of light levels. Types of lamps / Luminaires- Applications. Impact of lighting on human beings. Subjective impressions. Energy efficient systems.

**MODULE 4 LIGHTING DESIGN BASICS**

Considerations for Lighting design- typology- room dimensions, openings design. Daylight factor. Integrated lighting. Choice of luminaires. Standards and bye laws.

**MODULE 5 LIGHTING DESIGN: EXERCISES**

Analysis of lighting from case studies- architects works – Lighting design for a particular typology – layout - drawings. Physical models and lighting study. Lighting simulation and performance analysis using lighting software – Autodesk Ecotect Analysis, Dialux or Lite Pro 2.0.

**TEXTBOOKS:**

1. E. P. Ambrose, Electric Heating, John Wiley & Sons Inc., New York, 1968.
2. Philips Lighting in Architectural Design, McGraw Hill. New York, 1964.
3. R. G. Hopkenson & J.D.Kay, The lighting of Buildings, Faber & Faber, London, 1969.
4. Gary Gordon, Interior Lighting for Designers, 5th Edition, John Wiley & Sons Inc., New York, Feb 2015.

**REFERENCES:**

1. Handbook of building Engineers in metric systems, New Delhi 1968.
2. National Lighting Code 2010.
3. Descottes, Herve and Cecilia E. Ramos, Architectural Lighting: Designing with Light and Space, Princeton Architectural Press, Princeton, 2011.

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To study the basic concepts of load transfer mechanism in structures.
- To use limit state design for the analysis and design of slabs, beams, columns, footings and staircases
- Case studies and models applicable.

**MODULE 1 BASIC CONCEPTS**

Lloads on Structure - combination of loads in design -Effect of Temperature and Settlement – Concepts of load flow in building elements like slab, beam, column and foundation Estimation of loads on slabs, beams, columns and foundation- Structural materials– Choice of Structural Material for different types of buildings- Methods of design -Concept of Elastic method, Ultimate load method and limit state method - Advantages of limit state method over other methods.

**MODULE 2 LIMIT STATE DESIGN OF SLABS AND STAIRCASES**

Behavior of one way and two way slabs-Design of one way slabs and two way slabs for various edge conditions and corner effects , circular slabs subjected to uniformly distributed loads-design of continuous slabs using codal coefficients –Detailing of slabs using SP34- Design of doglegged staircase.

**MODULE 3 LIMIT STATE DESIGN OF BEAMS**

Analysis and Design of singly, doubly reinforced rectangular and flanged beams for bending and shear - Design of continuous beams using codal coefficients -Detailing of beams using SP34.

**MODULE 4 LIMIT STATE DESIGN OF COLUMNS**

Long and short columns –axially loaded Rectangular and circular columns – Columns subjected to uniaxial and biaxial bending – Design of columns using column interaction diagrams – Use of SP16 – Detailing of columns using SP34.

**MODULE 5 LIMIT STATE DESIGN OF FOUNDATION**

Types of R.C.C. foundation –Design of wall footings, design of axially loaded rectangular pad footings and Sloped footings - Design of combined rectangular and trapezoidal footings.

**TEXTBOOKS:**

1. Park .R and Paulay .T, Reinforced Concrete Structures, John Wiley & Sonc Ic., New York, 1975.
2. Simha .N.C and Roy .S.K, Fundamentals of Reinforced Concrete, S.Chand & Co. Ltd., New Delhi, 2001.
3. B.C. Punmia, Reinforced Concrete Structures, Vol. 1 & 2, - Laxmi Publications, Delhi, 2004.
4. IS 456:2000, Indian Standard, Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standards.
5. SP – 16, Design Aids for Reinforced Concrete to IS 456 National Building Code of India, 1983.

**REFERENCES:**

1. Unnikrishna Pillai .S and Devadass Menon, Reinforced Concrete Design, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1998.
2. Neville .A.M, Properties of Concrete, Pitman Publishing Co., London, 1990.
3. Purushothaman .P, Reinforced Concrete Structural Elements, Tata McGraw Hill Publishing Co Ltd., New Delhi, 1984.
4. Ramamrutham .S and Narayanan .R, Reinforced Concrete Structures, Dhanpat Kai Publication, New Delhi, 1997.
5. S.S Bhavikatti -Design of steel structures (as per IS 800:2007),I.K International, 2015.
6. N. Subramanian- Design of steel structures ,Oxford Higher Education, India, 2008.
7. A.S.Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971.
8. National Building Code of India, Part VI, Structural Design,1983.

**17AR550**

**BUILDING MATERIALS AND  
CONSTRUCTION TECHNOLOGY – V**

CATEGORY	L	T	S	CREDIT
BS & AE	2	0	2	4
<b>CONTACT HOURS : 60</b>				

**MODULE 1**

Modular Co-ordination Module - basic module - multimodules - horizontal & vertical multimodules and sub modules. Modular space grid. Modular dimensioning and modular drawing.

**MODULE 2**

Preferred sizes for horizontal and vertical co-ordinating and controlling dimensions. Controlling dimensions for widths of building components & controlling zones. Controlling dimensions for heights of building components & controlling zones. Storey heights & room heights.

**MODULE 3**

Space structures. Skeleton frame works (space frames) - single layer grids (two way, three way & four way) and double layer grids (lattice grids & true space grids). Offset grids and differential grids.

**MODULE 4**

Study of prefabricated commercially available systems - Space Deck System, Triodetic System, Mero System & Nodus System. Geodesic Domes.

**MODULE 5**

Introduction to System Building / Method Building. Closed System & Open System. Analysis of building elements / components for introduction of prefabrication in India context. Classification of prefabricated components.

**References:**

1. Makowski, "Analysis, Design and Construction of Double - Layer Grids", Applied Science, London, 1981.
2. Heki,K., (ed.), "Shells, Membranes and Space Frames", Elsevier, New York, 1986.

CATEGORY	L	T	S	CREDIT
BS & AE	1	0	2	3
<b>CONTACT HOURS : 45</b>				

The students learn to draw working drawings used for building construction

**OBJECTIVES :**

Reading of working drawing, their co-relation and cross-referencing in various technical projections like plans, elevations, sections, detailing etc.

**MODULE – I BUILDING COMPONENTS**

Working drawing of different types of doors and windows.

**MODULE – II BUILDING SURFACES**

Working drawing of wall murals, reflected ceiling plans and flooring patterns.

**MODULE – III FURNITURE**

Working drawing of work station, living room furniture, bedroom furniture and dining tables.

**MODULE – IV DETAILING OF SPECIAL AREAS**

Working drawing for toilets with plumbing diagram – working drawing of kitchen with detailing of shelves and cupboards.

**MODULE – V DETAILING OF STORAGE AREAS**

Working drawing of wardrobes, TV cabinet and showcase, crockery shelves, cadenza, chest of drawers, dressing table, etc.

**REFERENCES**

1. De Chiara and Callender – Time Saver Standards for interior design, 1982.
2. De Chiara et al – Time Saver standards for interior design and space planning, Mcgraw Hill, 1982.

**17AR580 ARCHITECTURAL DESIGN - III**

CATEGORY	L	T	S	CREDIT
PC	0	0	11	12
<b>CONTACT HOURS : 165</b>				

**OBJECTIVES:**

- To explore the design of buildings addressing the socio-cultural & economic needs of contemporary urban society.
- To enable the students to understand the importance of spatial planning within the constraints of Development Regulations in force for urban areas.
- To enable the students to design for large groups of people in a socially and culturally sensitive manner in larger projects, and taking into account aspects such as large scale movement of people, identity.
- To emphasis on the importance of understanding the relationship between open space and built form, built form to built form and site planning principles involving landscaping circulation network and parking.
- To explore the addressing of functional needs in innovative ways- aspects of detailing, density, etc.,
- To introduce computer aided presentation techniques involving 2D and 3D drawings.

**CONTENT:**

**Scale and Complexity:** Buildings and small complexes that address the social and cultural needs of contemporary urban life (residential, commercial, institutional); multi bayed, multiple storeys, circulation intensive; passive and active energy

**Areas of concern/ focus** Socio-cultural and economic aspects Designing for the differently abled Building byelaws and rules Appropriate materials and construction techniques, detailing Climatic design

**Typology/project:** housing projects- detached, semi-detached, row housing, cluster housing, apartment; housing and facilities for other user groups- old age home, orphanage, working women's hostel, home for physically and mentally challenged; museum/art centre, educational campus, R & D centre, shopping complex.

**TEXTBOOKS:**

1. Joseph De Chiara, Michael J Crosbie, Time Saver Standards for Building Types, McGraw Hill Professional 2001.
2. Ernst Neuferts Architects Data, Blackwell 2002.

**REFERENCES:**

1. Rem Koolhaas Harvard Design School Guide to Shopping, TaSchen; 2001.
2. MVRDV, FARMAX- Excursions on Density; 010 Publishers; 2006.

## **SEMESTER - VI**

**17AR610**

**BUILDING ACOUSTICS**

CATEGORY	L	T	S	CREDIT
PC	2	0	0	2
<b>CONTACT HOURS : 30</b>				

### **OBJECTIVES:**

- The objective of this course is to understand the behavior of sound in an enclosed space and remedial measures for controlling unwanted noise.

### **MODULE1**

Acoustical / Sonic Environment and acoustical comfort. Sound, Nature of sound. Behavior of sound in enclosed spaces. Concept of Geometric Acoustics. Reflection of sound and their applications. Absorption of sound. Sound absorption coefficient. Reverberation & Reverberation Time Calculation.

### **MODULE 2**

Sound absorbing materials - Porous materials, Panel / Membrane absorbers & Cavity / Helmholtz Resonators. Absorption coefficients of indigenous acoustical materials. Space / Functional absorbers. Mounting conditions and its impact on sound absorption.

### **MODULE 3**

Acoustical design of Auditoriums - adequate loudness, uniform distribution of sound energy, optimum reverberation time & elimination of acoustical defects. Methods of raking the auditorium floor and the balcony. Acoustical Design of seminar rooms, Conference halls, Cinema Theatres etc.

### **MODULE 4**

Outdoor & indoor noise, airborne noise & structure borne noise / impact noise, community noise, & industrial noise. Transmission of noise & transmission Loss. Maximum acceptable noise levels. Means of noise control & sound insulation. Sources of industrial noise.

### **MODULE 5**

Sources of outdoor noise - Traffic noise - air traffic, rail traffic, road traffic and sea shore & inland water traffic. Planning & Design against Outdoor Noise - for air traffic, road traffic and rail traffic.

### **References:**

1. Knudson, Vern (1950), "Acoustical Designing in Architecture", John Wiley, N.Y.
2. Parich, Peter (1979), "Acoustics: Noise and Buildings", Faber and Faber, London
3. Kinsleter, Lawrence E. and Frey Austin R., (1989), "Fundamentals of Acoustics (ed.2)", Wiley Eastern Ltd., New Delhi
4. David Egan (1988), "Architectural Acoustics", McGraw Hill Book Co., NY
5. Templeton and Saunders (1987), "Acoustic Design", Architectural Press, London
6. Narasimhan V., (1974), "Introduction to Building Physics", Central Building Research Institute, Roorkee.
7. Templeton (ed.), "Acoustics in the Built Environment", Butterworth, London, 1993.

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To expose the students to the science behind an air-conditioning and refrigeration system.
- To familiarize them with the various air- conditioning systems and their applications.
- To study the design issues for the selection of various systems and their installation
- To inform of the various ways by which fire safety design can be achieved in buildings through passive design.
- To familiarize the students with the various firefighting equipment and their installation.

**MODULE I AIR CONDITIONING: BASIC REFRIGERATION PRINCIPLES**

Thermodynamics – Transfer of Heat- refrigeration cycle components – vapor compression cycle – compressors – evaporators – Refrigerant control devices – electric motors – Air handling Units – cooling towers.

**MODULE 2 AIR CONDITIONING: SYSTEMS AND APPLICATIONS**

Air conditioning system for small buildings and large building – Chilled water plant – All Air system, variable air volume, All water system -Configuring/ sizing of mechanical equipment, equipment spaces and sizes for chiller plant, cooling tower, Fan room, circulation Pumps, Pipes, ducts.

**MODULE 3 AIR CONDITIONING:DESIGN ISSUES AND HORIZONTAL DISTRIBUTION OF SYSTEMS**

Selection- Energy efficient systems - choices for small and large buildings - Horizontal distribution of services for large buildings - Grouped horizontal distribution of mechanical services. NBC 2005 and BIS.

**MODULE 4 FIRE AND SAFETY: DESIGN AND GENERAL**

Causes of fire in buildings- stages of fire and how it spreads- fire drill- Heat/ fire / smoke detection, alarm and extinguisher systems- fire safety standards- NBC 2005 General guidelines for egress design for multistory buildings. Exercises on drawing layout for fire safety systems in a building type.

**MODULE 5 VERTICAL TRANSPORTATION SYSTEMS IN BUILDINGS**

Elevators, escalators, conveyors, travelators, dumb waiters – types and applications-round trip time, design of lift lobby and vertical transportation core. Latest technologies in vertical transport systems. Integration of lifts and escalators with building automation systems. Case study visits to commercial complexes, hospitals, apartments and offices.

**TEXTBOOKS:**

1. William H. Severns and Julian R Fellows, Air conditioning and Refrigeration, John Wiley and Sons, London, 1988.
2. Fire Safety: National Building Code of India 2005.
3. ISHRAE Handbook for Refrigeration 2015.
4. The Vertical Transportation Handbook 4th Edition - George R. Strakosch (Editor), Robert S. Caporale – Wiley and sons, 2010.

**REFERENCES:**

1. A.F.C. Sherratt, Air conditioning and Energy conservation, The Architectural Press, London, 1980.
2. Andrew H Buchanan; Design for fire safety, John Wiley & Sons Ltd., NY.
3. Heating, ventilating and air conditioning –Swenson S. Don, Amer Technical Pub.
4. ISHRAE : All about AHUs – Air Handling Units. 5. CIBSE Guide D: Transportation Systems in Buildings (2010).

CATEGORY	L	T	S	CREDIT
BS & AE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To understand the behavior of structural systems for tall buildings and to design them for different types of loadings.
- To study the different types of tensile structures and their applicability.
- To learn the different industrial structures and their merits.
- To study the different types of shells.
- To study the different types of domes, folded plates and grids and their applications.

**MODULE 1 TALL BUILDINGS**

Load action in high rise buildings- structural systems for tall buildings - Brief outline of their behaviour and their applicability for various heights of buildings - Approximate analysis and design of frames for gravity and lateral loadings.

**MODULE 2 TENSILE STRUCTURES**

Concepts, Development, Laws of formation, Merits and demerits of Pneumatic Structures - Basic principles, various forms, Merits and Demerits of cable structures.

**MODULE 3 INDUSTRIAL STRUCTURES**

Classification - Planning and layout requirements, Functional requirements - Types of power plants - Bunkers and Silos, Cooling Towers, Containment structures - Transmission line towers - Chimneys - Merits.

**MODULE 4 SHELLS**

Shells of translation - Shells of revolution - Cylindrical barrel vaults - Multiple barrels - Corrugated curves, North light shells - Butterfly shells - Intersection shells - Groined vaults - Warped surface - Conoidal shells - Hyperbolic parabolic shells - Umbrella shells - Trumpet shells - Their merits.

**MODULE 5 DOMES AND FOLDED PLATES**

Domes of revolution, spheres, translator domes, multiple domes, Folded plate domes - Tapered elements, multifaceted Domes – Types – Classification as per BIS – Stress resultants – Relative merits and applicability. Folded plates – Types – Comparison with shells – Applicability. Arches – Basic concepts - grids- Definitions - various forms - Geodesic domes.

**TEXTBOOKS:**

1. Thandavamoorthy T S. Advanced Structures of Architecture, Eswar Press,2008.
2. B.C. Punmia, Reinforced Concrete Structures, Vol. 1 & 2, - Laxmi Publications, New Delhi, 1994.
3. N. Subramanian, Principles of Space Structures – Wheeler and Co., Allahabad, 1983.
4. Milo.S.Ketchem and Mark.A. Ketchem, Types and Forms of Shell Structures, 1997.

**REFERENCES:**

1. Wolfgang Schueller – High Rise Building Structures, John Wiley & sons, New York 1976.
2. Frei Otto – Tensile structures Volume 1, Pneumatic structures, Volume 2, cable structures. The MIT press, London; 1966.
3. Bryan Stafford and Alex Coull -Tall Building structures – Analysis & Design- John Wiley; 1991.
4. Structural system for tall buildings – Council on tall buildings and urban habitat - McGraw Hill; 1995.
5. Thomas Herzog; Pneumatic structures,– Crosby Lockwood staples, London; 1976.
6. Bandyopadhyay J.N, Thin Shell Structures Classical and Modern Analysis, New Age International Publishers, New Delhi, 1998.
7. Ramaswamy .G.S, Design of Construction of Concrete Shell Roofs, McGraw Hill Publishing Company, New York, 1986.

**17AR650**

**WORKING DRAWING – II**

CATEGORY	L	T	S	CREDIT
BS & AE	1	0	3	4
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES:**

- To enable students to design and develop a comprehensive set of drawings for construction of building in a site containing architect's drawings along with structural and services engineer's drawings etc.
- To focus the students on the development of a project design (a typology/ architectural design project completed in their previous semesters) from concept through analysis to create an architectural design with well develop engineering systems/ complete technical drawings by the use of computer drafting software /tools.
- To enable students to understand and appreciate the challenges in construction detailing and to train them in the aspects of detailing buildings with allied requirements namely structure, building services, Furniture, Fittings & Equipment (FFE) etc along with the installation methods.

**MODULE 1 INTEGRATION TO ARCHITECTURAL AND STRUCTURAL DETAILING**

Exercise involved in development and generation of architectural working drawing with detailing of floor plan , technical drawing with working drawings for Structural System most suitable for the project with integration of structural components into the design – application of appropriate Building Materials ,development of assembly drawing regarding the installation of materials.

**MODULE 2 INTEGRATION OF SERVICE COMPONENTS OF DESIGN**

Exercise involved in development of technical drawing with understands the integration of Electrical, Plumbing and HVAC systems into the Design.

**MODULE 3 DETAILING OF ARCHITECTURE COMPONENTS**

Exercise involved in detailing of, joinery scheduling, dimensions explaining the various components. Detailing of site layout with facilities; specific Areas like Staircase, WallSections, explaining the interface of the building.

**MODULE 4 DETAILING OF BUILT-IN FURNITURE AND FITTINGS**

Exercise involved in development of technical drawing and detailing of built-in elements like kitchen counters, cupboards, cabinets, toilets, toilet fitting , workstation, display unit etc. as per the project typology and design.

**MODULE 5 DETAILING OF EXTERIOR AND INTERIOR ARCHITECTURAL ELEMENTS**

Exercise involved in development of technical drawing and detailing of architectural elements like indoor fountains, water walls, transparent floors, street furniture, hard and soft landscape, swimming pools, water bodies and courtyard spaces etc. Detailing of interior architectural elements in existing buildings.

**TEXTBOOKS:**

1. De Chiara and Callendar, Time Saver Standard Building Types, McGraw Hill Co, 1980.
2. Richardson Dietruck, Big Idea and Small Building, Thames and Hudson, 2002.
3. Edward D Mills, Planning – The Architecture Handbook, British Library Cataloguing in Publication Data, 1985.

**REFERENCES:**

1. Susan Dawson, Architect's Working Details (Volume 1-10), E- Map Construct; 2004.
2. Swimming Pools, Lane Book Company, Menlo Park, California, 1962.
3. Nelson L Burbank, House Carpentry Simplified, Simmons-Board- McGraw Hill Publishing Corporation, New York, 1986.
4. Landscape Construction, Delmar publisher, 2000.
5. Grant W. Reid , Landscape Graphics, Whitney Library of Design, 1987.
6. Francis. D. K. Ching, Building Construction Illustrated, John Wiley & Sons, 2011.

CATEGORY	L	T	S	CREDIT
PC	0	0	12	12
<b>CONTACT HOURS : 180</b>				

**OBJECTIVES:**

- To understand the design and form of building typologies that are the result of pressure on urban lands with a thrust on issues like urban land economics, technology and ecology.
- To balance complex planning needs in buildings of large floor areas and diverse requirements.
- To critically question and creatively address aspects such as sustainable architecture and green buildings.
- To inculcate the importance of services integration and construction in spatial planning in the context of design of high-rise buildings and service intensive buildings.
- To explore advanced computer aided presentation techniques involving 2D and 3D drawings and virtual models, apart from physical models.

**CONTENT:**

**Scale and Complexity:** Advanced and complex problems involving large scale multi-storeyed buildings and complexes for residential/ commercial/ institutional/ mixed-use buildings in an urban context with focus on planning aspects, service integration and sustainable practices.

**Areas of focus/ issues:** Planning integration and detailing Sustainable building practices, green issues, alternative energy intelligent building techniques and service integration Advanced building practices

**Typology/ project:** office building, multi-use center, convention center, multiplex, corporate complex, health care and hospitality building.

**TEXTBOOKS:**

1. Sustainable Design, Ecology, Architecture & Planning, Daniel Williams, John Wiley & sons Inc, NJ, 2007.
2. Mili Mazumdar, Energy Efficient Buildings in India, TERI, New Delhi, 2012.
3. Sustainable Building Design Manuals I & II, TERI 2004.

**REFERENCES:**

1. Office - Architecture + Design, Lara Menzel, Braua Publishers 2009.
2. Prefabulous + Sustainable, Building and Customizing an affordable, Energy efficient home, Sheri Koonen, ABRAMS, 2010.

## **SEMESTER - VII**

**17AR710**

### **ESTIMATION, QUANTITY SURVEYING AND SPECIFICATION**

CATEGORY	L	T	S	CREDIT
PC	2	0	0	2
<b>CONTACT HOURS : 30</b>				

#### **OBJECTIVES:**

- To prepare detailed exact as well as approximate estimates to meet a number of requirements and also to have a clear picture of the project expenditure.
- To have a thorough idea regarding the quality and quantity of materials, quantity and classes of skilled and unskilled labors and tools and plants required for the project.
- To calculate the exact quantities of items of work done for affecting payment especially when direct measurements are difficult and also to determine the quantities of different materials required for various items of work.
- To draw up specifications for the different items of civil engineering project and also to prepare the schedule of programming of the project.
- To prepare valuation report of real and landed property.

#### **MODULE 1 SPECIFICATION AND SPECIFICATION WRITING**

Necessity of specification, importance of specification, - How to write specification, - Types of Specification, -Principles of Specification writing, - Important aspects of the design of specification – sources of information – Classification of Specification- Brief Specification for 1 st class, 2 nd class , 3 rd class building-Detailed specification for earthwork excavation, plain cement concrete, Reinforced concrete, first class and second class brickwork, Damp proof course, ceramic tiles/marble flooring and dado, woodwork for doors, windows frames and shutters, cement plastering, painting & weathering course in terrace.

#### **MODULE 2 ESTIMATION**

Types & purpose, Approximate estimate of buildings – Bill of quality, factors to be considered, - principles of measurement and billing, contingencies, measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work – abstract of an estimate-Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.

#### **MODULE 3 DETAILED ESTIMATE**

Deriving detailed quantity estimates for various items of work of a building. Like earthwork excavation, brick work, plain cement concrete, Reinforced cement concrete works, wood work, iron works, plastering, painting, flooring, weathering course for a single storied building.

#### **MODULE 4 VALUATION**

Valuation - Explanation of terms-types of values, sinking fund, years of purchase- Depreciation –types of depreciation- Valuation of real properties- types, methods and purpose of valuation.

#### **MODULE 5 BUDGETING**

Elements of cash flow- Time value of Money – Capital investment decision - Types of business firms - Budget and Budgetary Control – Types of Budgets – Preparation of Financial Budget.

#### **TEXTBOOKS:**

1. Estimating, Costing and Valuation (Professional practice) By Rangwala – S.C, 1984 CHAROTAR PUBLISHING HOUSE, INDIA.
2. M. Chakraborti, Estimating costing & Specification in Civil Engineering; Chakraborti; 1984.
3. Estimating & Costing – By B.W. Dutta (Revised by S. Dutta) UBS Publishers Distribution P.Ltd. India, 1983.
4. S.SangaReddi & P.L.Meiyappan, Construction Management, Kumaran Publication, Coimbatore.

#### **REFERENCES:**

1. I.S.1200-1968 Methods of measurements of buildings and Civil Engineering works.
2. Latest schedule of rates of P.W.D.
3. Latest Data book of P.W.D.
4. PWD Standard Specifications. Govt Publication.

**17AR720**

**URBAN DESIGN**

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVE:**

To understand the fundamental concepts and theories of urban design and apply them in their design projects.

**UNIT I INTRODUCTION- EVOLUTION AND UNDERSTANDING OF THE CONCEPT OF URBAN DESIGN**

Evolution of urban design as a discipline – Need for urban design – different realms attached to urban design- urban design theories and key personalities and their contribution to urban design (Gordon Cullen and Kevin Lynch)

**UNIT II ELEMENTS AND APPROACHES OF URBAN DESIGN**

Urban scale, Mass and Space; Understanding components of urban fabric; Making a Visual survey; Understanding the various urban spaces in the city and their hierarchy. Special focus on streets; Expressive quality of built forms, spaces in public domain

**UNIT III CONCEPTS AND TECHNIQUES IN URBAN DESIGN**

Concepts and theories of William H Whyte; spacemaking and placemaking concepts of GHEL architects (case study : Copenhagen) . understanding different terms involved in urban Design. Current trends in urban design

**UNIT IV RENEWAL, REDEVELOPMENT AND FORMULATING URBAN DESIGN POLICIES**

Understanding urban renewal and the need for it, Scope, challenge and Implementation methods; Public participation; Townscape policies and urban design guidelines for new developments- Case studies. A brief Analysis of urban spaces in history - in the Western world ( Greek, Roman, Medieval and Renaissance towns) and the Eastern world ( Vedic, temple towns, medieval and Islamic towns ) ; Relevance of the historical concepts in the present context ; Critical analysis of some Indian cities like New Delhi, Chandigarh etc

**UNIT V URBAN DESIGN EXERCISE**

Conducting an urban design survey, Analysis of data, Formulating urban design guidelines and drawings for an area - practical problem solving. The first part of the urban design project could deal with the Identification and documentation of areas such as riverfronts, beach fronts, market areas, bazaars or commercial & residential districts with, its surrounding areas. And second part would be to solve and provide appropriate and relevant solutions for the same.

**TEXT BOOKS:**

1. Gordon Cullen, "The Concise townscape", The Architectural press
2. Kevin Lynch, "Image of the city"
3. Cliff Moughtin, "Urban design - Ornament and decoration", Bath Press
4. Cliff Moughtin, "Urban design - street and square", Bath Press
5. Paul Zucker , "Town and square"
6. Arthur B Gallion, "The urban pattern", CBS publishers
7. Raymond J Curran , "Architecture and the urban experience", Van Nostrand Reinhold Company
8. Christopher Alexander, "Pattern language"
9. Christopher Alexander, "The timeless way of building"

**REFERENCE READINGS:**

1. Rangwala, "Town Planning", Charotar publishing house
2. David Gosling, "Concepts of Urban design ", Academy editions
3. Spiro Kostof, "City shaped" , Bulfinch Press
4. Paul D. Speriregon, "Architecture of town and cities", The MIT press
5. Johnathan Barnet, "An introduction to Urban design", Harper& Row Publishers
6. Arthur B. Gallion and Simon Eisner, "The Urban Pattern - City planning and Design", Van Nostrand Reinhold Company.

**17AR730**

**HUMAN SETTLEMENTS  
PLANNING**

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To enable the students to comprehend the evolution of settlements, its elements & classifications.
- To understand the various levels of planning, planning principles & the process over a period of time
- To outline the scope and content of Urban planning, Urban renewal and Regional planning and the various plans to be prepared.
- To enable students to understand how planning activities are regulated in the state at various levels.

**UNIT I INTRODUCTION TO THE CONCEPT OF HUMAN SETTLEMENTS**

Elements of human settlements context and contain - Meaning and Examples - Nature, Man, Society, shells and Network: Their sub elements, characteristics, functionaries / potentials, major aspects in spatial planning.

Classification of human settlements: Classification based on population, functions, locations, Municipal status.

**UNIT II FORMS OF HUMAN SETTLEMENTS**

Growth and decay of human settlements: Factors influencing the growth and decay, History of settlement studies (Ancient Classical, medieval, Renaissance industrial) Structure and Form of Human settlements - Linear, Non-linear & circular, examples and their functional characteristics of Indian and European towns and cities.

**UNIT III PLANNING CONCEPTS**

Contribution to planning thoughts & their relevance to Indian planning practice – Patric Geddes, Ebenezer Howard, CA Perry, Le Corbusier, Doxiadis - Principles and concepts with case studies.

**UNIT IV URBAN AND REGIONAL PLANNING**

Aim, objective, scope and content of Regional plan, Master plan, zonal plan, planned unit development (PUD) and urban renewal plan - Redevelopment, rehabilitation and conservation - Case - studies.

**UNIT V LOCAL GOVERNANCE**

Objectives, Functions, Responsibilities and Organizational structure of: (i) Village Panchayats (ii) Municipalities (iii) Corporations and (iv) Urban Development Authorities.

**TEXT BOOKS:**

1. C.L.Doxiadis, Ekistics, "An Introduction to the Science of Human Settlements", Hutchinson, London, 1968.
2. Gallion Arthur B & Eisna Simon, "The Urban Pattern: City Planning and Housing", Cbs, 2005.
3. John Ratchiffe, An Introduction to Town and Country Planning, Random House.

**REFERENCES:**

1. L.R. Kadiyali, "Traffic Engineering and Transport Planning", Khanna Publishers, New Delhi, 2000.
2. Government of India, "Report of the National Commission on Urbanisation", 1988.
3. Andro D.Thomas, "Housing and Urban Renewal", George Allen and Unwin, Sydney, 1986.
4. Rodwin, Lloyd, "Shelter, Settlements and Development" (Hemel Hempstead, United Kingdom, Unwin Hyman Ltd.), 1987.
5. Ministry of Urban Affairs and Employment, Government of India, New Delhi, 'Urban Development Plans: Formulation & Implementation' - Guidelines - 1996.
6. Madras Metropolitan Development Authority, 'Master Plan for Madras Metropolitan Area, Second Master Plan - 1995
7. Centre for Human Settlements, Anna University, Chennai 'Development Plan for Uthokottai Taluk, Cheyyur Taluk, 1999.
8. [http://www.jadavpur.edu/academics/centers\\_human.htm](http://www.jadavpur.edu/academics/centers_human.htm)
9. <http://www.virtualref.com/uncrd/558.htm>
10. [http://www.unescap.org/huset/m\\_land/index.htm](http://www.unescap.org/huset/m_land/index.htm)
11. <http://www.esa.un.org/subindex/prviewsites.asp?termcode=GH.05>

**17AR750**

**ADVANCED COMPUTER  
APPLICATIONS IN ARCHITECTURE**

CATEGORY	L	T	S	CREDIT
SEC	2	0	2	4
<b>CONTACT HOURS : 60</b>				

**OBJECTIVES:**

This course is to prepare students for modeling architectural geometry through development of parametric schemes for architecture applications.

This course supplies the basis of understanding parametric geometric construction mechanisms.

**MODULE 1: Elements of parametric design and design patterns**

The structure of parametric design processes, their characteristics and reusable parametric design approaches, Spatial coordinates, projections, Boolean operations, formal transformations, freeform surface creation, surface development and deformations aimed at architecture applications, discretization and meshing, digital prototyping and geometry reconstruction. Lectures will focus on concepts in computational geometry that can be applied to parametric architectural geometry modeling.

**MODULE 2: Parametric modeling techniques and tools**

Tools that are available to model design parametrically will be introduced in this class to illustrate the construction of geometrical relationships among complex shapes. The lectures will focus on hands-on techniques that can be applied to the design process, to extend the efficiency and productivity of work during the process.

**MODULE 3: Parametric variation**

Coupling CNC fabrication with parametric modeling allows for mass-customization, high-volume design iteration, custom detailing in architectural design.

**MODULE 4: Modeling of complex assemblies**

Using digital workflows to describe, organize, and construct geometrically complex and dimensionally unique components.

**MODULE 5: Modeling for fabrication**

Using 3D digital modeling to efficiently produce components without the need for 2D representation. Adjusting global forms can automatically update individual components.

**REFERENCE**

1. Arturo Tedeschi. AAD – Algorithms-Aided Design. Le Penseur Publisher, 2014.
2. Robert Woodbury. Elements of Parametric Design. Routededge, 2010.
3. Helmut Pottmann, Andreas Asperl, Michael Hofer, and Axel Kilian. Architectural Geometry. Bentley Institute Press, 2007
4. Wassim Jabi. Parametric Design for Architecture. Lawrence King Publisher, 2013
5. Robin Evans. The Projective Cast: Architecture and ITs Three Geometries. The MIT Press, 2000
6. Robin Evans. Translations from Drawing to Building and Other Essays, AA Document 2, The MIT Press, 1997.
7. Grasshopper, a graphical editor for form generations
8. The Grasshopper Primer Third Edition | Foundations
9. Rajaa Issa. Essential Mathematics for Computational Design – Second Edition
10. Rajaa Issa. The Grasshopper Primer – Second Edition
11. Zubin Khabazi. Generative Algorithms

17AR780

ARCHITECTURAL DESIGN - V

CATEGORY	L	T	S	CREDIT
PC	0	0	13	12
<b>CONTACT HOURS : 195</b>				

**OBJECTIVES:**

- To develop a critical faculty/ position in architectural design with respect to various qualitative and quantitative aspects of architecture.
- To engage architectural form as an expression of philosophical/ critical ideas relating to the role of architecture in society.
- To explore techniques of mapping and diagramming to understand the built environment as well as design it.
- To create physical models and drawings that are expressive of studies and ideas.

**CONTENT:**

**Scale and Complexity:** Projects involving large campuses or groups of buildings, large scale buildings, mixed use projects involving diverse user groups.

**Areas of concern/focus:** exploration of relationship between building, space, landscape and movement in a context involving diverse user groups. appropriate architecture and exploration of architectural form towards a desired ideal for a given context of time and place. Meaning and identity contemporary processes in design.

**Typology/ project-** Campus buildings, culturally significant buildings, large housing communities, five star hotel complex, multi use urban complexes.

**TEXTBOOKS:**

1. Kate Nesbitt, Theorizing a New Agenda for Architecture, Princeton Architectural Press, 1996.
2. Michelle Provoost et al. Dutchtown, NAI Publishers, Rotterdam, 1999.
3. Mark Garcia, The Diagrams of Architecture, Wiley 2010.

**REFERENCES:**

1. Kevin Lynch, Site Planning, MIT Press, Cambridge, 1967.
2. Mitchell WJ, Imagining MIT: Designing a campus for the 21st century; MIT Press; 2007.
3. Campus Architecture: Building in the groves of academe, Richard P. Dober, McGraw Hill, 1996.

## **SEMESTER - VIII**

**17AR810**

**DISSERTATION**

<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>S</b>	<b>CREDIT</b>
<b>PAECC</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>
<b>CONTACT HOURS : .</b>				

### **OBJECTIVES:**

- To expose the students to the various thrust areas in architecture.
- To inculcate the spirit of research in architecture by providing opportunities to read on various issues.
- To expose the students to the finer details of technical writing.
- To provide a platform for a prelude to the 'Design Thesis'.

### **CONTENT:**

Design studio emphasize on explaining and understanding Architecture primarily through the mode of making. Dissertation offers an opportunity to look at architecture, history and design primarily through textual. However, like design, dissertation involves process of observation, reflection and abstraction. Students are encouraged to choose any topic of their interest. They may range from analyzing the works of an architect, history, typological changes, writing, design process and many more. The dissertation should state its objectives, followed by exhaustive documentation and arguments. The emphasis however, could vary according to the topic. The dissertation proposal in about 1500 words stating the topic issues to be explored and the scope must be submitted. After approval the work would be periodically reviewed. A well written report of a minimum 15,000 words must be submitted in the prescribed format, if any provided by the University. The student would subsequently make a presentation of his/her work and defend them.

### **TEXTBOOKS:**

1. Iain Borden and Kaaterina Ruedi; The Dissertation: An Architecture Student's Handbook; Architectural Press; 2000.
2. Linda Grant and David Wang, Architectural Research Methods, John Wiley Sons 2001.

### **REFERENCES:**

1. Wayne C Booth; Joseph M Williams; Gregory G. Colomb; The Craft of Research, 2nd Edition; University of Chicago Press; 2008.
2. Ranjith Kumar; Research Methodology- A step by step guide for beginners; Sage Publications; 2005.
3. John W Creswell; Research design: Qualitative, Quantitative and Mixed Methods Approaches; Sage Publications; 2002.

**17AR820**

**PRACTICAL TRAINING**

CATEGORY	L	T	S	CREDIT
PAECC	0	0	0	15
CONTACT HOURS :				.

**OBJECTIVES:**

- To facilitate an understanding of the evolution of an architectural project from design to execution.
- To enable an orientation that would include the process of development of conceptual ideas, presentation skills, involvement in office discussions, client meetings, development of the concepts into working drawings, tendering procedure, site supervision during execution and coordination with the agencies involved in the construction process.

**CONTENT:**

The Practical Training would be done in offices / firms in India empaneled by the Institution in which the principal architect is registered with the Council of Architecture if the firm is in India or in an internationally reputed firm established abroad.

The progress of practical training shall be assessed internally through submission of log books supported by architectural drawings maintained by students every month along with the progress report from the employer/s of trainees.

The students would be evaluated based on the following criteria:

1. Adherence to time schedule, Discipline.
2. Ability to carry out the instructions on preparation of schematic drawings, presentation drawings, working drawings.
3. Ability to work as part of a team in an office.
4. Ability to participate in client meetings and discussions.
5. Involvement in supervision at project site.

At the end of the Practical Training, a portfolio of work done during the period of internship along with certification from the offices is to be submitted for evaluation by a viva voce examination.

## **SEMESTER - IX**

**17AR910**

**PROFESSIONAL PRACTICE**

<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>S</b>	<b>CREDIT</b>
<b>PAECC</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>CONTACT HOURS : 30</b>				

### **OBJECTIVES:**

- To give an introduction to the students about the architectural profession.
- To enable the students to grasp the elementary issues concerning professional practice.
- To teach the students about the role of professional and statutory bodies in the conduct of professional practice.
- To teach the students about the importance of code of conduct and ethics in professional practice.
- To expose the students some of the important legislation which have a bearing on the practice of architectural profession.

### **MODULE -I ARCHITECT AND PROFESSION; SERVICES AND SCALE OF FEES**

Role of architect in society - relationship with client and contractor - code of conduct – Conditions of engagement of an architect - normal additional, special and partial services – scale of fees for various services - claiming of fees

### **MODULE -II ARCHITECTURAL COMPETITIONS**

Open and closed competitions - appointment of assessors - duties of assessors - instructions to participants - rejection of entries - award of premium - guidelines prescribed by COA AND IIA for promotion and conduct of competitions

### **MODULE -III BUILDING LEGISLATION AND EASEMENTS**

Salient features of various Acts such as Architects' Act 1972 -Chennai Corporation Building Rules 1972- The Panchayat Building Rules 1942-The Tamil Nadu Factory Rules 1950-Development control Rules for Chennai Metropolitan Area 1990 -Definition - types of easement – acquisition extinction and protection of easements

### **MODULE -IV TENDER & CONTRACT**

Calling for tenders - tender documents - open and closed tenders - item rate, lumpsum, labour and demolition tender - conditions of tender - submission of tender - scrutiny and recommendations. Conditions of contract - Form of contract articles of agreement - Contractor's bill certification.

### **MODULE -V ARBITRATION**

TYPES OF ADR -Arbitration in disputes - arbitration agreement - sole arbitration - umpire - excepted matters - award

### **REFERENCES:**

1. J.J. Scott, Architect's Practice, Butterworth, London 1985
2. Publications of COA IIA Hand book on Professional Practice, The Architects publishing Corporation of India, Bombay 1987
3. D.C. Rules for Chennai Metropolitan Area 1990
4. T.N.D.M. Building Rules, 1972
5. T.N.P. Building Rules 1942
6. Chennai City Corporation Building Rules 1972
7. Derek Sharp, The Business of Architectural Practice William Collins Sons & Co. Ltd, 8 Erafton St., London W1 19868. Roshan Namavathi, Professional Practice, Lakshmi Book Depot, Mumbai 1984 Publication of IIA
8. Environmental Laws of India - by Kishore Vanguri, C.P.R. Environmental Education Centre, Chennai
9. The Tamil Nadu Hill Areas Special Building Rules - 19
10. Heritage Act
11. Consumer Protection Act
12. Indian Easements Act
13. Professional Practice –Prof.Radhey Mohan Chundur.

17AR920

## URBAN HOUSING

CATEGORY	L	T	S	CREDIT
PC	2	1	0	3
<b>CONTACT HOURS : 45</b>				

### OBJECTIVES:

- To outline the Issues concerning housing in the Indian Context and the various agencies involved in the production of housing.
- to outline factors that influence housing affordability and to familiarize students with various schemes and policies of the government in the housing sector.
- To inform about the standards and guidelines for housing
- To inform about the various housing design typologies and the processes involves in housing project development.

### UNIT I - INTRODUCTION TO HOUSING AND HOUSING ISSUES – INDIAN CONTEXT

Housing and its importance in Architecture and its relationship with neighbourhood and city planning. Housing demand and supply – National Housing Policy – Housing agencies and their role in housing development – impact of traditional life style – Rural Housing, Public, private sector housing.

### UNIT II SOCIO-ECONOMIC ASPECTS

Social economic factors influencing housing affordability – equity in housing development sites and services/-slum upgradation community participation – Rajiv Awas Yojana Crime prevention, Health principles in Housing.

### UNIT III HOUSING STANDARDS

UD PFI – guide lines, standard and regulations – DCR – performance standards for housing.

### UNIT IV SITE PLANNING AND HOUSING DESIGN

Site Planning : Selection of site for housing, consideration of physical characteristics of site, locational factors, orientation, climate, topography – Landscaping- Housing design – Traditional housing, row housing, cluster housing – apartments and highrise housing relating to Indian situations – case studies in India – integration all types of services, parking, incorporation of green sustainable practices – prefabrication in housing.

### UNIT V HOUSING PROCESS

Various stages and tasks in project development – community participation and housing management – Environmental aspects and national calamities and disaster mitigation.

### REQUIRED READINGS:

1. Richard Kintermann and Robert small, “Site planning for Cluster Housing”, Van Nastrand Reinhold company, Jondon/New York 1977.
2. Joseph de Chiara and others, “Time Saver Standards for Housing and Residential development”, McGraw Hill Co, New York 1995.
3. Forbes Davidson and Geoffrey Payne, “ Urban projects Manual”, Liverpool University press, Liverpool 1983.
4. HUDCO publications – Housing for low income, sector model.

### REFERENCES:

1. Christopher Alexander, “A pattern Language”, Oxford University press, New York 1977
2. Leuris (S), Front to back: “A Design Agenda for Urban Housing”, Architectural Press, 2006.
3. Mohanty. L.N.P., Mohanty. S, “Slum in India” APH Publications., 2005
4. Saxena A. K. , “Sociological Dimensions of Urban Housing and Development “, Common wealth Publications, 2004
5. Geol. S. L. Dhaliwal. S. S. “Slum improvement through participatory Urban based Community structures”, Deep & Deep Publications, 2004.

**17AR950**

**BUILDING INFORMATION  
MODELLING**

<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>S</b>	<b>CREDIT</b>
<b>SEC</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>4</b>
<b>CONTACT HOURS : 60</b>				

**UNIT-1 INTRODUCTION**

New Features of Revit, Editing and Working with Families in a Project, Concepts of Revit, creating a shared Family, Project and System settings

**UNIT-2 BASIC MODEL**

Creating the Basic Model, Adding Doors and Windows, Floors and Floor Openings, Roof and Ceiling, Staircases

**UNIT-3 MODELLING**

Creating Walls, Doors. Windows, openings, stairs, railings, roofs, curtain systems

**UNIT-4 DOCUMENTATION**

Creating drawings, Creating detail from Building Model, Scheduling, Annotating and Dimensioning, Viewing the Model

**UNIT-5 RENDERING**

Applying Materials and textures, creating a perspective vies, rendering an Exterior view, rendering an Interior vies, Creating and Recording Walkthroughs, creating 3D cutaways with Section Boxes

**TEXT BOOKS**

Autodesk REVIT 9.1 Manual, Autodesk publications 2 REVIT 9.1 Tutorials, Autodesk publications

**REFERENCE BOOKS**

AUTODESK Publications

17AR980

ARCHITECTURAL DESIGN - VI

CATEGORY	L	T	S	CREDIT
PC	0	0	16	14
<b>CONTACT HOURS : 240</b>				

**OBJECTIVES:**

- To understand the continuity and dynamics of urban form with a thrust on the interrelationships between the disciplines of architecture, urban design and town planning.
- To understand the various components and aspects of the urban environment as well as their interrelationships.
- To understand in particular aspects such as public spaces, physical infrastructure, socio - cultural aspects such as heritage, gender, class, dynamics of urban growth.
- To take design decisions in a comprehensive manner understanding their implications in the larger context.
- To value ideas and opinions of others in society by engaging in collaborative study and design projects in the urban context and making design more inclusive.

**CONTENT:**

**Scale and Complexity:** projects involving the urban context and architecture in the urban context with a thrust on understanding interdependencies and formulating appropriate design directions.

**Areas of focus/ issues:** exploration of relationship between building and larger context addressing issues in urban areas – transportation, sustainability, heritage, sprawl, place making, identity, collective memory Mixed use programming.

**Typology/ project:** large scale urban interventions and projects with impact on the urban context-revitalization and renewal of urban fragments, evolving guidelines for heritage areas, adaptive reuse, urban waterfront development, transportation nodes, new communities, urban nodes, multi-use urban complexes.

**TEXTBOOKS:**

1. Jonathan Barnett, An Introduction to Urban Design, Harper and Row; 1982
2. Michelle Provoost et al., Dutchtown, NAI Publishers, Rotterdam, 1999.
3. Jan Gehl, Life between Buildings- Using Public Space, Arkitektens Forleg 1987.
4. Time Savers Standard for Urban Design, Donald Watson, McGraw Hill, 2005.
5. Malcolm Moore & Jon Rowland Eds, Urban Design Futures, Routledge, 2006.

**REFERENCES:**

1. Edmund Bacon, Design of Cities , Penguin, 1976.
2. Gordon Cullen, The Concise Townscape, The Architectural Press, 1978.
3. Lawrence Halprin, Cities, Reinhold Publishing Corporation, New York, 1964.
4. Gosling and Maitland, Urban Design, St. Martin's Press, 1984.
5. Kevin Lynch, Site Planning, MIT Press, Cambridge 1967.

## **SEMESTER - X**

**17AR080**

**ARCHITECTURAL THESIS**

<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>S</b>	<b>CREDIT</b>
<b>PC</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>18</b>
<b>CONTACT HOURS : 345</b>				

### **OBJECTIVES:**

- All the architectural design courses offered since semester II culminate in the thesis Project to motivate students to involve in individual research and methodology.
- This is to train them in handling projects independently.

### **TOPICS OF STUDY**

The main areas of study and research can include advanced architectural design, including contemporary design processes, urban design including urbaninfill, environmental design, conservation and heritage precincts, housing etc. However, the specific thrust should be architectural design of built environment. Preparation of presentation drawings, working drawings, detailed drawings and study model are part of the requirements for submission.

### **METHOD OF SUBMISSION**

The Thesis Project shall be submitted in the form of drawings, project report, models, slides, CDs and reports.

### **TEXTBOOKS:**

1. Linda Grant and David Wang, Architectural Research Methods, John Wiley Sons, 2002.

### **REFERENCES:**

1. Donald Appleyard, The Conservation of European Cities, M.I.T. Press, Massachusetts, 1979.
2. Michelle Provoost et al., Dutchtown, NAI Publishers, Rotterdam, 1999.
3. Richard Kintermann and Robert small site planning for cluster Housing; Van Nostrand Reinhold company, London/New York 1977.
4. Miller T.G. Jr., Environmental Sciences, Wadsworth Publishing Co. (TB) 2004.
5. Kevin Lynch - Site planning - MIT Press, Cambridge, MA - 1967.
6. Geoffrey And Susan Jellicoe, The Landscape of Man, Thames And Hudson, 1987.
7. Arvind Krishnan & Others, Climate Responsive Architecture, A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2007.

# ELECTIVE - 1

17ARE101

## THEORY OF DESIGN

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
CONTACT HOURS : 30				

### OBJECTIVES:

- To give understanding of design as a broader field and the changing role of designer in society.
- To give exposure to methodologies, theories and models of the design process.
- To give deeper understanding of the process of creativity as well as to introduce techniques which will enable creative thinking.
- To help understand creativity with respect to the discipline of architecture.
- To introduce participatory approach to design.

### MODULE I INTRODUCTION TO DESIGN

Definition and understanding of design. History of design process from earliest times through Renaissance, Beaux Arts, Bauhaus. Different classifications of design according to scale, process, mode of production, etc., - selfconscious/ unselfconscious, design through drawing/ design through craft, pragmatic/ iconic/ analogic/ canonic or syntactic, hand made/ machine made, product design to city design, functional/ aesthetic, nature vernacular/ technological.

### MODULE II DESIGN METHODOLOGY MOVEMENT

Context for the rise of the design methodology movement from the 1950s with the critique of modernism. Theories of the first generation and the second generation design methodologists. Design as wicked problem. Escalation and regression in design. Summary by Johnson of various models of the design process - parametric or analysis/ synthesis/ evaluation, conjecture-refutation, paradigmatic, hermeneutical.

### MODULE III CREATIVE THINKING

Understanding the term creativity. Theories on thinking - left brain/ right brain, convergent/ divergent thinking, lateral/ vertical thinking. Broadbent's idea of the design spectrum - from the logical to chance. Blocks in creative thinking. Techniques to generate creativity as put forth by Broadbent, Bono.

### MODULE IV ARCHITECTURAL CREATIVITY

Types of architectural concepts - programmatic, analogic, metaphor, essence, etc., Channels to creativity in architecture as put forth by Antoniades. Personal philosophies and strategies of individual designers.

### MODULE V PROCESS AND DESIGN

People and design process- concept of pattern language by Christopher Alexander, participatory approach to design, design as process involving time and people. Introduction to contemporary processes in design including diagramming, mapping, parametric exploration, etc.,

### TEXTBOOKS

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, 2005.
3. Anthony Antoniades, 'Poetics of Architecture- Theory of Design', VNR, 1992.
4. Edward De Bono, 'Lateral Thinking- Textbook of Creativity', Penguin Books, 1990.
5. Christopher Alexander, 'A Pattern Language', Oxford University Press, 1977.
6. James C. Snyder, Anthony J. Catanese, Timothy L. McGinty, 'Introduction to Architecture', McGraw Hill, 1979.
7. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
- Thomas Mitchell, 'Redefining Designing: From Form to Experience', Van Nostrand Reinhold, 1992.

### REFERENCES

1. Victor Papanek, 'Design for the Real world, Human Ecology and Social Change', Chicago Review Press, 2005.
2. Paul Alan Johnson, 'Theory of Architecture- Concepts, Themes, Practices', VNR; 1994.
3. Christopher Jones, 'Design Methods', John Wiley and Sons; 1980.
4. Tom Heath, 'Method in Architecture', John Wiley & Sons, New York, 1984.
5. Nigel Cross, 'Developments in Design Methodology', John Wiley & Sons, 1984.
6. James L. Adams, 'Conceptual Blockbusting', Basic Books, 2001. Jeremy Till et al, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011.

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

**17ARE102**

**ERGONOMICS**

**MODULE I**

Introduction to Ergonomics- Definition , Importance and Advantages of Ergonomics- Anthropometry – Definition , Anthropometric Data, Common Work Place Postures and Motion, Difference between Ergonomics and Anthropometry.

**MODULE II**

A study on Human Comfort in relation to basic Concepts of Day Lighting, Artificial Lighting, Natural Ventilation, Mechanical Ventilation and Acoustics-Introduction to Ergonomics, Checklist – Discomfort

**MODULE III**

Survey Checklist – Human Comfort and Good Practices-Ergonomics in residential spaces -Anthropometric database, Planning and design consideration techniques in Kitchen, Bathrooms, Toilets, Study Room, Living Room, Bedroom etc.,

**MODULE IV**

Study on overall and individual ergonomic pattern in the above spaces, the anthropometric postures and motions - Participatory design process - Exercises on full scale modelling of spaces such as kitchen, study room, toilet, bedroom with attached toilet etc. to study and understand the ergonomics

**MODULE V**

Ergonomics in work/ learning spaces-Anthropometric database, Planning and design consideration techniques in classrooms Work Stations, Laboratory ,library etc., Study on overall and individual ergonomic pattern in the above spaces, the anthropometric postures and motions-Exercises on above spaces to understand the ergonomics

**Text Book**

1. Debkumar Chakrabarti, Indian Anthropometric Design for Ergonomic Design Practice, National Institute of Design, Hardcover (Edition: 1997).
2. IS 4838 (1990): Anthropometric dimensions for school children age group 5-17 years.
3. Joseph De Chiara, Julius Panero, Martin Zeinik, Time – Saver Standards for Interior Design and Space Planning, McGRAW-HILL International Editions.
4. Sp 7 (2005): National Building Code Of India 2005(Group 1 To 5).
5. Wiley Blackwell, Neufert Architects Data Fourth Edition, Kenrick Munnings

17ARE103

## ART APPRECIATION

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
CONTACT HOURS : 30				

### 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 to enable the appreciation of art.
- To understand different productions of art as manifestations within particular contexts.

### MODULE I INTRODUCTION TO ART

Definition of art, need for art, role of art. Art, reality, perception, representation. Categories of art in terms of media and technique. How to appreciate art in terms of form, content and context.

### MODULE II VOCABULARY OF ART

Introduction to 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). Appreciation of art with respect to all the above through examples.

### MODULE III BEGINNINGS OF WESTERN ART TO MODERN ART

Outline of art in the West from the beginnings to the birth of modern art. Important works from the following art traditions will be understood and appreciated 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.

### MODULE IV MODERN ART AND AFTER

Outline of the context for the major changes in art from late 19<sup>th</sup> century and the birth of modern art. Important works from the following movements will be understood and appreciated in terms of their form, content and context: Impressionism, Post Impressionism, Fauvism, Expressionism, Modern art, Abstract/ Non Objective art, Cubism, Dadaism, Surrealism, Futurism, Constructivism, Suprematism, De Stijl, Abstract Expressionism, Pop art, Op art. Outline of new forms and media in art from mid 20<sup>th</sup> century.

### MODULE V INDIAN ART

Outline of art in India over history. Important works from the following art traditions and movements will be understood and appreciated in terms of their form, content and context: Indus Valley art, Hindu, Buddhist and Jain art, Mughal and Rajput miniature art, art during the colonial period, modern Indian art, contemporary directions.

### TEXTBOOKS

1. Fred, S. Kleiner, 'Gardener's Art through Ages', Wadsworth Publishing, 2012.
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. Partha Mitter, '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.

## ELECTIVE – II

17ARE201

### CONCEPTS AND APPROACHES IN DESIGN

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

#### **MODULE - 1**

Introduction: Definitions of concepts, need and importance of concept in design, Design process and the role of concepts in design development, relationship between ideas, notions, concepts & conceptual scenarios, hierarchy of concepts and parti development.

#### **MODULE - 2**

Concept generators –Approaches to Concept in Architectural Design - Approaches for generating concepts – levels of concept development – variety, expression, reinforcement, Concept using keywords – Issue based concept – Theory based concept – Concept combining issue and theory Concepts - Types of concepts – Analogies, Metaphors( Direct, Personal, Symbolic, Fantasy, Narrative) Essences, Programmatic Concepts, Ideals - Case examples for all of the above.

#### **MODULE - 3**

Tools for Design Development: Pre designing phase- Programming and Problem seeking tools-context analysis (site , social, cultural etc), program analysis, proximity, adjacency tools (like matrix, bubble, zoning), check list, circulation , layering analysis, synthesis and diagrams –architectural programming – mission, goal, performance requirements and concepts , Case studies and examples.

#### **MODULE - 4**

EXERCISES ON : Focus on People , Observation using Visual language , Identifying Patterns - Design principles : Listing, Choosing , Reversing, Reframing, Designing - Idea sketching - Generating Alternatives and Evaluation.

#### **MODULE - 5**

Concept development stage : Concept diagrams - Qualities of a good concept diagram - Sketches of Ideas , Illustration of Concept – Free hand drawing, Parti diagrams - techniques for developing clear concepts, Schematic drawings , Presentation drawings, Construction Drawings, presentation techniques.

#### **Text Books**

1. Donna Duerk , “Architectural Programming - Information Management for Design”, Wiley, John & Sons, Incorporated, 1993
2. Keyam, S.M., “Psychology in relation to design” Dowden, Hutchinson an Ross, 1973.
3. Hall, E.T., “The Hidden Dimension” New York, Doubleday, 1996
4. James C.Snyder,Anthony J.Catarex – Introduction to Architecture, McGraw Hill Inc., 1979.
5. Joan Zunde and Hocine Bougdah, Integrated Strategies in Architecture, Taylor & Francis, 2006
6. Geoffrey Broadbent, ‘Design in Architecture’, John Wiley & Sons, 1973
7. John Chris Jones, Design Methods, Wiley, 1992
8. Helen Mari, An Invitation to Design,

17ARE202

## VERNACULAR ARCHITECTURE

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
CONTACT HOURS : 30				

### OBJECTIVES

- To introduce the study of vernacular architecture as a process and not a product.
- To provide an overview of the different approaches and concepts to the study of vernacular architecture.
- To study the various vernacular architecture forms in the different regions of the country.
- To look at the impact of colonial rule on the vernacular architecture of India.

### MODULE I INTRODUCTION

Definition and classification of vernacular architecture. Vernacular architecture as a process. Methodology for survey and study of vernacular architecture. Overview of cultural and contextual responsiveness of vernacular architecture.

### MODULE II APPROACHES AND CONCEPTS

Overview of different approaches and concepts to the study of vernacular architecture. Aesthetic, architectural and anthropological studies in detail.

### MODULE III VERNACULAR ARCHITECTURE OF THE WESTERN AND NORTHERN

**REGIONS OF INDIA** 11 Forms, spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of the deserts of Kutch and Rajasthan (including havelis of Rajasthan), rural and urban Gujarat (including wooden mansions/ havelis in general and that of the Bohra Muslims) and geographical regions of Kashmir (including house boats).

### MODULE IV VERNACULAR ARCHITECTURE OF SOUTH INDIA

Forms, spatial planning, cultural aspects, symbolism, art, colour, materials of construction and construction technique, proportioning systems, religious beliefs and practices in the vernacular architecture of Kerala (including houses of the Nair & Namboothri community, Koothambalam and Padmanabhapuram palace) and Tamil Nadu (including houses and palaces of the Chettinad region, agraharams).

### MODULE V WESTERN INFLUENCES ON VERNACULAR ARCHITECTURE OF INDIA

Colonial influences on the traditional Goan house. Evolution of the bungalow from the traditional bangla, Victorian villas. Planning principles and materials and methods of construction of the bungalow. Settlement pattern and house typologies of Pondicherry and Cochin.

### TEXT BOOKS

1. Paul Oliver, 'Encyclopedia of Vernacular Architecture of the World', Cambridge University Press, 1997.
2. Amos Rapoport, 'House, Form & Culture', Prentice Hall Inc. 1969.
3. R W Brunskill, 'Illustrated Handbook on Vernacular Architecture', Faber & Faber; 1970.

### REFERENCES

1. V.S. Pramar, 'Haveli – Wooden Houses and Mansions of Gujarat', Mapin, 1989.
2. Kulbushanshan Jain and Minakshi Jain, 'Mud Architecture of the Indian Desert', Aadi Centre, Ahmadabad, 1992.
3. G.H.R. Tillotson, 'The Tradition of Indian Architecture: Continuity, Controversy, Change since 1850', Oxford University Press, Delhi, 1989.
4. Carmen Kagal, 'Vistara- The Architecture of India', The Festival of India, 1986.
5. S. Muthiah et al, 'The Chettiar Heritage', Chettiar Heritage 2000.
7. Weber.W & Yannas.S, 'Lessons from Vernacular Architecture', Routledge, 2014.
8. Bernard Rudofsky, 'Architecture without Architects', MoMA, 1964.

## 17ARE203 ENERGY EFFICIENT ARCHITECTURE

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

### OBJECTIVES

- To inform about the need to use alternative sources of energy in view of the depleting resources and climate change.
- To provide familiarity with simple and passive design considerations.
- To inform about the importance of day lighting and natural ventilation in building design.
- To create awareness of future trends in the design of sustainable built environment.

### MODULE I PASSIVE DESIGN

Significance of energy efficiency in the contemporary context. Simple passive design considerations involving site conditions, building orientation, plan form and building envelope. Heat transfer and thermal performance of walls and roofs.

### MODULE II PASSIVE HEATING

Direct gain. Thermal storage of wall and roof. Roof radiation trap. Solarium. Isolated gain.

### MODULE III PASSIVE COOLING

Evaporative cooling. Nocturnal radiation cooling. Passive desiccant cooling. Induced ventilation. Earth sheltering. Wind tower. Earth air tunnels.

### MODULE IV DAY LIGHTING AND NATURAL VENTILATION

Daylight factor. Daylight analysis. Daylight and shading devices. Types of ventilation. Ventilation and building design.

### MODULE V CONTEMPORARY AND FUTURE TRENDS

Areas for innovation in improving energy efficiency such as photo voltaic cells, battery technology, thermal energy storage, recycled and reusable building materials, nanotechnology, smart materials, energy conservation building code.

### TEXTBOOKS

1. 'Manual on Solar Passive Architecture', IIT Mumbai and Mines New Delhi, 1999.
2. Arvind Krishnan et al, 'Climate Responsive Architecture A Design Handbook for Energy Efficient Buildings', Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
3. Majumdar M, 'Energy-efficient Building in India', TERI Press, 2000.
4. 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 pressLtd, 2011.
4. Dean Hawkes, 'Energy Efficient Buildings: Architecture, Engineering and Environment', W.W.Norton & Company, 2002.
5. David Johnson and Scott Gibson, 'Green from the Ground Up: Sustainable, Healthy and Energy Efficient Home Construction', Taunton Press, 2008.

## ELECTIVE – III

**17ARE301**

### **GLASS AND STEEL IN ARCHITECTURE AND DESIGN**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

#### **OBJECTIVES**

- To introduce latest advances in the field of glass in architecture.
- To enable right selection and usage of right glass for appropriate purposes.
- To give understanding of use of glass in contemporary architecture as well as its role in green design and improving building performance.

#### **MODULE I - GLASS AS BUILDING MATERIAL**

Evolution & importance of glass in modern architecture. Applications of glass in buildings (façade/ interior applications). Understanding the production & properties of glass. Value additions including coating technology (importance & necessity) and processing (tempering, heat strengthening, DGU, laminated, ceramic fritting). Types of Glass- mirror, lacquered, fire resistant. Modern glass with different applications. Glass for hospitals, green homes, airports, offices, other buildings. Glass and human safety compliances. Role of glass in fire safety considerations - Class E, EI & EW. Role of glass in acoustics. International standards & codal provisions.

#### **MODULE II -GLASS AND GREEN ARCHITECTURE**

Building Physics. Theory of electromagnetic radiation. Understanding of internal and external reflections. Day-lighting in Buildings - introduction and basic concepts (VLT) . Solar Control and thermal insulation (SF, UV, SHGC). Need for green Buildings. Energy efficient buildings. Achieving energy efficiency using glass. Factors of energy efficient material selection. Performance parameters. Energy codes and Green ratings - ECBC, IGBC, GRIHA. Approaches of energy efficiency - prescriptive method, trade off method. Accommodating passive architecture. Whole Building Simulation.

#### **MODULE III STEEL IN HIGH TECH MOVEMENT, CONTEMPORARY ARCHITECTURE**

Introduction to High Tech movement. Understanding of various typologies of high tech movement – Extruded, Grid/Bay, Diagrids, arched/ curved structures, tensile. Advantages of diagrids over standard frames. Curved steel – creating curves in steel buildings, limitations in curving steel. Evolution of AESS (architecturally exposed structural steel) through High Tech movement.

#### **MODULE IV STRUCTURAL EXPRESSION OF STEEL**

Introduction to AESS (architecturally exposed structural steel), standard structural steel versus AESS. Factors that define AESS. Characteristics and categories of AESS. Connection types for AESS – bolted, welded and cast connections. Member types for AESS – Tubular and standard sections. Various steel frame design, basic connection strategies, basic understanding of steel floor systems, truss systems and braced systems.

#### **MODULE V SUSTAINABILITY, STEEL AND OTHER MATERIALS**

Introduction to steel as a sustainable material. Recycled, reuse and adaptive reuse of steel. Steel and glazing systems, support systems for glazing. Technical aspects of combining steel with glass. Various steel and glass envelope systems - curtain wall system, wind braced support systems, cable net walls, spider steel connections with structural glass, simple and complex cable systems. Handling curves and lattice shell construction. Advanced framing system – Steel and Timber. Low carbon design strategies.

#### **TEXTBOOKS**

1. Christian Schittich, 'Glass Construction Manual', Birkhauser Basel, 2007.
2. 'Architectural Glass Guide', Federation of Safety Glass, 2013.

#### **REFERENCES**

1. 'LEED 2011 For India - Green Building Rating System', Indian Green Building Council, 2011
2. 'Energy Conservation Building Code. User Guide', Bureau of Energy Efficiency, 2009.
3. IS 875 (Part -3) Reaffirmed 1997. Code of Practice for Design loads', Bureau of Indian Standards,1998.
4. 'IS 7883. Code of Practice for the Use of Glass in Buildings', Bureau of Indian Standards, 2013.
5. Training Manuals & E- Learning, Glass Academy.

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To equip the students with multi-disciplinary approach to sustainable design such as design methodology, resource optimization and innovative approaches to eco-design.
- To familiarize the student with some of the acclaimed sustainable buildings designed within the past decade.

**MODULE-1 INTRODUCTION**

Definition, need, History – Biomorphism, Organic Architecture, Metabolist architecture; basic principles; Characteristics – nature as a model, measure and mentor; Three levels of mimicry – the organism, its behaviours, and the ecosystem; Application in fields other than architecture. Approaches – design looking towards biology or Biology influencing design.

**MODULE -2 ORGANISM**

Biomimicry at organism level – mimicry of external forms, Fowers, phyllotaxy, soap bubbles pollen grain, insects, animals etc. Adoption of materials, structural systems and other formal characteristics; Phasing and methodology of construction; Project growth through flexible stages similar to an organism.

Case studies: Matthew Parkes' Hydrological Center for the University of Namibia and the stenocara beetle; Nicholas Grimshaw & Partners' Waterloo International Terminal and the pangolin; Norman Foster's Gherkin Tower; Grimshaw Architects; The Eden Project in Cornwall, England.

**MODULE - 3 BEHAVIOUR**

Biomimicry at Behavioural level – Biomimicry beyond imitating morphological aspects of biology to incorporating functional aspects into architectural design; mimicking the functioning of natural systems or organisms; resource optimization for functioning; Structures non-resistant into their environments; Cost effective solutions to environmental issues – structural efficiency; material manufacture; biomimetic products. Functional mimicry of skin by building facades – communication, thermoregulation, water balance, and protection— translation into design concepts.

Case study: Eastgate Centre, Zimbabwe, Mick Pearce Arup Associates; CH2 Building in Melbourne, Australia; Aesthetics Architects, The Qatar Cacti Building.

**MODULE -4 ECOSYSTEM**

Ecosystem level – functioning like an ecosystem and forming part of a complex system by utilising the relationships between processes mimicking of how the environments many components work together; ability to participate in the hydrological, carbon, nitrogen cycles; Cyclical closed-loop system; Strategy to combat climate change; zero waste systems; Reversal of environmental degradation. Applicable to projects on an urban scale or a larger project with multiple element

**Case studies:** Lloyd Crossing Project, Portland, USA; Tirau's iconic dog building, New Zealand town; The Cardboard to Caviar Project by Graham Wiles, Wakefield, UK; The Sahara Forest Project by Exploration Architecture; Lavasa, India by HOK (Hellmuth, Obata, and Kassabaum); Tetro Del Agua, Grimshaw Architects, Canary Islands; Adam Joseph.

**MODULE -5 FUTURE PROSPECTS**

Criticisms: Future scope; Sustainability through Biomimicry; Design Challenges; possibilities for architecture and allied fields; Role of computers. Limitations and approaches to overcome them.

**REFERENCES:**

1. Biomimicry in Architecture, Michael Pawlyn.
2. Biomimicry: Innovation Inspired by Nature Paper Back by Janine M. Benyus.
3. Vincent, Julian. Biomimetic Patterns in Architectural Design. Architectural Design 79, no. 6(2009).
4. Design by Nature: Using Universal Forms and Principles in Design, By Maggie Macnab.
5. Architecture Follows Nature-Biomimetic Principles for Innovative Design, by Illaria Mazzoleni.

## 17ARE303 LATERAL THINKING TECHNIQUES

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
CONTACT HOURS : 45				

### MODULE - I

Thinking – Definition – Attributes of a Good thinker Vs. Bad Thinker – Imagination- Creativity – Factors influencing origin of a creative idea.

### MODULE - II

Reasoning Vs Imagining - Inductive Reasoning Vs. Deductive Reasoning – Convergent Thinking Vs. Divergent Thinking –Landscape of mind - The way the mind works - Features of memory – Disadvantages of the memory system - Vertical Thinking Vs Lateral thinking – Lateral Thinking - Humour, Insight and Creativity .

### MODULE - III

Lateral Thinking Techniques - The generation of alternatives – theory and exercises; Challenging Assumptions – theory and exercises; Suspended Judgement – theory and exercises.

### MODULE - IV

Dominant Ideas and Crucial Factors– theory and exercises -Fractionation– theory and exercises; Reversal Method– theory and exercises - Brainstorming– Six thinking Hats - theory and exercises -Analogies– theory and exercises.

### MODULE - V

Choice of entry point and attention area– theory and exercises; Random Stimulation – Oblique strategies– theory and exercises.

### Text Books

1. Edward De Bono, Lateral thinking, Creativity Step by step, Penguin UK, 2010
2. Edward De Bono , Six thinking Hats, Penguin UK, 2010

### Reference Book

1. Glatthorn A.A.,& Baron J (1985), Developing Minds: A Resource Book for Teaching Thinking. Revised Edition, Volume 1.Costa, Arthur L., Ed.
2. Serious Creativity: Using the power of Lateral thinking to create new ideas by Edward de Bono.

## ELECTIVE – IV

**17ARE401**

### **CONTEMPORARY PROCESS IN ARCHITECTURAL DESIGN**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

#### **OBJECTIVES**

- To introduce theories of media and its influence on the perception of space.
- To enable study of the various aspects of digital architecture and its exploration through emerging phenomena that relies on abstraction of ideas.
- To give understanding of the works of contemporary architects who have illustrated the influence of the digital media in architecture.

#### **MODULE I INTRODUCTION**

Investigation of contemporary theories of media and their influence on the perception of space and architecture. Technology and art. Technology and architecture. Digital technology and architecture.

#### **MODULE II ASPECT OF DIGITAL ARCHITECTURE**

Aspects of digital architecture. Design and computation. Difference between digital process and non-digital process. Architecture and cyberspace. Qualities of the new space. Issues of aesthetics and authorship of design. Increased Automatism and its influence.

#### **MODULE III CONTEMPORARY PROCESS**

Emerging phenomena such as increasing formal and functional abstractions. Diagrams, diagrammatic reasoning, diagrams and design process. Animation and design. Digital hybrid.

#### **MODULE IV GEOMETRIES AND SURFACES**

Fractal geometry. Shape grammar. Hyper surface. Liquid architecture. Responsive architecture.

#### **MODULE V CONTEMPORARY PROCESS AND ARCHITECTURAL WORKS**

Ideas and works of architects related to contemporary processes. The architects to include Greg Lynn, Reiser + Umemotto, Lars Spuybroek / NOX Architects, UN studio, Diller Scofidio, Dominique Perrault, Decoi, Marcos Novak, Foreign Office Architects, Asymptote, Herzog and de Meuron, Neil Denari, Serie Architects, BIG Architects. Study to be undertaken in the form of assignments/discussions/seminars/presentations.

#### **TEXTBOOKS**

1. Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction', in Illuminations, Schocken Books, New York, 1969
2. Ignaci de Sola Morales, 'Differences: Topographies of Contemporary Architecture', MIT Press, 1997.
3. William J Mitchell, 'The Logic of Architecture: Design, Computation and Cognition', MIT Press, 1995.
4. Ali Rahim, 'Contemporary Process in Architecture', John Wiley & Sons, 2000.
5. Ali Rahim (Ed), 'Contemporary Techniques in Architecture', Halsted Press, 2002.
6. Peter Eisenmann; Diagram Diaries, Universe, 1999.
7. Greg Lynn, 'The Folded, The Pliant and The Supple, Animate form', Princeton Arch. Press, 1999.

#### **REFERENCES**

1. Gillian Hunt, 'Architecture in the Cyberspace II', John Wiley & Sons, 2001.
2. L. Convey et al, 'Virtual Architecture', Batsford, 1995.
3. Rob Shields (ed.), 'Cultures of the internet: Virtual Spaces, Real Histories, Living bodies', Sage, London, 1996.
4. John Beckman, 'The Virtual Dimension, Architecture, Representation and Crash Culture', Princeton Architecture Press, 1998.
5. William J Mitchell, 'City of Bits: Space, Place and the Infobahn', MIT Press, Cambridge, 1995.
6. Marcos Novak, 'Invisible Architecture: An Installation for the Greek Pavilion', Venice Biennale, 2000.

## 17ARE402 CONTEMPORARY BUILDING MATERIALS

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

### OBJECTIVES

- To introduce current materials and products in architecture that are eco-friendly, composite, durable, advanced, smart.
- To inform about innovations in materials and practices in building industry.
- To focus on materials and systems, their properties and connections, intrinsic relationship with structural systems and environmental performance.

### MODULE I INTRODUCTION

Introduction and need for ultra-performance materials in building design as a substitute to conventional materials. Newer application for special performance, thermal/ sound/ moisture protection, fitting, equipment and furnishing. Properties of contemporary materials – multidimensional, repurposed ,recombinant ,intelligent , interfacial, transformant, etc.

### MODULE II ADVANCED CONCRETE AND COMPOSITE REINFORCEMENT

Types of advanced concrete and its applications. Workability and mechanical properties, durability and reliability of advanced concrete materials. Manufacturing and application in buildings. Bendable concrete, light transmitting concrete, translucent concrete, pervious concrete, eco-cement, etc., Introduction to manufacture, types, properties and performance of new reinforcement materials in concrete - Aramid fibres, bio-steel, carbon (Graphite) Fibres and fibre glass etc.

### MODULE III COMPOSITE MATERIALS

Types, terminology and classification of composite materials based on particle reinforced, fiber reinforced, structural and composite benefit in building construction. Composite materials manufacturing process. Use of composite materials namely Polymer Matrix Composites (PMCs) and Fibre- Reinforced Polymers (FRPs) along with cement, steel, aluminium ,wood, glass, etc., for thermal insulation, fire protection, coating, painting and structural monitoring, etc.

### MODULE IV NANO-MATERIALS AND NANO-COMPOSITES

Definition, manufacture and types of nano materials. Properties, performance of nano materials in building construction, types and application of nano-materials like carbon, nanotubes etc., Nano composite used with cement, steel, aluminium, wood, glass for thermal insulation, fire protection, coating and painting and structural monitoring etc.. Nano technologies in building and construction.

### MODULE V DIGITAL AND TENSILE MATERIALS

Types of materials and its constitution, manufacturing and construction technology requirement for 3D printed buildings structure and Extraterrestrial printed structures. Tensile fabric structure by digital printing. Translucent fabric, thin-film photovoltaics, texlon foil, PVC (poly vinyl chloride) coated polyester cloth and PTFE (poly tetra fluoro ethylene) (teflon) coated glass cloth.

### TEXTBOOKS

1. Christiane Sauer, 'Made of...New Materials Sourcebook for Architecture and Design', Prestel Pub, 2010.
2. Mel Schwart, 'Encyclopaedia of Smart Materials -Vol 1,2', Wiley-Interscience, 2001.
3. Senem Özgönül Şensan, 'Smart Materials and Sustainability: Application of Smart Materials in Sustainable Architecture', LAP Lambert Academic Publishing, 2010.
4. Axel Ritter, 'Smart Materials in Architecture, Interior Architecture and Design', Birkhäuser Architecture, 2002.

### REFERENCES

1. Michelle Addington, & Daniel L Schodek, 'Smart Materials and New Technologies: for the Architecture and Design Professions, Architectural Press, 2005.
2. Michael. F. Ashby, Paulo Ferreira, Daniel L. Schodek, 'Nanomaterials, Nanotechnologies and Design: An Introduction for Engineers and Architects', Butterworth- Heinemann, 2009.
3. Blaine Brownell, 'Transmaterial 2', Princeton Architectural Press, 2008.
4. John Fernandez, 'Material Architecture: Emergent Materials for Innovative Buildings and Ecological Construction', Taylor & Francis, 2006.

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
CONTACT HOURS : 45				

**MODULE I**

Introduction to highrise building and its components - Indian Standards and Global Standards on High Rise Buildings; Introduction to services in high rise buildings, Integration of Services, - Importance of Service Core Design, Design Criteria for Service Core, Components of Service Core, Various Service Core Configurations - Vertical and Horizontal Ducts for various services.

**MODULE II**

Various Service Installation In Highrise Buildings – Mechanical services - Naturally and Mechanically assisted Ventilation Systems for high rise buildings - Air Conditioning Systems for Multi-Zone, Multi-Storey Buildings - Passive Fire Safety Standards for high rise buildings as per National Building Code of India - Security Systems at site level & building level: Compartmentalization in structure.

**MODULE III**

Perimeter protection & Access Control - Electrical and transportation services - Planning and Location of Electrical Rooms and power supply Distribution systems-Power Back-Up Systems - Passive and Active Day Lighting Systems-Glass and Glazing system for natural lighting. Vertical transportation system-Planning and Designing of Elevator Systems and Services – Express & Local Elevators, Sky lobbies etc, Escalators and Capsule elevators – Stairways & Ramps.

**MODULE IV**

Plumbing services – Types of Water Storage and Distribution Systems in high rise buildings - Types of Sewage Collection Systems in high rise buildings-Standards of Sanitary Services in high rise buildings - Refuse Collection and Disposal: Methods and types including solid waste collection and disposal -Selection of pumps, Auto Hydro-pneumatic & Pressure Boosting/Control Pumps

**MODULE V**

Integrated Building Management systems - IBMS encompasses the technologies which include energy management systems and building controls. List of utility, safety and security systems that are generally monitored and controlled through IBMS, the various components of IBMS, types of utility, safety & security systems and the basic knowledge on how they are designed and installed

**Text Book**

1. Fred Hall & Roger Greeno, Building Services Handbook, Elsevier,2005.
2. A K Mittal, Electrical and Mechanical Services in High Rise Buildings Design and Estimation Manual, 2001
3. R.Barry, The Construction of Buildings, Volume 5, Affiliated East-West Press Pvt. Ltd., New Delhi, 1999.
4. Building Automation Systems – A Practical Guide to selection and implementation – Author :Maurice Eyke  
Mechanical and Electrical Services for High Rise Buildings: Handbook by Basem M. M. (Author)

**Reference Books :**

1. National Building Code of India, 2005.
2. Proceedings of the council for tall buildings – vol 1 & 2,
3. Fire Safety Issues in High-Rise Residential Buildings: escape routes
4. Yahya Mohamad Yatim design and specification,Lambert Academic Publishing, 2011 Frank R.Dagostino,  
Mechanical and Electrical Systems in Construction and Architecture, Reston Publishing Company  
Inc.Reston, Virginia, 1978.
5. Ken Yeang, Ivor Richards, Bioclimatic Skyscrapers, Ellipsis, 1994.Johann Eisele and Ellen Kloft, High-  
Rise Manual, Birkhäuser-Publishers for Architecture, 2003
6. Design and Application of Security/Fire Alarm system – Author: John E. Traister.

## ELECTIVE – V

**17ARE502**

### **ADVANCED STRUCTURES**

CATEGORY	L	T	S	CREDIT
<b>PE</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>CONTACT HOURS : 45</b>				

#### **OBJECTIVES:**

- To give an understanding of the loss of pre- stress and design requirements for determinate beams.
- To provide familiarity with the concept of industrial structures and high rise structures.
- To enable the study of concepts of tensile structures, domes, shells and folded plates.

#### **MODULE 1      PRESTRESSED CONCRETE**

Losses of Prestress. Design requirements. Design of determinate beams.

#### **MODULE 2      INDUSTRIAL STRUCTURES**

Classification, planning and layout requirements, functional requirements. Types of industrial structures- power plants, bunkers and silos, cooling towers, containment structures, chimneys. Merits.

#### **MODULE 3      HIGH-RISE BUILDINGS**

Introduction. Load action in high rise buildings. Various structural systems. Waffle slab. Approximate analysis of frames for gravity and horizontal loadings.

#### **MODULE 4      TENSILE STRUCTURES**

Concept, development, laws of formation, merits and demerits of pneumatic structures. Basic principles, forms, merits and demerits of cable structures.

#### **MODULE 5      SHELLS, DOMES AND FOLDED PLATES**

Shells of translation. Shells of revolution. Classification of shells and different forms. Domes. Types of folded plates. Space frames.

#### **REQUIRED READING**

1. B.C. Punmia, 'Reinforced Concrete Structures, Vol. 1 & 2', Laxmi Publications, New Delhi, 1994.
2. N. Subramanian, 'Principles of Space Structures', Wheeler, 1998.
3. Thandavamoorthy T.S, 'Advanced Structures of Architecture', Eswar Press, 2008.
4. Council on Tall Buildings and Urban Habitat, 'Structural System for Tall Buildings', McGraw Hill, 1995.
5. Milo.S.Ketchum and Mark.A. Ketchum, 'Types and Forms of Shell Structures, 1997.

#### **REFERENCES**

1. P. Dayaratnam, P.Sarah, 'Prestressed Concrete Structures', Medtech, 2017.
2. Wolfgang Schueller, 'High Rise Building Structures', John Wiley & Sons, 1976.
3. Frei Otto, 'Tensile Structures Volume 1 & 2' The MIT Press, 1973.
4. Bryan Stafford Smith, Alex Coull, 'Tall Building Structures - Analysis & Design', John Wiley, 1991.
5. Thomas Herzog, 'Pneumatic Structures', Crosby Lockwood Staples, London, 1977.
6. Bandyopadhyay J.N, 'Thin Shell Structures: Classical and Modern Analysis', New Age International, 2007.
7. Ramaswamy G.S, 'Design and Construction of Concrete Shell Roofs', CBS, 2005.

**17ARE503**

**SUSTAINABLE ARCHITECTURE  
AND PLANNING**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To give an understanding of the concept of sustainability and sustainable development.
- To inform about issues like climate change, ecological footprint, etc.
- To provide familiarity with low impact construction practices, life cycle costs and alternative energy resources.
- To give exposure to the different rating systems for building practices with case studies.
- To enable understanding of the concept of sustainable communities and associated socio-economic dimensions through case studies.

**MODULE I INTRODUCTION TO SUSTAINABILITY**

Concept of sustainability. Carrying capacity, sustainable development. Bruntland report. Ethics and visions of sustainability. Circles of sustainability. Sustainable economy and use. eco systems, food chain and natural cycles or cradle to cradle concept.

**MODULE II CLIMATE CHANGE AND SUSTAINABILITY**

Overview of climate change and its impact on a global and regional scale. Principles of energy systems. Energy crisis and global environment. Study on vernacular techniques and technological advancements in climate control in different climatic zones.

**MODULE III SITE AND SUSTAINABILITY**

Sustainable site selection and development. Introduction to Green building concepts. TERI, LEED, GIRHA and BREEAM. Ecology and sustainability. Different sources of energy, recyclable products and embodied energy.

**MODULE IV SUSTAINABLE MATERIALS**

Selection of materials Eco building materials and construction. Low impact construction – bio mimicry, zero energy buildings, nano technology and smart materials.

**MODULE V SUSTAINABLE CITIES**

Dimensions of sustainable community- social, cultural and economic factors. Urban ecology, urban heat island effects, smog etc. Case studies of eco city or communities.

**TEXTBOOKS**

1. Dominique Gauzin–Muller, 'Sustainable Architecture and Urbanism: Concepts, Technologies and Examples', Birkhauser, 2002.
2. Catherine Slessor, 'Eco-Tech: Sustainable Architecture and High Technology', Thames and Hudson 1997.
3. Ken Yeang, 'Ecodesign- A Manual for Ecological Design', Wiley Academy, 2006.

**REFERENCES**

1. Arian Mostaedi, 'Sustainable Architecture: Low Tech Houses', Carles Broto, 2002.
2. Sandra F. Mendler & William Odell, 'HOK Guidebook to Sustainable Design', John Wiley and Sons, 2000.
3. Richard Hyder, 'Environmental Brief: Pathways for Green Design', Taylor and Francis, 2007.
4. Brenda Vale and Robert Vale, 'Green Architecture: Design for a Sustainable Future', Thames and Hudson, 1996.

**17ARE501**

**REAL ESTATE DEVELOPMENT**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- By the end of the course, students will be thoroughly exposed to the aspects of Real Estate Management. Students shall be capable of managing retail real estate and corporate real estate effectively.

**MODULE- 1 REAL ESTATE DEVELOPMENT**

Fundamental concepts and techniques, recognizing institutional and entrepreneurial elements, issues encountered in various phases of development like site evaluation and land procurement, development team assembly, market study and development scheme, construction & project management, project marketing and hand-over of completed projects.

**MODULE- 2 DEVELOPMENT & PROJECT FINANCING**

Project Feasibility, Development Financing, Asset Disposal and Redevelopment Options, Analyses of Development Sites and Case Studies, integrated case study on a specific development project, which requires reviewing, analysing and resolving the problems or strategic issues.

**MODULE- 3 URBAN POLICY & REAL ESTATE MARKETS**

Impact of Government Regulations and Public Policies on Real Estate Markets, include urban land rent and location theories, land use structures, community and neighbourhood dynamics, degeneration and renewal in urban dynamics, private-public participation, government policies on public and private housing, and urban fiscal policy including property taxation, local government finance.

**MODULE- 4 CORPORATE REAL ESTATE ASSET MANAGEMENT**

Strategic plans to align real estate needs with corporate business plans; Performance measurement techniques to identify asset acquisition or disposal; methods for enhancing value through alternative uses, efficient space utilization or improving user satisfaction.

**MODULE- 5 COMMERCIAL REAL ESTATE APPRAISAL**

Determination of the capitalization rates across different types of properties; Appraisal of freehold and leasehold interests; Critical analysis of the valuation approaches adopted for securitized real estate; Asset pricing models; investment flexibility and future redevelopment opportunities.

**REFERENCES:**

1. Barron's real estate hand book V Edition, Hauppauge, NY, Barron , 2001
2. Project planning scheduling & control in construction an encyclopedia of terms & applications , New York, Wiley, 1995

## ELECTIVE – VI

17ARE602

### **ARCHITECTURAL JOURNALISM AND PHOTOGRAPHY**

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

#### **OBJECTIVE:**

- To introduce general skills necessary for the practice of professional journalism.
- To introduce the fundamentals of writing, explain different strategies and their criticism.
- To give particular exposure to architectural journalism.
- To introduce photojournalism, bring out importance/ contributions of photography in the architectural profession and to help develop proficiency in modern photography techniques.

#### **MODULE I INTRODUCTION**

Introduction to journalism, key concepts and objectives of journalism. Specialised journalism with emphasis on architectural journalism. Journalism skills: research, reporting, writing, editing, photography, columnists, public relationships, criticism. Issues such as copyright, public art policy, the arts and urban redevelopment. Introduction to local culture scene.

#### **MODULE II TECHNOLOGIES IN JOURNALS**

Environment, social change, persuasion. Interviewing techniques, argument and debate as a technique in the investigation of social problems. Evidence, proof, refutation, persuasion. Training in argumentative speaking. Introduction to software needed in journalism and photography, video coverage, walk-through of buildings, production of contemporary architectural journalism. Understanding the individual demands in the context of newspapers, radio, film, and television.

#### **MODULE III CONTEMPORARY ARCHITECTURAL JOURNALISM**

Role of the editor. Editing of articles, features and other stories. Editing for online newspaper and magazines. Text preparation, mode of presentation, standards and guidelines for documentation. Code of ethics. Basic knowledge on press laws, Press Council of India. Multimedia/ online journalism and digital developments.

#### **MODULE IV DISCUSSIONS AND ISSUES**

Regional, national and international discussion forums. Changes in contemporary and historical design practices. Discussions on topics needed in an architectural journal and current issues. Types of journals. Works of key architectural journalists. Public discourse on the internet. Mass media and public opinion. Critique on selected pieces of journalism.

#### **MODULE V ARCHITECTURAL PHOTOGRAPHY**

Introduction to architectural photography and role of the photographic image in the global world. Equipment - cameras and lenses. Techniques- film speed, exposure measurement, gray scale, photo-finishing and editing digital images. Perspectives- single point, two- point, three- point and methods of correcting distortions. Lighting - external and interior

#### **TEXTBOOKS**

1. Edward Jay Friedlander and John Lee, 'Feature Writing for Newspapers and Magazines', 4<sup>th</sup> edition, longman, 2000.
2. David Fuller & Patricia Waugh, eds., 'The Arts and Sciences of Criticism', Oxford: Oxford University Press, 1999.
3. James Foust, 'Online Journalism Principles and Practices of News for the Web', Holcomb Hathaway Publishers, Scottsdale, AZ, 2005.
4. M. Harris, 'Professional Architectural Photography', Focal Press, 2001.
5. M. Harris, 'Professional Interior Photography', Focal Press, 2002

#### **REFERENCES**

1. Martin Huckerby, 'The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries'. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
3. S. J. A. Ward, 'Philosophical Foundations of Global Journalism Ethics', Journal of Mass Media Ethics, Vol. 20, No. 1, 3-21, 2005.
4. M. Heinrich, 'Basics Architectural Photography', Birkhauser Verlag AG, 2008.

5. Gerry Kopelow, 'Architectural Photography: The Professional Way', Princeton Architectural Press, 2007.

17ARE601

**ARCHITECTURAL CONSERVATION**

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

**OBJECTIVE:**

- To introduce the various issues and practices of conservation in architecture.
- To provide familiarity with the status of conservation in India and the various agencies involved in the field of conservation worldwide and their policies.
- To outline the status of conservation practice in the country and the various guidelines for the preservation, conservation and restoration of buildings.
- To inform about the character and issues in Indian heritage towns through case studies.

**UNIT I INTRODUCTION TO CONSERVATION**

Understanding heritage. Defining conservation, preservation and adaptive reuse. Heritage conservation- need, debate and purpose. History of conservation movement. International agencies like ICCROM, ICOMOS, UNESCO and their role in conservation. Charters. Principles and ethics of conservation.

**UNIT II CONSERVATION IN INDIA**

Museum conservation. Monument conservation and the role of ASI, SDA, INTACH. Central and state government policies and legislations. Inventories and projects. Selected case studies of sites such as Hampi, Golconda, Mahabalipuram. Craft Issues of conservation.

**UNIT III CONSERVATION METHODS AND MATERIALS**

Investigation techniques and tools. Behaviour of historic materials and structures. Problems with masonry, foundation. Repair methods, traditional and modern methods. Seismic retrofit, services additions and disabled access to historic buildings. Moisture and pollution problems.

**UNIT IV CONSERVATION PRACTICE**

Listing of monuments. Documentation of historic structures. Assessing architectural character. Historic structure report. Guidelines for preservation, rehabilitation and adaptive re-use of historic structures. Case studies of palaces in Rajasthan, dwellings in Chettinad and Swamimalai. Heritage site management.

**UNIT V URBAN CONSERVATION AND CONSERVATION PLANNING**

Understanding the character and issues of historic towns. Selected case studies. Historic districts and heritage precincts. Conservation as a planning tool. Financial incentives and planning tools such as TDR. Urban conservation and heritage tourism. Case studies of sites like Cochin, Pondicherry French town. Conservation project management.

**TEXTBOOKS**

1. Bernard Fielden, 'Conservation of Historic Buildings', Architectural Press, 2003.
2. Bernard Fielden, 'Guidelines for Conservation - A Technical Manual', INTACH, 1989.
3. MS Mathews, 'Conservation Engineering', Universitat Karlsruhe, 1998.
4. J. Kirk Irwin, 'Historic Preservation Handbook', McGraw Hill, 2003.
5. Donald Appleyard, 'The Conservation of European Cities', M.I.T. Press, Massachusetts, 1979.
6. Publications of INTACH

**REFERENCES**

1. James M. Fitch, Historic Preservation: Curatorial Management of the Built World by University Press of Virginia; Reprint Edition, 1990.
2. Robert E. Stipe, 'A Richer Heritage: Historic Preservation in the Twenty-First Century', University of North Carolina Press, 2003.
3. B.P. Singh, 'India's Culture- The State, The Arts and Beyond', Oxford University Press, 2000
4. A.G. K. Menon (Ed), 'Conservation of Immovable Sites', INTACH Publication, N. Delhi.
5. John H. Stubbs and Emily G Makas; Architectural Conservation in Europe and the Americas, John Wiley & Sons, 2011.

CATEGORY	L	T	S	CREDIT
PE	2	0	0	2
<b>CONTACT HOURS : 30</b>				

**OBJECTIVE:**

To create an awareness towards natural and man -made disasters, disaster preparedness and disaster management

**MODULE 1 INTRODUCTION TO DISASTERS**

Natural resources and its importance-understanding on fragile eco-system - characteristics and types of Disasters, Geological and Mountain Area Disasters: Earthquakes, Volcanic eruption, landslides- Wind and Water Related Natural Disaster: Floods, Droughts, Cyclones, Tsunamis - Man Made Disasters: Forest fires, Nuclear, Biological and Chemical disaster - Causes and effects - Disaster Profile of India - Disaster Management cycle.

**MODULE 2 DISASTER PREPAREDNESS**

Disaster management, mitigation and preparedness: Disaster Preparedness for People and Infrastructure, Community based Disaster Preparedness Plan - Roles & Responsibilities of Different Agencies and Government: Education, Communication & Training, Central, State, District and local administration, Armed Forces, Police, Para Military Forces, International Agencies, and NGO 's - Disaster Mitigation: Strategies, Emerging Trends, Mitigation management and Role of Team and Coordination.

**MODULE 3 REHABILITATION, RECONSTRUCTION & RECOVERY**

Damage assessment – Development of Physical and Economic Infrastructure - Nature of Damage to Houses and Infrastructure due to Disasters - Funding Arrangements for Reconstruction - Monitoring and Evaluation of Rehabilitation Work: Training, Rescue and planning the rescue activities and rehabilitations - Role of Government and NGO's - Participative Rehabilitation Process: Case Studies

**MODULE 4 DISASTER RESPONSE AND DISASTER MANAGEMENT**

Disaster Response Plan: Communication, Participation and Activation of Emergency Preparedness Plans, Search, Rescue, Evacuation and other logistic management - Human Behaviour and Response Management: Psychological Response and Psychological Rehabilitation, Trauma and Stress Management, rumour and Panic Management, Medical and Health Response to Different Disasters – Relief Measures: Minimum Standard of Relief, essential components of Relief Management, and funding.

**MODULE 5 RISK ASSESSMENT AND VULNERABILITY ANALYSIS**

Hazard, Risk and Vulnerability: Concept and Relationship: Disaster Risk Reduction, People Participation in Risk Assessment - Vulnerability Analysis, Vulnerability Identification - Vulnerability profile of India - Strategies for Survival - Social Infrastructure for Vulnerability Reduction.

**REFERENCE BOOKS**

1. Bryant Edwards, Natural Hazards, Cambridge University Press, U.K, 2005
2. Carter, W. Nick, Disaster Management, Asian Development Bank, Manila, 1991.
3. Government of India, Vulnerability Atlas of India, New Delhi, 1997.
4. Sahni, Pardeep et.al. (eds.), Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi, 2002
5. Sahni, Pardeep and Ariyabandu, Disaster risk reduction in South Asia, Phi learning pvt. Ltd., New Delhi, 2012.
6. Sharma, R.K. & Sharma, G.,(ed), Natural Disaster, APH Publishing Corporation, New Delhi, 2005.
7. Taori, K, Disaster Management through Panchayati Raj, Concept Publishing Company, New Delhi, 2005.
8. NOAA Coastal Services Center, Linking People Information and Technology,
9. Risk and Vulnerability Assessment Tool, at, <http://www.csc.noaa.gov/rvat/criticalEdd.htm>

## ELECTIVE – VII

**17ARE702                      EARTHQUAKE RESISTANT  
ARCHITECTURE**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

### **OBJECTIVE:**

- To enable an understanding of the fundamentals of earthquake and the basic terminologies.
- To give basic knowledge of earthquake resistant design concepts.
- To provide familiarity with design codes and building configuration
- To enable understanding of the different types of construction details to be adopted in a seismic prone area.
- To give knowledge for applying earthquake resistant principles in an architectural design project.

### **MODULE I    FUNDAMENTALS OF EARTHQUAKES**

Earth's structure, seismic waves, plate tectonics theory, origin of continents, seismic zones in India. Predictability, intensity and measurement of earthquake. Basic terms- fault line, focus, epicentre, focal depth etc.

### **MODULE II    SITE PLANNING, PERFORMANCE OF GROUND AND BUILDINGS**

Historical experience, site selection and development. Earthquake effects on ground, soil rupture, liquefaction, landslides. Behaviour of different types of building structures, equipments, lifelines, collapse patterns. Behaviour of non-structural elements like services, fixtures in earthquake-prone zones

### **MODULE III    SEISMIC DESIGN CODES AND BUILDING CONFIGURATION**

Seismic design code provisions. Introduction to Indian codes. Building configuration - scale of building, size, horizontal and vertical plane, building proportions, symmetry of building - torsion, re-entrant corners, irregularities in buildings like short storeys, short columns, etc.

### **MODULE IV    DIFFERENT TYPES OF CONSTRUCTION DETAILS**

Seismic design and detailing of masonry structures, wood structures, earthen structures. Seismic design and detailing of RC and steel buildings. Design of non-structural elements - architectural elements, water supply, drainage, electrical and mechanical components.

### **MODULE V    URBAN PLANNING AND ARCHITECTURAL DESIGN**

Vulnerability of existing buildings, facilities planning, fires after earthquake, socio-economic impact after earthquakes. Conceptual design for earthquake resistance involving institutional masonry building with horizontal spread and height restriction, multi-storeyed RC framed apartment/commercial building.

### **REQUIRED READING**

1. 'Guidelines for earthquake resistant non-engineered construction', National Information centre of earthquake engineering (NICEE, IIT Kanpur, India), 2004.
2. C.V.R Murthy, Andrew Charlson, 'Earthquake Design Concepts', NICEE, IIT Kanpur, 2006.
3. Agarwal.P, 'Earthquake Resistant Design', Prentice Hall of India, 2006.

### **REFERENCES**

1. Ian Davis, 'Safe Shelter within Unsafe Cities: Disaster Vulnerability and Rapid Urbanization', Open House International, UK, 1987
2. 'Socio-economic developmental record'- Vol.12, No.1, 2005.
3. Mary C. Comerio, Luigia Binda, 'Learning from Practice- A Review of Architectural Design and Construction Experience after Recent Earthquakes', Joint USA-Italy workshop, Oct.18-23, 1992, Orvieto, Italy.

17ARE701

**CONSTRUCTION AND  
PROJECT MANAGEMENT**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVE:**

- To introduce different management techniques suitable for planning and construction projects.
- To enable understanding of management systems for accomplishing the task efficiently in terms of quality, time and cost.

**MODULE I INTRODUCTION TO PROJECT MANAGEMENT**

Project management concepts. Objectives, planning, scheduling. Controlling and role of decision. Inproject management. Traditional management system. Gantt's approach. Load chart. Progress chart. Development of bar chart, merits and demerits. CPM networks, merits and demerits. PERT network. Introduction to the theory of probability and statistics.

**MODULE II PROJECT PROGRAMMING AND CRITICAL PATH METHOD**

Project network. Events activity. Dummy. Network rules. Graphical guidelines for Network. Numbering the events. Cycles. Development of network-planning for network construction. Models of network construction. Steps in development of network. Work break down structure. Hierarchies. Critical path method - process, activity time estimate, earliest event time, latest allowable occurrence time, start and finish time of activity, float, critical activity and critical path problems.

**MODULE III RESOURCE PLANNING**

Cost model- project cost, direct cost, indirect cost, slope curve, total project cost. Optimum duration contracting the network for cost optimization. Steps in cost optimization, updating, resource allocation, resource smoothing, resource leveling.

**MODULE IV COMPUTERIZED PROJECT MANAGEMENT**

Creating a new project, building task. Creating resources and assessing costs, refining project. Project tracking, recording actual. Reporting on progress. Analysing financial progress. Introduction to BIM.

**MODULE V CONCEPT TO COMMISSIONING**

Project feasibility study. Real estate & regulatory strategies. Facility programming and planning. Design management. EPC. testing & commissioning.

**TEXTBOOKS**

1. Dr. B.C. Punmia and K.K. Khandelwal, 'Project Planning and Control with PERT and CPM', Laxmi Publications, 2018.
2. Elaine Marmel, 'Microsoft Project 2010 Bible', Wiley, 2010.
3. Sam Kubba, 'Green Construction Project Management and Cost Oversight', Elsevier, 2010.

**REFERENCES**

1. Jerome D. Wiest and Ferdinand K. Levy, 'A Management Guide to PERT/CPM', Prentice Hall of India, 1982.
2. Bert Bielefeld, 'Basics Project Management Architecture', Birkhauser, 2013.

**17ARE703      ADVANCED LANDSCAPE DESIGN**

<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>S</b>	<b>CREDIT</b>
<b>PE</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>CONTACT HOURS : 45</b>				

**OBJECTIVES:**

- To train the students in the detailing and drawing of landscape elements and features like lighting, play area, terraces and water features.
- The course discusses the management of water in site through landscape design.

**MODULE I - OUTDOOR LIGHTING**

Definition of technical terms, types of electrical lighting, types of fixtures, auxiliary fixtures. Principles of design for outdoor illumination, design and type of effects with electrical lighting. Safety precautions and drawbacks of electrical lighting, electrical accessories and their installation. Solar energy and lighting.

**MODULE II - PLAY AREA AND TERRACE LANDSCAPING**

Design of play areas -Totlots to play grounds. Design and detail of play equipments. Considerations, design and detail for terrace landscaping, concept of green roof - intensive and extensive.

**MODULE III - WATER FEATURES**

Design of water features such as swimming pools, cascades, fountains etc., and their technical requirements. Consideration for design and detail. Water bodies and natural ponds. Design of irrigation system – landscape area types, objectives and design, water needs and sources, application, methods of installation. Control systems, scheduling and maintenance.

**MODULE IV - STORM WATER MANAGEMENT**

Drainage – surface drainage, calculation of surface run off, design of surface and storm water drainage, design of swales and gutters.

**MODULE V - WATER RESOURCES PLANNING**

Water shed and their characteristics, urban storm water drainage systems, protection of natural water bodies, water retention structures, water harvesting techniques and devices.

**REFERENCES:**

- 1.David Sauter, Landscape Construction, Pelmer Thomson Learning, 2000.
- 2.Michael Little wood, Landscape Detailing Volume I-IV, Architectural Press, 1993.
- 3.Roger Narboni, Lighting the Landscapes- Art Design technologies, Birkhauser, Switzerland, 2004.
- 4.Halpeth, T.Senthilkumar, G.Harikumar, Light Right, TERI, New Delhi, 2004.
- 5.Charles.W.Harris & Nicholas T. Dines, Time saver Standards for Landscape Architecture, Mc. Graw Hill.

## **ELECTIVE - VIII**

**17ARE801 ENVIRONMENTAL IMPACT ASSESSMENT**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVE:**

To provide a basic understanding of the EIA process as it is used for research, planning, project or program evaluation, monitoring, and regulatory enforcement and to introduce students to the legal, economic, administrative and technical process of preparing and/or evaluating environmental impact documents.

**MODULE 1 - INTRODUCTION**

Historical development of Environmental Impact Assessment (EIA). EIA in Project Cycle. Legal and Regulatory aspects in India. Types and Limitations of EIA, Cross sectoral issues and terms of reference in EIA Public Participation in EIA. EIA process.

**MODULE 2 - METHODS FOR EIA**

Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives.

**MODULE 3 - PREDICTION AND ASSESSMENT**

Assessment of Impact on land, water, air, social & cultural activities and on flora & fauna- Mathematical models-Public participation – Rapid EIA.

**MODULE 4 - ENVIRONMENTAL MANAGEMENT PLAN**

Environmental Management Plan – Preparation, Implementation and review – Mitigation and Rehabilitation Plans– Policy and guidelines for planning and monitoring programmes – Post project audit – Ethical and Quality aspects of Environmental Impact Assessment.

**MODULE 5 - LIFE CYCLE ASSESSMENT & EXECUTIVE SUMMARY**

Life Cycle Assessment - Elements of LCA - Life Cycle Costing – Eco Labeling – Designs for the Environment - International Environmental Standards - ISO 14001 - Environmental Audit. Executive summary - Documentation of EIA Findings, Planning, Organization of information and Visual display material, Report preparation.

**REFERENCE BOOKS :**

1. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York. 1996
2. Y.Anjaneyulu: Environmental Impact Assessment Methodologies, BS Pub. 2002.
3. S.K.Shukla and Srivastava P.R., Concepts in Environmental Impact Analysis, Common Wealth Publishers, New Delhi, 1992.
4. John G. Rau and David C Hooten (Ed), Environmental Impact Analysis Handbook, McGraw-Hill Book Company, 1990.
5. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience, New Jersey, 2003.
6. Environmental Assessment Source book, Vol. I, II & III. The World Bank, Washington, D.C., 1991.
7. J.Petts, Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science, London, 1999.
8. Judith Petts, Handbook of Environmental Impact Assessment, Vol. I & II, Blackwell Science, 1999
9. World Bank –Source book on EIA

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVE:**

To provide an overview about dynamic urban transformation and resultant architectural developments taking place in major developing countries in Asia – and thus gain a non-Western perspective; To provide a platform for the students to contextualize the architectural and urban development processes in India with the neighbouring countries; Think from a holistic and multidisciplinary perspective about common problems.

**MODULE - I. Setting the Context**

Understanding and Asia's urban shift and its multiple dimensions; Evolution of the Asian cities: Morphology of pre-modern, market, colonial and contemporary Asian cities.

**MODULE - II. Opportunities and Challenges**

Understanding contemporary issues: Demographic transition, urbanisation trends, economic momentum and environmental consequences.

**MODULE - III. Looking Towards East and Southeast Asia**

Understanding underlying socio-political dynamics and critiquing new architecture and urban development patterns in Asian metropolises such as Tokyo, Hong Kong, Singapore, Bangkok.

**MODULE - IV. Looking Towards South and West Asia**

Understanding underlying socio-political dynamics and critiquing new architecture and urban development patterns in Asian metropolises such as Dubai, Abu Dhabi, New Delhi (NCR), Mumbai.

**MODULE - V. Similarities and Dissimilarities**

Locating Indian cities in changing Asia: Economic transformation and settlement patterns – informal and formal cities, Issues of sustainability, resilience and urban form; Roles of state and non-state actors in India's urban development process.

**References:**

1. Asian Development Bank. (2008). Managing Asian Cities : Mandaluyong City, Philippines.
2. Hamnett, S. and Forbes, D. (2011). Planning Asian Cities. Routledge.
3. MeeKam, N. and Hills, P. (2003). World cities or great cities? A comparative study of five Asian metropolises. Cities. Vol. 20, No.3, pp. 151-165.
4. Srivastava, S. (2014). Entangled Urbanism: Slum, Gated Community and Shopping Mall in Delhi and Gurgaon. New Delhi : Oxford University Press India.
5. UN Habitat. (2011). The State of the Asian Cities. 2010/11.
6. Weightman, B. A. (2011). Dragons and Tigers. A Geography of South, East and Southeast Asia. Wiley.
7. World Bank. (2010). Coastal Risks and Adaptation in Asian Coastal Megacities - A Synthesis Report. Washington DC : World Bank.
8. Lu, D. (2011). Third World Modernism – Architecture Development and Identity. Oxon: Routledge.

**17ARE802**

**BUILDING ECONOMICS**

CATEGORY	L	T	S	CREDIT
PE	2	1	0	3
<b>CONTACT HOURS : 45</b>				

**OBJECTIVE:**

To make the students aware of the effect of economics on architectural considerations, and to familiarize the students to various economic concepts that come within the purview of architecture.

**MODULE -I. General Economics**

Micro Economics: The market, demand and supply, choice, budget, consumer satisfaction, monopoly and oligopoly, choice of production technology and returns, profit maximization and cost minimization, production welfare and public good.

Macro Economics: GNP, NNP, demand and supply, inflation, interest rate, employment, saving and investment, monetary and fiscal systems and policies.

**MODULE -II. Theory of Demand**

Utility analysis of demand, basic assumptions of marginal utility analysis, law of diminishing marginal utility, consumer's equilibrium, Demand.

**MODULE -III. Project Economics**

Economics of the basic inputs into building construction projects - land, labour, capital and Material. Labour intensive v/s capital intensive projects. Financing for projects, sources of capital, Agencies and Institutions influencing project economics, public private participation.

**MODULE -IV. Capital, Interest and Profits**

Basic concepts of Interest and Capital, prices and rentals on investment, Capital v/s Financial assets, IRRS on Investment, IRR and Interest rates, (PV) Present Value of assets, PV of Perpetuities, general formula for PV, Nominal & Real Investments.

**MODULE -V. Economic Analyses of Projects**

Cost – Control, Cash - Flow Analyses, Cost – Projection, Cost – Benefit, Feasibility, Estate Investments & returns, Valuation, Law relating to properties & Buildings.

**REFERENCES:**

1. Chaudhuri, S. and Sen, A. (2010). Economics. McGraw Hill.
2. Dewett, K. K. (2009). Modern Economic Theory. S. Chand Publications.
3. Ferry, J. D. and Brahdon, S. P. (1994). Cost Planning of Buildings. BSP Professional Books.
4. Koutsoyiannis, A. (1994). Modern Microeconomics. 2nd Ed. MacMillan Press.
5. Nobbs, J. and Hopkins, I. (1995). Economics: a core text. 4th Ed. London : McGraw-Hill.
6. Smell, M. Cost – benefit Analysis – a practical guide. Thomas Telford Publishing.
7. Stone, P. A. (1976). Building Economy: Design Production and Organisation a synoptic view, 2<sup>nd</sup> Ed. Oxford : Pergamon Press.
8. Teck, H. and Hian, O. (1998). Economics: theory and applications. Taiwan : McGraw-Hill.