

SEMESTER 1

SCIA1104	APPLIED MECHANICS	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

- To determine the forces, loads and reactions on structural members.
- To comprehend the elastic and geometric properties of structural sections.
- To familiarize the students to the relationships between Loading, Shear Force & Bending Moment.

UNIT 1 FORCES**10 Hrs.**

Definition - Coplanar - Concurrent - Non-Concurrent - Parallel Forces - Triangular and Parallelogram Law of Forces - Equilibrium of Forces - Conditions for Static Equilibrium - Concept of Transfer of Forces in Beams, Cables, Arches & Domes. Various Types of Load - Dead, Live, Wind, Impact, Earthquake etc. & their Effect on Structures. Various Types of Structural Members - Support Conditions - reactions moments for plane frame trusses.

UNIT 2 ELASTIC PROPERTIES**10 Hrs.**

Definition - Stress, Strain - Tensile, Compressive & Shear - Linear & Lateral Strain - Poisson's ratio - Stress Strain Curve for Mild Steel & High Tensile Steel - modulus of Elasticity, bulk modulus, modulus of Rigidity and their Relationships - Application to Uniform Sections. Analysis of Plane frame trusses by method of Joints.

UNIT 3 GEOMETRICAL PROPERTIES OF SECTIONS**10 Hrs.**

Area - Centroid - C.G of Various Sections (Including Cutout Holes) - Moment of Inertia - Parallel & Perpendicular Axis Theorem - Moment of Inertia of Various Section - Section Modulus.

UNIT 4 SHEAR FORCE & BENDING MOMENTS**10 Hrs.**

A Definition - Relation between Loading, Shear Force & Bending Moment - Simply Supported, Cantilever and Overhanging Beams Subjected to Concentrated, uniformly distributed and uniformly varying loads and their Combinations.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**5 Hrs.**

Demonstrate comprehensive understanding of structural mechanics, preparation of assignments and group discussion

Max. 45 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Understand the interaction between forces and concept of equilibrium concept significance of elastic properties in resisting forces.
- CO2** Determine the various forces, loads and reactions acting on structures.
- CO3** Comprehend and analyze simple trusses. Formulate relationship among various elastic properties of sections.
- CO4** Quantify the moment of Inertia on various sections. Analyze the forces in plane frame truss using method of joints.
- CO5** Evaluate shear force due to loading on simply supported beams. Evaluate the geometric properties of various sections.
- CO6** Analyse bending moment due to loading on simply supported beams. Analyze the shear forces and bending moment in different types of beams under various loading conditions.

TEXT / REFERENCE BOOKS

- Junnarkar S.B. & Shah H.J. (1995). Mechanics of Structures (Volume I), 21st edition, AnandCharotar publishing house, India.
- Bansal R.K (1990). Strength of Materials, Laxmi Publications Pvt Limited, India.
- Rajput R.K. (1996). Strength of Materials, S. Chand and company, New Delhi.
- Punmia P.C. (1994). Strength of materials and Theory of structures, Vol 1, Laxmi publications, Delhi.
- Ramamrutham S. & Narayan.R. (1990). Strength of Materials, Dhanpat Rai & Sons, Delhi.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SMTA1103	MATHEMATICS FOR ARCHITECTURE	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

To identify, reflect upon, evaluate and apply different types of information and knowledge to form independent judgments.

To develop Analytical, logical thinking and conclusions based on quantitative information will be the main objective of learning this subject.

UNIT 1 MATHEMATICS IN DESIGN**10 Hours**

Proportion, Golden ratio and Beauty, Scale, fractal design, Euclidean geometry, Understanding non-parallel surfaces, Symmetry and Anti-symmetry. Algebraic relations and its application in Egyptian pyramids, Fibonacci series. Sacred Geometry, Square root Proportions, Modular Proportions

UNIT 2 MATHEMATICS AND MEASUREMENTS**10 Hours**

Methods to calculate areas and volumes for various geometrical shapes and volumes. SI Metric Units of measurements for angles, time, mass, distance, volume, force, energy, power, current, potential difference, resistance, pressure, frequency, thermodynamic temperature, luminous intensity

UNIT 3 STATISTICS & PROBABILITY**10 Hrs.**

Measures of Central Tendency and Measures of Dispersion. Kurtosis, Curve fitting, Method of Least Squares (Straight Line and Parabola), Correlation and Regression. Elementary concepts of Probability.

UNIT 4 DIFFERENTIAL AND INTEGRAL CALCULUS**10 Hrs.**

Tangent and Normal, Curvature (Cartesian and parametric forms), Taylor's and McLaurin's expansion for one variable. Indeterminate forms, Maxima, Minima for a function of one variable. Reduction Formulae for $\sin^n x$, $\cos^n x$, $\tan^n x$ and $\sin^m x \cos^n x$. Use of double and triple integrals, Calculation of areas using multiple integrals.

UNIT 5 TRIGONOMETRY**5 Hrs.**

Angles of intersection for components of structure using of trigonometry. Length of wall using trigonometry – Tangents - Pythagoras Theorem. Measure of Cube and other Solids – Applications of Trigonometry in Arches, Domes, Support Beams and Suspension bridges.

Max. 45 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Define Golden ratio, measures, Taylor's and Maclaurins series. Concepts of probability.
- CO2** Explain the measures of central tendencies, dispersion, Golden ratio and Fibonacci series with illustrations. Explain addition and total theorem of probability with examples.
- CO3** Choose appropriate SI metric units for measurements.
- CO4** Distinguish correlation and regression, various types and methods of dispersion. Categorize the regression coefficients. Differentiate correlation and rank correlation. Estimate the maxima and minima of functions of one variable.
- CO5** Evaluate the coefficient of variation and correlation coefficients. Evaluate area using double integral.
- CO6** Produce the solution of integral using reduction formula. Designing architecture using golden ratio, Construct the curve using method of least squares.

TEXT / REFERENCE BOOKS

1. Kreyszig E., Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons, 2001.
2. Grewal B.S., Higher Engineering Mathematics, 36th Edition, Khanna Publishers, 2002,
3. Vittal.P.R., Business Statistics, Margham publications, Chennai, 2008.
4. S.P.Gupta, Business Statistics, Sultan Chand & Sons, New Delhi, 2008.
5. Veerarajan T, Engineering Mathematics for First Year, 2nd Edition, Tata McGrawHill Publications, 2008
6. Kandasamy P & co., Engineering Mathematics for First Year, IX Revised Edition, S.Chand&Co Pub., 2010
7. New Mathematics of Architecture by Jane Burry and Mark Burry.
8. BIPM. (2014). The International System of Units (SI). 8 th Ed. Bureau International des Poids et Mesures.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA 1101	HISTORY CULTURE AND BUILT ENVIRONMENT -I	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

To construct knowledge on the fundamentals of art and its reflection in culture, theories and solutions related to society and culture.

To understand the basic concepts / theories of formation of society, role of architecture in the built environment and the relationship between man and the environment.

To familiarize the students with the community, various factors influence various communities in a society and its impact on the environment.

UNIT 1 CULTURE AND ARTS**4 Hrs.**

Introduction to the elements of culture. Role of art, art reality, perception, representation categories of art in terms of media and technique, paintings, sculpture, film- basic characteristics and development of each field, aspects of literature, performing arts - theatre, dance, music with examples from different cultural contexts.

UNIT 2 CULTURE AND SOCIETY**8 Hrs.**

Importance of Culture and social identity with reference to architecture, Evolution of civilization and cultures, groups, society, culture, environment and time, Levels of social organization & the evolution of various social groups over time, human habitat to be related with culture and various contexts with examples in different eras, research on cultural anthropology.

UNIT 3 CONSTRUCTION AND CULTURE**8 Hrs.**

Relationship between nature and Architecture. Architecture and its context, Social and cultural aspects of building practices, Role of intuition, innovation, inventiveness, creativity, ingenuity, expression of power in construction and the origin of the Architect and the master builder Construction as an agent of change, emergence of the specialist, designer and builder relationship, culture of construction workers.

UNIT 4 BUILT ENVIRONMENT**6 Hrs.**

Introduction to history and theory of built forms - Geographical location, politics, religion, materials and construction techniques with examples in different contexts. Understanding human cultural development, built form and cultural context. Expression of the underlying value systems and relationship with the built form.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**4 Hrs.**

Book Review on Culture, Architecture and design by Amas Rapoport. Assignment on the topic - Aspects influencing the experience and expression - place, people, society, culture, history, tradition, time etc. through Case studies of architects' work. Document the existing communities in urban spaces that illustrate the current socioeconomic and cultural pattern, and show the impact of socio-cultural change on age and the built environment.

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Understand the cultural contexts, development of various art forms and their representation during different time periods.
- CO2** Comprehend the relationship between society, culture and the environment.
- CO3** Understand the evolution of social groups over time and human habitat related to various contexts and culture.
- CO4** Appraise the relationship of construction with respect to society and their culture and also the emergence of the Architect.
- CO5** Summarize the different cultural context and analyze their relationship with the design of built forms.
- CO6** Relate the role of culture and human behavior in a society and their response to the environment.

TEXT / REFERENCE BOOKS

- Lewis, Jeff. Cultural Studies - The Basics. SAGE Publications, 2002.
- Rapoport, Amos. Culture, Architecture, and Design. Locke Science Publishing Company, 2005.
- The Meaning of the Built Environment: A Nonverbal Communication Approach. University of Arizona Press, 1990.
- Stolley, Kathy S. The Basics of Sociology. London: Greenwood press, 2005.
- James W. Spradley Late, D. W. (2015). Conformity and Conflict: Readings in Cultural Anthropology. Pearson; 15 editions.
- Rapoport, A. (1969). House Form and Culture. Pearson; 1 edition.
- Saile, D. G. (1986). Architecture in Cultural Change: Essays in Built Form and Culture Research. University of Kansas.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100
Hrs.

Exam Duration: 3

SARA 1102	THEORY OF ARCHITECTURE - I	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE 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 develop the design vocabulary skills by exposing the students to visual and emotional effects and aesthetic design relationships like proportion scale, balance, symmetry etc., by studying architectural examples.

UNIT 1 PRIMARY ELEMENTS IN ARCHITECTURE**12 Hrs.**

Introduction to Theory of Architecture, Primary elements of Architecture – Points, lines and shapes - Linear elements -planar elements and volumetric elements. Geometry in Architecture - Patterns in nature and building design - Order to chaos. Regularity and irregularity.

UNIT 2 ORDERING PRINCIPLES AND MEANING IN ARCHITECTURE**12 Hrs.**

Ordering principles: Axis, Symmetry, Hierarchy, Datum, Rhythm, Repetition, Transformation, Balance - Human scale - proportion -- Golden Section, Le modular, Fibonacci series - Renaissance Theories. Anthromorphism and architecture. Figure and ground, positive and negative spaces.

UNIT 3 FORM & SPACE**8 Hrs.**

Definition of Form and its properties, Visual & Emotional effects of geometrical forms & their derivatives - Elements of spatial definition - Form defining space - Elevated base plane, depressed base plane -Vertical and horizontal elements defining space - Depth and density of space - Spatial juxtaposition and interpenetration - Spatial characteristics of elementary shapes - Qualities of architectural space - Degree of enclosure.

UNIT 4 ORGANISATION OF FORMS AND SPACES**8 Hrs.**

Spatial relationships: space within space, interlocking spaces, adjacent spaces, space linked by a common space - spatial organization: centralized, linear, radial, clustered, grids. Articulation and its role as a form modifier –edges and corners, surfaces.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**5 Hrs.**

Analyzing works of Frank Lloyd Wright, Le Corbusier, Tadao Ando, Mies van der Rohe, Charles Correa & Zaha Hadid - Case studies – Analyzing with reference to form and space. Identifying architectural elements and principles in their works.

Max. 45 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Identify that architecture is a communicative medium involving aspect of expression and experience.
- CO2** Understand the interdependency of form and space.
- CO3** Explore the various principles of architectural design.
- CO4** Analyze the various possibilities of approaching architectural design through examples.
- CO5** Acquire design vocabulary skills to put forth the ideas in graphics and literature.
- CO6** Evaluate their own analysis and the ability to derive ideas from abstract thinking.

TEXT / REFERENCE BOOKS

- Ching, F. D. (2014). Architecture: Form, space, and order. John Wiley & Sons.
- Unwin, S. (2013). Analysing architecture. Routledge.
- Pramar, V. S. (1973). Design fundamentals in Architecture. Somaiya.
- Von, M. P. (2013). Elements of Architecture: from Form to Place.
- Rasmussen, S. E. (1964). Experiencing architecture (Vol. 2). MIT press.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA2101	ARCHITECTURAL GRAPHICS - I	L	T	P	Credits	Total Marks
		1	0	3	2	100
Continuous assessment	End Semester Examination	Minimum pass marks				
		Continuous Assessment		End Semester Examination		
70	30	35		15		

COURSE OBJECTIVES:

- To outline the basic principles of drafting and rendering techniques
- To understand plane and solid geometry, isometric and axonometric view
- To familiarize with simple objects and building components through measured drawing.

UNIT 1 INTRODUCTION**12 Hrs.**

Introduction to fundamentals of drawing/ drafting: Construction of lines, line value, line types, lettering, architectural notations & dimensioning. Basic rendering techniques, basics of sheet presentation drawing, drawing instruments, sheet layout. Use of scale, free hand and geometric construction of Lines

UNIT 2 GEOMETRICAL DRAWING - PLANE GEOMETRY**12 Hrs.**

Construction of shapes - angles, circles, tangents. Construction of Plane Curves: Ellipse, Parabola and Hyperbola. Principles of orthographic projections, Construction and Multiview projection of - Points, lines, square, rectangle, polygon, etc.

UNIT 3 GEOMETRICAL DRAWING - SOLID GEOMETRY**16 Hrs.**

Multi- view projection of solids – cube, prism, pyramids, cones, cylinders etc.; Sections of solids, true shape of solids.

UNIT 4 MEASURED DRAWING**8 Hrs.**

Study of plan, section and elevation of simple objects, simple building components and furniture through documentation exercises.

UNIT 5 ISOMETRIC AND AXONOMETRIC VIEW**12 Hrs.**

Isometric and Axonometric projection of planes, solids and combination of solid etc. Isometric and Axonometric projection of simple objects, building components etc.

Max. 60 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understand the concepts and fundamentals of architectural drawing.
- CO2** Develop representation skills and to generate geometrical forms and its projections.
- CO3** Ability to represent various solids and its sectional projection.
- CO4** Measure real objects and represent them graphically.
- CO5** Create three-dimensional solids and combination of solids
- CO6** Develop graphical skill to represent real time objects.

TEXT / REFERENCE BOOKS

- Ching, F. D. (2015). Architectural graphics. John Wiley & Sons.
- Reekie, R. F., & McCarthy, T. (1995). Reekie's architectural drawing. Edward Arnold.
- Morris, I. H. (1912). Geometrical drawing for art students. Longmans, Green.
- Martin L.C.(1978). Architectural Graphics, The Macmillan Company, New York.
- Dinsmore.G.A. (1968). Analytical Graphics, Van Nostrand, Company Inc., Canada.

SARA9101	ART STUDIO - I		L	T	P	Credits	Total Marks
			0	0	4	2	100
Continuous assessment	End Semester Examination	Minimum pass marks					
		Continuous Assessment	End Semester Examination				
70	30	35	15				

COURSE OBJECTIVES:

Develop sketching and visual representation in different media of different 2-dimensional art forms, painting and interior decoration of walls and floors.

Correlate three-dimensional art and craft forms, natural forms, structure and learn to model the same in different media.

Investigate the properties and appropriate use of materials in different craft forms.

UNIT 1 INTRODUCTION**16 Hrs.**

Visual Art and Purpose - Expression of Imagination, Function, Ritualistic or Symbolic - Visual qualities and grammar of art; Imaginative thinking and creativity through hands on exercises – Visual effects, study of light and shadow, using lettering and combining lettering with image, in expressive and communicative modes.

UNIT 2 DRAWING AND SKETCHING**20 Hrs.**

Sketching and visual representations using various media and tools – image-making, image manipulation and development, enlargement, cropping, reversing, abstraction, changes in colour and treatment, sequential imagery. Imagery from imagination, memory and direct observation

UNIT 3 THREE-DIMENSIONAL VISUALISATION**12 Hrs.**

Study of outdoor objects /systems and observation of their scale and proportion, natural occurrence, relationships with context, form, structure, color and textures along with its functions

UNIT 4 VISUALIZATION TECHNIQUES AND STORYBOARDING**12 Hrs.**

Storyboard/ Cartoon making Graphical representation in the form of illustrations or images displayed in sequence for the purpose of pre-visualizing the area of student's interest. A series of drawings that tells a story. Expressive and Communicative aspects. Implementing abstract or generic ideas.

Max. 60 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Interpret and combine different art forms in different media while appreciating artistic expressions.
- CO2** Develop the ability to manipulate various types of images.
- CO3** Develop skills in image making, and development of sequential imagery.
- CO4** Understand the various techniques of three-dimensional modeling.
- CO5** Design and model craft forms using any medium.
- CO6** Adapt the properties and applications of materials in different craft forms like terracotta, metal craft etc.

TEXT / REFERENCE BOOKS

1. Jones, J. C. (1992). Design methods, Wiley.
6. Bielefeld, B., & El Khouli, S. (2017). Basics Design Ideas. Birkhäuser.
7. Frank W. (1994). The Artist guide to Composition, David & Charles, UK.
8. Ching, F. D. (2008). Drawing a creative process. Wiley.
9. Pipes, A. (2003). Foundations of art and design. Laurence King Publishing.
10. John, W. (1966). Mills-The Technique of Sculpture, BT Batsford Limited.
11. Bunchy, C.L. (1972). Acrylic for Sculpture and Design, 450, West 33rd Street, New York.
12. White, A. W. (2011). The elements of graphic design: space, unity, page architecture, and type. Skyhorse Publishing, Inc..
13. Elam, K. (2001). Geometry of design: studies in proportion and composition. Princeton Architectural Press.

SARA9102	DESIGN STUDIO I		L	T	P	Credits	Total Marks
			1	2	9	7	300
Continuous Assessment	End Semester Examination	Min Pass Marks					
		Continuous Assessment	End Semester Examination				
200	100	100	50				

COURSE OBJECTIVES:

The studio aims at widening the avenues of creativity and allows inquiring more on lateral thinking.

The emphasis is on understanding the process of design as a proactive and analytical tool towards generating alternatives which forms the foundation for future design

To introduce students to various ideas and techniques of creative thinking and communication; To provide students with a foundation in design through the comprehension of elements and principles of composition;

MODULE I ELEMENTS OF DESIGN, SHAPE AND ITS MANIPULATION**30 Hrs.**

Introduction to elements and principles of design – Exploring the interrelationship between part and the whole - Shapes - Developing geometric and organic shapes and compositions - Texture - study of textures – role of texture in stimulating human senses

Exploring use of colour and its application in stimulating human senses - symbolism using colors

MODULE II PRINCIPLES OF DESIGN - ORDERING PRINCIPLES AND SCALE/PROPORTION**36 Hrs.**

Exploring spatial relationships through ordering principles – spatial transformation using Balance, Contrast, and Pattern Gestalts theory of Composition - Continuity, Similarity, Proximity, Closure, Figure ground. Human & Dramatic Scale - Anthropometrics - Anthropological studies and important dimension of man at different activities and reach. Proportioning systems - Classical orders, Golden Section - Types of proportion.

MODULE III FORM AND ITS COMPONENTS AND DERIVATION**48 Hrs.**

Evolution of forms from planes - Study of solids and voids and their interdependence - 3d abstraction -Articulation and its role as a form modifier - edges and corners, surfaces - Transformation of form- dimensional, subtractive and additive- centralized, linear, radial, clustered and grid forms for arriving at new shapes and compositions. Interlocking of forms- interlock of forms differing in geometry or orientation (rotated grid).

MODULE IV CONCEPTS OF SPACE – SPATIAL RELATIONSHIPS & ORGANISATION**32 Hrs.**

Concepts of space- form- space relationships- Visual & Emotional effects of geometrical forms & their derivatives - Spatial relationships - Space within a space, interlocking spaces, adjacent spaces and spaces linked by a common space, Spatial organization - centralized, linear, radial, clustered, grid.

TUTORIAL SESSION INTRODUCTION TO COMMUNICATION**14 Hrs.**

Basics & Principles– Objectives of Communication – Types - Verbal and non-verbal communication - Barriers to communication - Communication techniques - Listening & understanding - The four essential Communication skills - Levels of Communication: Intrapersonal, Interpersonal, Group, Mass Communication - computer enabled Presentations - Public Speaking Techniques

Max. 165 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understand the basic characteristics of different techniques, mediums and its practical applications.
- CO2** Ability to comprehend the elements of space making through understanding the configuration of elements which can be unified as a whole in a composition.
- CO3** Apply the basic elements and principles of design and implement them in design compositions
- CO4** Analyze, visualize, communicate and represent design
- CO5** Create models /sculptures to understand the evolution of three-dimensional forms from two dimensional shapes
- CO6** Develop an insight towards sensibility and aesthetic appreciation.

TEXT / REFERENCE BOOKS

1. Prammar V.S., (1973). Design Fundamentals in Architecture, Somaiya Publication Pvt. Ltd.
2. Bloomer, C. M. (1990). Principles of visual perception. Herbert Press.
3. Ching, F. D. (2014). Architecture: Form, space, and order. John Wiley & Sons.
4. Gottfried, S. (1984). The four elements of Architecture, London. UK: Cambridge University press.
5. Catanese A.J. and Snyder J.C (1988) Introduction to Architecture, New York: Mc Graw Hill.
6. Dekay M. & Brown G.Z. (2014). Sun, wind and Light: Architectural design strategies, John Wiley and sons, 3rd edition

SEMESTER 2

SCIA1203	BUILDING STRUCTURES - I	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

To analyze and understand the behavior of building elements. To apply the Indian Standard code provisions in the design of reinforced concrete structural elements.

To comprehend the geometric properties of structural sections. To analyze the forces and moments in flexural and compression members.

To design and detail the reinforcements in various structural elements.

UNIT 1 LIMIT STATE METHOD OF DESIGN AND COLLAPSE FLEXURE 8 Hrs.

Historic perspective and definition of structure-System of load transferring from various structural elements of building to ground. Principles, Characteristics of load and strength in Limit State Method of design, partial safety factor, stress block parameters-balance, under and over reinforced beams, analysis and design of singly and doubly reinforced beams, analysis and design of under reinforced flanged beams, clear cover for durability and fire resistance, reinforcement details for beams in flexure.

UNIT 2 LIMIT STATE OF COLLAPSE - SHEAR 8 Hrs.

Effect of shear, design of rectangular and flanged beams for shear-minimum shear requirement- Details of shear reinforcement as per provisions of codes.

UNIT 3 SLABS AND CONTINUOUS BEAMS 6 Hrs.

Design of simply supported one way and two-way slabs-continuous one way and two-way slabs-continuous rectangular beams as per provisions of IS codes.

UNIT 4 LIMIT STATE OF COLLAPSE - COMPRESSION 6 Hrs.

Design of columns for axial loading-square and rectangular sections with lateral ties, circular section with lateral and spiral ties, Design of columns for uniaxial bending, reinforcement details for columns.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS 2 Hrs.

Demonstrate comprehensive understanding of building structural, preparation of assignments & group discussions

Max. 30 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understand the principles of load, safety factors and balance in beams.
- CO2** Apply the design principles of Indian Standard in reinforced concrete elements.
- CO3** Analyze simple shear in beams. Analyze the forces and moments in flexural members like beams and slabs.
- CO4** Explore slabs and their limit state. Design the sections and reinforcements of simply supported and continuous beams.
- CO5** Explore continuous beams and their limit state. Design the sections and reinforcements of two way simply supported and one-way continuous slabs.
- CO6** Understanding compression and their limit state. Design the various types of columns based on axial load and uniaxial bending.

TEXT / REFERENCE BOOKS

- Junnarkar S.B.& Shah H.J. (1995). Mechanics of Structures (Volume I), 21st edition, AnandCharotar publishing house, India, 1995
- Sinha S. N. (2004). Reinforce Concrete Design, Tata McGraw-Hill publishing company Limited, New Delhi.
- Varghese P.C. (2001). Limit State Design of Reinforced concrete, Prentice Hall of India Private Limited, New Delhi, 2001
- Jain,A.K. (1993). Reinforced Concrete Limit State Design, 4th Edition, Nem Chand, Roorkee,
- Chandra.R (2007)., Limit state design of Concrete Structures, Scientific Publishers.
- IS CODES
- IS 456:2000 Plain and Reinforced Concrete-Code of Practice
- IS 875 (1-5) : 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100**Exam Duration: 3****Hrs.****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA120 1	HISTORYCULTURE AND BUILT ENVIRONMENT -II	L	T	P	Credit s	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

To explore the diverse factors that shaped the built forms during Neolithic, bronze and Iron Age.

To understand the planning principles and the construction techniques adopted in the Early Iron Age.

To understand the space development and structural quality in roman architecture.

UNIT 1 NEOLITHIC AND BRONZE AGE**6 Hrs.**

Shelter in the Neolithic period - Khirokitia, Catal Huyuk, Early Indus settlements, Harappa and Mohenjodaro, Stonehenge.

Study of the cultural influences & architectural character of ancient Egypt with relevant examples of Tomb (Pyramid of Cheops) & Temple structures (Temple of Ammon), Study of Mesopotamian architecture with examples of Ziggurat, Sargon palace & Palace of Persepolis

UNIT 2 EARLY IRON AGE**8 Hrs.**

Factors influencing Greek Architecture and Evolution of City states in Greece, systems of proportion and scaling- classical orders, the features of the Greek temple, the building of the Acropolis- Doric (Parthenon), Ionic (Erechtheon) & Corinthian. Public architecture: Theatre of Epidaurus and Agora, Optical illusions in Greek architecture. Formation of Roman republic & Empire.

UNIT 3 MIDDLE AGE**4 Hrs.**

Introduction to Mauryan empire- life - culture & important rulers. Mauryan dynasty- Ashoka pillar- Development of Mahayana Buddhism- Symbolism- Lomas rishi, Rani Gumpa, Sanchi complex, Viharas, Chaitya halls at Karle, Baja, Ajanta and Ellora caves.

UNIT 4 LATE IRON AGE**8 Hrs.**

Influence of geology, culture & lifestyle of Roman Architecture- Structural and construction technology- Classical Orders- Roman forums, basilicas – Pantheon, Thermae of Caracalla, Colosseum and Circus Maximus. Architecture as a realisation of the ideals of the society and influence on later civilizations.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**4 Hrs.**

Map the role of tangible and intangible factors that shaped the architecture in contexts. Scale models and sketches of different ages- built forms, columns, details and architectural developments.

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Outline the role of tangible and intangible factors that influenced the architecture during the Neolithic and bronze age.
- CO2** Appraise the salient characteristics of Greek architecture.
- CO3** Comprehend the other factors influencing architecture in India.
- CO4** Analyze the contributing factors for the design development of different styles.
- CO5** Compare and Contrast various styles on the basis of the contributing factors responsible for their development.
- CO6** Discuss the influence of factors in determining the architectural character and features from Neolithic to late iron age.

TEXT / REFERENCE BOOKS

1. Jarzombek, M.M. & Prakash, V. (2011). A global history of architecture, Wiley.
2. Lloyd, S. & Miller, H.W. (1986). History of world Architecture series, Faber Ltd., London.
3. Fletcher, B. (1986). A History of Architecture, University of London, The Athlone Press.
4. Kostof, S. (1985). A history of Architecture - settings and Rituals, Oxford University Press London.
5. Tadgell, C. (1990). The History of Architecture of India from the Dawn of Civilization to the end of the Raj, Longman UK, London.
6. Brown, P. (1983). Indian Architecture (Buddhist Period), Volume I, Taraporevala and Sons, Bombay
7. Grover, S. (1981). The Architecture of India (Buddhist period), Vikas Publishing House Pvt. Ltd., New Delhi

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100**Exam Duration: 3****Hrs.****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA 1202	THEORY OF ARCHITECTURE -II	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

- To enable the students, understand the role of form, space articulation.
- To Understand the importance of the concept of ordering of forms and spaces by establishing spatial relationships and organization.
- To recognize the various principles of composition and to describe the path of our movement as circulation or movement through space with an experience and perception of forms and spaces in a sequence.
- To understand the ideologies and functional aspects of design from the works of architects and planners.

UNIT 1 PRINCIPLES OF COMPOSITION**12 Hrs.**

Specific qualities of - Dominance, Unity, Harmony, punctuating effect, Dramatic effect, Climax, Contrast, Accentuation and Fluidity with building examples, Circulation - Building approach, Building entrance, configuration of path, Path space relationship, circulation patterns - circulation within buildings, types of circulation

UNIT 2 DETERMINANTS**12 Hrs.**

Climate as determinant-Principles of climatic comfort climate shaping form with examples from history-Structure & Building materials as determinants-Socio cultural determinants-Culture temporal & regional influences as determinant in architecture – Beliefs, Aspiration, values of the user-Anthropometrics and space standards— Definition of personal space, territory, etc. Examples from past and modern era.The study of architecture across different time periods to understand the notion of styles and movements in architecture. The constituents of an architectural style, what are the elements which distinguish an architectural movement.

UNIT 3 INTRODUCTION TO ARCHITECTURE**8 Hrs.**

Origin of Architecture, Context for architecture as satisfying human needs. Functional aspects, Aesthetic aspects, Introduction to Psychological aspects. Architectural components - in context to structures & skin. Introduction to the formal vocabulary of architecture. Visual perception.

UNIT 4 WORKS OF MODERN & POST-MODERN ARCHITECTS**8 Hrs.**

Works of modern and postmodern architects and their ideologies and philosophies towards architecture- Louis Sullivan, F.L. Wright, Louis Kahn, Le Corbusier, Philip Johnson, Charles Correa and Michael Graves- Case studies.

UNIT 5 WORKS OF CONTEMPORARY ARCHITECTS IN INDIA**5 Hrs.**

Works of Indian Contemporary Architects and their ideologies and philosophies towards architecture- Achyut Kanvinde, B.V. Doshi, Raj Rewal, Hafeez Contractor, Sanjay Puri, Dean D'Cruz, Morphogenesis Studio- Case studies

Max. 45 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Identify and analyse the relationship between forms and spaces.
- CO2** Understand the principles of composition and its importance in architecture.
- CO3** Understand the aspects of circulation and their influence in design.
- CO4** Develop analytical and creative thinking.
- CO5** Ability to synthesis different ideologies and philosophies of renowned architects through examples.
- CO6** Develop an ability to analyse and experience architecture through case studies.

TEXT / REFERENCE BOOKS

- Hamlin, T. (Ed.). (1952). Forms and Functions of Twentieth-century Architecture: The principles of composition (Vol. 2). Columbia University Press.
- Pramar V.S., (1973). Design Fundamentals in Architecture, Somaiya Publication Pvt. Ltd.
- Ching D.K, (1979). Form - Space – order, New York: Van Nostrand Reinhold company.
- Catanese.A.J. & Snyder.J.C (1988) Introduction to Architecture, New York: Mc Graw Hill Books Co.
- Roth.L.M. (2014) Understanding Architecture: Its Elements, History, and Meaning, Westview Press.
- Gottfried.S, (1984). The four elements of Architecture, London. UK: Cambridge University press.
- .Nikos.S.A. (2007). A Theory of Architecture, Umbau Verlag.
- Unwin.S. (2003). Analysing Architecture, London: Routledge.
- Pandya.Y, (2007). Elements of Space making, Mapin.
- Von, M. P. (2013). Elements of Architecture: from Form to Place.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100
Hrs.

Exam Duration: 3

SARA2201	MATERIALS AND CONSTRUCTION STUDIO - I		L	T	P	Credits	Total Marks
			1	1	3	3	200
Continuous Assessment	End Semester Examination	Min Pass Marks					
		Continuous Assessment	End Semester Examination				
150	50	75	25				

COURSE OBJECTIVES

To comprehend the types of building materials and the appropriate applications in the built form and environment.

To explore the fundamental components of the buildings, the role and purpose in the built forms including the necessary thumb rules for designing temporary shelters and single storied buildings.

To incorporate appropriate materials while designing space enclosures.

MODULE I INTRODUCTION TO BUILDING MATERIALS**30 Hrs.**

Introduction to building materials - Natural building materials – renewable and nonrenewable resources - Definitions, types and applications - soil, sand, aggregate, clay, gravel, timber, coconut leaf, reed, bamboo, Palmyra leaf, lime – Fencing and temporary shelters

Manufactured building materials - Definitions, types and applications - glass, paint/ polish, brick, terracotta products, stabilized mud blocks, polymer, steel, Basics of DPC.

MODULE II INTRODUCTION TO FUNDAMENTALS OF COMPONENTS OF BUILDINGS**45 Hrs.**

Introduction to fundamental components of buildings (sub structure & super structure) – definitions and thumb rules based on soil types as well as the number of floors and height of the structure

Principles of load bearing Construction - simple brick footing - principles of bonding, English and Flemish bond, rat trap Brick bond, T-Junctions (1 and 1 1 / 2, 2 bricks), L - Junctions, Cross junction (2 bricks), Brick piers, Cavity walls, rat trap bond, plinth and Sill details, brick arches and lintels, compound walls.

Stone foundation - random rubble/ ashlar, copings, stone piers, plinth and sill details, stone arches and lintels, stone fencing, Dhajji wall construction

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

Max. 75 Hours

Modules	Assignments	Suggestive Outdoor / hands on Workshop	Construction plates	No.	Remarks
I	Collection of brochures, BM and applications in buildings, Case study presentation of temporary structures, specific to building materials and applications - Eraser models to explore types of Bonding	Handling Mud Brick bonding Bamboo Workshop	Construction techniques for temporary structures	1	Facilitates Architectural design III
			Brick bonding	2	
			Stone masonry	1	
			Compound wall section	1	
II	Sketches and pictures – rammed mud wall, stabilized mud wall		Building components (Shallow foundations, flooring, wall, sill, openings, lintel, slab, roof, parapet)	2	

COURSE OUTCOME:

On completion of the course the student will be able to

CO1 Classify the building materials based on properties and applications in built forms and environment.

CO2 Explain the applications of building materials in the sub and super structures.

CO3 Design temporary as well as permanent elements for enclosing spaces both physically and visually.

CO4 Devise ways to incorporate natural and manufactured materials in buildings.

CO5 Generate ways to utilize diverse materials for temporary structures as well as single storied buildings.

TEXT / REFERENCE BOOKS

1. Arora S.P. and Bindra S.P., (2012). Text book of Building Construction, Dhanpat Rai & Sons, New Delhi.
2. Chudley R., (1999). Construction Technology (Volume 1), Longman publications 3rd Edition.
3. Ching, F.D.K. (2000). Building Construction Illustrated, John Wiley & Sons
4. McKay W.B. (1981). Building construction, Volume 1 and 2, Longman UK
5. Rangwala S.C. (2000). Building Construction, AnandChartar Publishing House, India
6. KlansDukeeborg, Bambus - Bamboo, Karl Kramer Verlag Stuttgart Germany, 2000

SARA2202	ARCHITECTURAL GRAPHICS - II		L	T	P	Credits	Total Marks
			1	0	3	2	100
Continuous assessment	End Semester Examination	Minimum pass marks					
		Continuous Assessment	End Semester Examination				
70	30	35	15				

COURSE OBJECTIVES:

- To outline the basic principles of perspective drawing and sciography.
- To measure and document-built form and represent it graphically.
- To develop the skill required for constructing a complete rendered three-dimensional simple built form.

UNIT 1 INTRODUCTION OF PERSPECTIVE DRAWING**8 Hrs.**

Study of concepts, types and terminologies such as picture plane, station point, vanishing point, eye level, ground level, Horizon line etc. Technical construction of one point, two point and three-point perspective drawings through exercises on simple objects like cube, prism, combination of shapes and views at various eye levels.

UNIT 2 PERSPECTIVE: SCIENTIFIC METHOD & OFFICE METHOD**16 Hrs.**

One point, two and three-point perspective of building interiors and exteriors. Adding figures, trees, furniture etc., shade and shadows and applying rendering techniques. Introduction to office perspective method.

UNIT 3 SCIOGRAPHY**16 Hrs.**

Principles of shade and shadow- construction of shadow of simple geometrical shapes - point, line and planes. Construction of sociography on Architectural elements.

UNIT 4 MEASURED DRAWING: DOCUMENTATION**10 Hrs.**

Documentation of a complete building of a special interest in terms of history, building construction, architectural excellence or technology by using simple measuring tools like tapes, photographs etc.

UNIT 5 ARCHITECTURAL RENDERING**10 Hrs.**

Techniques of rendering for various architectural drawings - plans, site plan, elevations, views etc, using mediums like pen and ink etc.,

Max. 60 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understand the concepts and fundamentals of perspective drawing.
- CO2** Construct the perspective drawings of the buildings and 3d views.
- CO3** Develop representation skills in three dimensional drawings and sociography.
- CO4** Develop the skill of architectural drawing through measured drawing of complex structures.
- CO5** Apply rendering techniques in architectural drawings.
- CO6** Construct a complete rendered three-dimensional drawing of a simple built form.

TEXT / REFERENCE BOOKS

- Bernard Alkins, Architectural Rendering, Walter Foster Art Books, 1986
- Claude Batley, Indian Architecture, D.B. Taraporevale Sons and Co. Ltd., Bombay
- Ernest Norling, Perspective drawing, Walter Foster Art Books, California, 1986
- Francis D.K. Ching, Architectural Graphics, Van Nostrand and Reinhold Company, NY 1975
- George A. Dinsmore, Analytical Graphics, Van Nostrand, Company Inc., Canada, 1968
- John M. Holmes, Applied Perspective, Sir Isaac Pitman and Sons Ltd., London, 1954
- Leslie Martin C., Architectural Graphics, The Macmillan Company, New York, 1964
- Robert W. Gill, Basic Perspective, Advanced Perspective, Thames and Hudson, London, 1974

SARA 9201	ART STUDIO - II	L	T	P	Credits	Total Marks
		0	0	3	2	100
Continuous assessment	End Semester Examination	Minimum pass marks				
		Continuous Assessment		End Semester Examination		
70	30	35		15		

COURSE OBJECTIVES:

- To utilize models as technique for design presentations
- To construct models as a way of representation and experimentation
- To gain an ability to integrate all the technical aspects of sculpture, modelling, and storytelling as means to realize creative ideas to shape into concrete and significant art forms.

MODULE 1 EXPLORING MATERIALITY**10 Hrs.**

Selection of materials used in everyday life – textiles / earthenware terracotta / stone / paper / wax / glass / wood etc. and study their properties and characteristics, materiality and feeling. Processes of additive, subtractive and constructional form-making in expressive and functional modes.

MODULE 2 CREATIVE REPRESENTATIONS OF SPACES**15 Hrs.**

Need for architectural models. Role of scale-models in design - Developing of surfaces and solids viz. Cubes, prisms, cylinders, pyramids, cones. Development of transition pieces, for spheres etc. using appropriate materials. Various materials and tools to be used in model making. Use of materials, viz. paper / mountboard / cardboard in architectural models.

MODULE 3 CREATIVE REPRESENTATIONS OF SPACES**20 Hrs.**

Use of materials, viz. Snow-white board / mountboard / cardboard / Acrylic / Polystyrene (thermocool) / softwood / metals in architectural models. Painting model surfaces with various finishes, development of topography and landscape elements, use of materials like cork, polyurethane foam, use of laser, acid etching, stereolithography for development of building envelopes.

Max. 45 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to:

- CO1** Develop the processes of 3-dimensional form making from concept to finish.
- CO2** Interpret different art forms in different media while appreciating artistic expressions.
- CO3** Observe and interpret different forms and qualities in built and natural environments and objects.
- CO4** Design and model craft forms using any medium.
- CO5** Develop a narrative approach to art work.
- CO6** Interpret the different stories communicated through visualizations of various types.

TEXT / REFERENCE BOOKS

- Jones, J. C. (1992). Design methods, John Wiley & Sons
- Bielefeld, B., & El Khouli, S. (2017). Basics Design Ideas. Birkhäuser.
- Ching, F. D., & Juroszek, S. P. (2010). Design drawing. John Wiley & Sons.
- Faimon, P., & Weigand, J. (2004). The nature of design. HOW Books.
- Pipes, A. (2003). Foundations of art and design. Laurence King Publishing.
- John, W. (1966). Mills-The Technique of Sculpture, BT Batsford Limited.
- White A.W.(2011). The Elements of Graphic Design: Space, Unity, Page Architecture, and Type, Skyhorse Publishing, Inc.,
- Elam, K. (2001). Geometry of design: studies in proportion and composition, Princeton Architectural Press.
- Yarnell, J. (2002). Painting Techniques, North Light Books.
- Anderson Turner, Pottery Making techniques: a pottery making illustrated handbook, American ceramic Society, 2004
- Chapman G. and Robson P., Art from Rocks and Shells, Thomson Learning, 1995 6
- Barnbaum, B. (2010). The Art of Photography, Wiley.

SARA9202	DESIGN STUDIO II	L	T	P	Credits	Total Marks
		0	1	9	6	300
Continuous Assessment	End Semester Examination	Min Pass Marks				
		Continuous Assessment	End Semester Examination		Total	
200	100	100	50		150	

COURSE OBJECTIVES:

To enable the students, understand the principles of composition and its importance in Architecture and to understand role of transformation of form in Architecture

To know the importance of spatial qualities and to experiment and understand the art of space arrangement

To enable Conceptualization in architecture through creative thinking and to analyse the functional relationship between space, user and built environment

MODULE I PRINCIPLES OF COMPOSITION**30 Hrs.**

Role of Principles of Design in a built form - Qualities of - Dominance, Unity, Harmony, Punctuating Effect, Dramatic Effect, Climax, Contrast, Accentuation, Fluidity. Analyzing compositions - balance, rhythm, movement etc. and its application.

MODULE II ANALYZING ARCHITECTURE**45 Hrs.**

Concept /Content/Context -Understanding the response of a built form as a negotiation of its setting-climatic, social, economic, cultural and aesthetic. Study of built examples through documentation and analysis.

MODULE III EXPLORING ARCHITECTURE**60 Hrs.**

The Art of Space Making - Analyzing spatial qualities - spatial in quest of a pavilion Design (e.g. Gazebo, Kiosk, Shop, Security Cabin, a Police Booth - developing the Tectonic Vocabulary.

TUTORIAL SESSION	DESIGN STORYTELLING AND NARRATIVES	15 Hrs.
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Elements of a good story: facts, situation, characters, plot and resolution of a design project; Building context in the design process: Emotional, Environmental, Social context; Organizing ideas- Personas, storyboards, and flowcharts; Documenting processes through writing.

Max. 150 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understand the principles of composition and its importance in architecture
- CO2** Document and analyze a modest design project that incorporates technical and environmental areas of study.
- CO3** Develop analytical and creative thinking.
- CO4** Ability to comprehend the transformation of forms through sketches and three-dimensional models
- CO5** Evolve from concept to pragmatic design within a specific timeline
- CO6** Present an architectural design project and justify the different approaches that rate their judgement for the final solution

TEXT / REFERENCE BOOKS

- Brown, G. Z. (1985). Sun, wind, and light. Architectural design strategies, John Wiley and sons, 3rd edition.
- Hamlin, T. (Ed.). (1952). Forms and Functions of Twentieth-century Architecture: Building types: buildings for commerce and industry, for public health, for transportation, for social welfare and recreation. The community as architecture (Vol. 4). Columbia University Press.
- Pramar V.S., (1973). Design Fundamentals in Architecture, Somaiya Publication Pvt. Ltd.
- Leland M. Roth, (2014) Understanding Architecture: Its Elements, History, and Meaning, Westview Press
- Ching, F. D. (2014). Architecture: Form, space, and order. John Wiley & Sons.
- Gottfried, S. (1984). The four elements of Architecture, London. UK : Cambridge University press.
- Catanese A.J. and Snyder, J.C. (1988) Introduction to Architecture, New York: Mc Graw Hill.
- DeKay, M. & Brown G.Z. (2014). Sun, wind and Light: Architectural design strategies, John Wiley and sons, 3rd edition

SEMESTER 3

SCIA1306	BUILDING STRUCTURES - II	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

- To construct knowledge on the analysis and design of brick masonry.
- To analyze the different types of trusses and arches.
- To outline various cost-effective construction techniques in flooring.

UNIT 1 STRUCTURAL MATERIALS-BRICK IN MASONRY & WALLS 10 Hrs.

Introduction to masonry bearing walls: solid walls, cavity walls - Masonry units - size, wall thickness, strength of bricks - Allowable Stresses: Effective Height: slenderness ratio: net permissible stresses - Analysis and design of masonry walls for axial and eccentric loads-Design of masonry piers for axial loads only.

UNIT 2 TIMBER TRUSSES 10 Hrs.

Introduction to sloped roofs: Ridges, hips, valleys and eaves - Slope with respect to roofing materials - Wood rafter span range: roof beams parallel to slope and perpendicular to slope: Trusses - types of trusses, properties and their span ranges - analysis of truss to determine the Forces, deflection of truss - joinery details of different members of timber truss. (No Design Problem).

UNIT 3 STRUCTURAL ELEMENTS 10 Hrs.

Arches: Introduction to arches, types of arches - Theory of arches - BM diagram for arches - Design of masonry arches using empirical equations - Drawings: types of arches. Floors and flooring: Principles of flooring and terracing - Types of floors: Bricks, stone, concrete colors with finishes - Wooden floors: Study of relevant IS Codes.

UNIT 4 COST EFFECTIVE CONSTRUCTION TECHNIQUES 10 Hrs.

Introduction to cost effective construction techniques, need for cost effective construction techniques - Roofing Types -Ferro cement roofing system, filler slab roofs - Pre-cast roofs- Funicular shells, advanced types of flooring - steel fiber reinforced flooring, epoxy flooring, vacuum flooring, linoleum flooring, ESD flooring.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS 5 Hrs.

Demonstrate comprehensive understanding of building structural, preparation of assignments & group discussions

Max. 45 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Ability to analyze the interaction of forces and the concept of equilibrium in masonry walls and piers.
- CO2** Design the masonry walls and piers under different loading conditions.
- CO3** Various types of timber trusses with respect to span and analysis to determine the action of forces.
- CO4** Analyze the various types of trusses using methods of joints and sections for determining forces and deflections.
- CO5** Comprehend the theory of arches, types and the structural behavior.
- CO6** Design the different types of masonry arches using empirical equations.

TEXT / REFERENCE BOOKS

- Dayaratnam P (1987), Brick and Reinforced Brick Structures, Oxford & IBH publishing.
- Arya A.S(1978), Structural design in steel, masonry & timber, Nem Chand and sons, Roorkee,
- Ching, F. D., Onouye, B. S., & Zuberbuhler, D. (2013). Building Structures Illustrated: Patterns, Systems, and Design. John Wiley & Sons.Gautam Bhatia, Laurie Baker Life works and writings, HUDCO Publications, Viking, 1991
- Appropriate Building systems, Instruction manual, Building materials technology Promotion council, New Delhi, 1993
- IS 883:1994 code of practice for design of structural timber in building
- IS 1905:1987 code of practice for structural use of reinforced masonry
- IS 2366:1983 code of practice for nail - jointed timber construction

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3

Hrs.

PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks

: 08 x 05 = 40 Marks

PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks

: 04 x 15 = 60 Marks

SARA1301	HISTORY CULTURE AND BUILT ENVIRONMENT -III	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

To comprehend the role of tangible and intangible parameters in determining the architectural expressions in diverse contexts of Dravidian architecture.

To impart knowledge about the development of architecture from early middle age to late middle age.

To explore the construction techniques adopted in Western and Indian context.

UNIT 1 EARLY MIDDLE AGE

8 Hrs.

Spread of Christianity - the evolution of early Christian Church form from the Roman basilica- Contribution of Byzantine architecture in the development of structural system with relevant examples-Evolution of artisanal craft and structural principal of Romanesque period- Medieval Monasteries - Influences & architectural character of Romanesque churches in Italy (Pisa complex), France (Abbey Aux Hommes)&Durham cathedral.

UNIT 2 MIDDLE AGE: DRAVIDIAN ARCHITECTURE

8 Hrs.

Evolution of Hindu Temple-fractals in temples - Early shrines of the Gupta and Chalukyan periods - Sangam Era keezadi-Tigawa temple, Ladh Khan temple and Durga temple - Development of Dravidian style and importance of the rulers, life and culture:Pallava style five Rathas, temple at Mahabalipuram:Chola style with temple examples:Evolution of Gopuram & temple complexes – Example of Pandyan style - Influence of Nayaks.

UNIT 3 MIDDLE AGE: NAGARA ARCHITECTURE

4 Hrs.

Classification of Indo-Aryan temples, examples of Orissa style - Lingaraja temple at Bhuvaneshwar & Sun temple at Konarak, Example of Gujarat style - Surya temple at Modhera, Madhyapradesh - Dilwara temple, Mt. Abu.

UNIT 4 LATE MIDDLE AGE

6 Hrs.

Political and social changes- Re-Emergence of the city - Crusades - Scholasticism-Development of Gothic Architecture in France, evolution of Gothic cathedral & structural system using vaulting & flying buttress, the example of Notre Dame cathedral at Paris. Gothic Architecture in Italy & the example of Milan cathedral. Development of English Gothic vaulting & the example of Westminster Abbey at London - wooden roofed churches.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS

4 Hrs.

Map the role of tangible and intangible factors that shaped the architecture from early to late middle age. Sketches / models of different ages- built forms, columns, details and architectural developments. Comparative studies of Dravidian architecture and Indo -Aryan architecture.

Max. 30 Hours

COURSE OUTCOME:

On completion of the course the student will be able to

CO1 Outline the evolution of churches during the early middle ages.

CO2 Discuss the evolution of Dravidian temple architecture.

CO3 Summarize the planning principles and salient features of temples in South India.

CO4 Comprehend the architectural features of Indo Aryan temple styles.

CO5 Appraise the emergence, evolution and construction techniques of Gothic architecture in Italy and Britain.

CO6 Construct structural drawings in details of middle age historic buildings.

TEXT / REFERENCE BOOKS

1. Jarzombek, M.M. & Prakash, V. (2011). A global history of architecture, Wiley.

2. Lloyd.S& / Miller,H.W. (1986). History of world Architecture series, Faber Ltd., London.

3. Fletcher, B. (1986). A History of Architecture, University of London, The Athlone Press.

4. Kostof, S. (1985). A history of Architecture - settings and Rituals, Oxford University Press London.

5. Tadgell, C. (1990). The History of Architecture of India from the Dawn of Civilization to the end of the Raj, Longman UK, London.

6. Brown, P. (1983). Indian Architecture (Buddhist Period) , Volume I, Taraporevala and Sons, Bombay

7. Grover, S. (1981). The Architecture of India (Buddhist period), Vikas Publishing House Pvt. Ltd., New Delhi

8. Volwahren, A. (1969). Living Architecture: India (Buddhist Period), Macdonald & Co, London.

9. Srinivasan, K.R. (2005), Temples Of South India, National Book Trust, India

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1302	BUILDING SERVICES-I	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To inculcate basic principles of plumbing and sanitation services
- To understand its necessity in architectural space planning parameters.
- To enable them to comprehend the subject thoroughly and integrate the learning in the architectural design.

UNIT 1 WATER SUPPLY AND PLUMBING**8 Hrs.**

Introduction to Building Services - Water sources- Quantity and quality of water-demand projection, per capita consumption of water, Nature of impurities, water treatment process, tests, Methods of Distribution, Layout of Distribution Pipes, sump and other storage tanks -Internal water supply in Buildings, Types of Pipes, Laying of pipes, Prevention of Water Wastage, Fixtures and fittings of a contemporary bathroom and kitchen - Preparing Water Supply Schemes, standards for water supply- ECBC requirements.

UNIT 2 SANITATION AND DRAINAGE**6 Hrs.**

House Drainage, Layout of Drainage system, Methods of laying and construction of sewers, Traps - shapes, sizes, types, function, Ventilation of House drainage - Anti siphonage pipe, various system of plumbing, Chambers - fixtures and fittings of toilet, bathroom and kitchen - Rain water harvesting and systems.

UNIT 3 SEWAGE TREATMENT**6 Hrs.**

Typical layout and components of sewage treatment plant - Primary and Secondary treatment - Activated Sludge Process, Disinfection, Disposal of Sewage-Disposal of sewage from isolated buildings - Septic Tanks, Disposal of sewage in Villages - Waste water recycling - ECBC requirements

UNIT 4 ENVIRONMENTAL SANITATION**6 Hrs.**

Introduction to Environmental sanitation-the importance of sanitation classification of waste- disposal of refuse, Sewerage system - storm water and design of sewers-systems of sewerage-dry and water carriage systems, patterns of collection, sewers - materials used, shapes of sewers, construction & maintenance of sewers, sewer joints, sewer appurtenances, EIA requirements of water supply and drainage systems for large scale infrastructure development.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**4 Hrs.**

Spatial requirements for overhead water tank, sump, sewage treatment plant, water treatment plant, plumbing shaft types – ventilation shaft, shaft for different types of pipes, and their location, integration in different building typologies Suggested Assignment: Plates, brochure collection – incorporation of studied concepts in the respective semester's Architecture Design studio - Suggested Assignment: Documentation of Environmental sanitation through Case study and field visits.

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Ability to understand the importance of water supply system and its operation in buildings.
- CO2** Identify various types of sanitary fittings, demand calculation and to prepare water supply scheme.
- CO3** Develop comprehensive knowledge of design and construction of drainage systems in buildings and built environment
- CO4** Ability to understand the process of solid waste management and hence develop strategies for effective waste management in buildings and built environment
- CO5** Understand and comprehend the Environmental Sanitation through classification of types of wastes.
- CO6** Analyse and develop comprehensive knowledge of architectural space planning for water supply & sanitation system and integration of systems in built forms

TEXT / REFERENCE BOOKS

1. Fair G.M., Geyer J.C. and Okun D.A., Water and Waste Water Engineering: water Supply and wastewater Removal, 3rd Edition, October 2010 John Wiley & Sons,
2. Manual on water supply and treatment, 1999, CPHEEO, Ministry of works and Housing, New Delhi
3. Manual on Sewerage and Sewage treatment Systems, 2013, CPHEEO, Ministry of works and Housing, New Delhi
4. Rangwala S.C., water supply and sanitary Engineering, Anand Charotar publishing house, 29th edition, 2019
5. Venugopala Rao P., Textbook of Environmental Engineering, Prentice Hall of India Pvt. Ltd., 2004
6. Husain S.K., Textbook of Water Supply and Sanitary Engineering, Oxford & IBH, 3rd edition, 2017
7. Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain., "Water Supply Engineering" Laxmi Publications, 1995,. Reprint 2016
8. Dr.B.C. Punmia, Arun Kumar Jain., "Wastewater Engineering", Laxmi Publications, 1998.
9. Rakesh Hooja Ramesh K. Arora, et al., "Water Management- Multiple dimensions", Rawat Publications, 2007
10. Nobert, M.L, "Plumbing, Electricity, Acoustics- Sustainable design methods for Architecture", John Wiley & Sons, Inc, 2012.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100**
Hrs.**Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1303	CLIMATOLOGY	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To realize the role of climate in shaping a climate responsive built form.
- To understand the need and importance of ventilation, day lighting, shading devices in building design towards the approach of climate responsive built environment.
- To familiarize on passive design strategies for architecture of different climatic zones.

UNIT 1 CLIMATE: FACTORS AND CLASSIFICATION 6 Hrs.

Global climatic factors, Components of climate - Koppen Climate Classification System - Atkinson climate classification - Impact of climate and building on Ecological balance- characteristics of tropical climates - climate graph.

UNIT 2 VENTILATION AND DAYLIGHTING 6 Hrs.

Functions of ventilation - stack effect due to the thermal forces, wind velocity - wind rose, wind pressure - Air movement through buildings - Air movement around buildings - factors affecting air flow and wind shadows. Importance of day lighting – designing principles with day lighting in buildings – Characteristics of natural light: transmission, reflection, diffusion, glare – light shelves and light pipes.

UNIT 3 SOLAR CHARTS AND SHADING DEVICES 8 Hrs.

Introduction to Sun path diagrams - Angles of Incidence – Shadow angle protractor - Horizontal and Vertical Shadow angles - Shadow Mask - Exercises on plotting shadow angles on sun-path diagrams, Design of shading devices for walls with different orientations.

UNIT 4 DESIGN WITH CLIMATE 6 Hrs.

Climate data analysis for various zones - Design considerations and strategies through case studies - hot and dry; hot and humid; warm and humid; cold and cloudy; cold and dry; moderate/composite. Passive design strategies with respect to different climatic zones in India. Selection of building components based on climate classification – Design strategies and construction parameters for Walls, Roofs & floors surfaces (surface color and texture, U value, exterior absorption / insulation) - material properties, thickness and layers / composite walls.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS 4 Hrs.

Shading design calculations for wall in four different orientations. Comparative analysis of design strategies in traditional and contemporary buildings for a particular climatic region. Introduction to climatic analysis software for energy calculation of designed building envelope for their studio project with climate consultant,

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Comprehend the role of climate in architecture and the factors affecting the climate.
- CO2** Acquire knowledge on the climate classification based on the influencing factors.
- CO3** Understand the importance of natural ventilation and day lighting in building design and analyzing their designing strategies.
- CO4** Familiarize the sun as a main design element and understanding the sun path diagram in detail for calculating the heating and cooling hours of a region.
- CO5** Marking the angle of incidence for equinox, summer and winter solstices for arriving the shadow mask and overshadowing in sun path diagram for the design of shading devices.
- CO6** Creating a data base of passive design strategies adapted for different climate zones through a comparative analysis of traditional and contemporary buildings.

TEXT / REFERENCE BOOKS

1. Arvind Krishan, N. B. (2001). *CLIMATE RESPONSIVE ARCHITECTURE: A Design Handbook for Energy Efficient Buildings*. New Delhi: Tata McGraw-Hill Education India.
2. Evans, M. (1980). *Housing, Climate and Comfort*. London: Architectural Press.
3. Givoni, B. (1976). *Man, climate and architecture* (Architectural science series). Applied Science Publishers.
4. Mareike Krautheim, R. P. (2014). *City and Wind: Climate as an Architectural Instrument*. DOM Publishers.
5. Mark DeKay, G. Z. (2014). *Sun, Wind, and Light: Architectural Design Strategies*. John Wiley & Sons.
6. Majumdar, M. (2001). *Energy-efficient buildings in India*. TERI Press.
7. O H Koenigsberger, T. G. (2013). *Manual of Tropical Housing and Building: Climate Design*. Hyderabad: Universities Press India Pvt. Ltd.

WEBSITES

1. <https://law.resource.org/pub/in/bis/S03/is.sp.41.1987.pdf> - SP 41 (1987): Handbook on Functional Requirements of Buildings (Other than Industrial Buildings)
2. <http://koeppen-geiger.vu-wien.ac.at/>
3. <http://plea-arch.org/wp-content/uploads/PLEA-NOTE-1-SOLAR-GEOMETRY.pdf>
4. <https://nptel.ac.in/courses/105107156/>

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100**Exam Duration: 3****Hrs.****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1304	PRINCIPLES OF SITE PLANNING	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

- To impart knowledge on the site planning principles including the features and parameters that govern the proposed development.
- To educate the students in site selection for different building typologies including the techniques of surveying and site analysis.
- To evolve a methodology for site responsive design strategy through the relation between built environment and their immediate surroundings.

UNIT 1 SITE LAYOUT AND PLANNING PRINCIPLES**8 Hrs.**

Definition of plot, site, region, site planning, units of measurements-Factors influencing a site-Onsite and offsite factors-Topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available-sources of water supply and means of disposal system-Architectural design consideration and visual aspects. Organization of vehicular and pedestrian circulation, Networks -types of roads, hierarchy of roads, networks, patterns, road widths, turning radii, street intersections.

UNIT 2 SURVEYING AND SITE ANALYSIS**10 Hrs.**

Reconnaissance and need for surveying – chain survey, compass survey, plane table & theodolite surveys. Contouring: contour interval, characteristics, uses of contours. Study of site climate – elements of climate. Importance of site analysis-systemic process of site analysis- site suitability analysis- locality plans - Analysis of natural, cultural, aesthetic factors and visual characteristics- Site analysis diagram - Preparation of maps - matrix analysis, composite analysis

UNIT 3 SITE SELECTION AND REGULATIONS**6 Hrs.**

Study of microclimate: Influence of vegetation, wind, landforms and water as modifier of microclimate-Site selection process-Site selection criteria for housing development, commercial and institutional projects. Site zoning regulations- Land use regulations-Development control rules of local bodies- building setbacks- FSI- FAR-plot coverage- OSR- parking regulations and standards.

UNIT 4 SITE DESIGN AND DEVELOPMENT TECHNIQUES**12 Hrs.**

Site context- contextual analysis responding to programmatic, functional, environmental, aesthetic factors. Integrated approach to design of building and open spaces-relationship of space and mass, enclosure and spatial perception, spatial enclosure- Sense of space- Introduction to land use mapping, existing master plans- types of plans-site layout-Development of Master plan- Site plan. Case study of the projects in hilly areas, Housing development, Commercial, institutional spaces and factory buildings.

UNIT 5 COMPREHENSIVE LEARNING**9 Hrs.**

Understanding the site features by visiting a nearby construction site and manual documentation with photos. Reviewing the given site plan and listing the opportunities on site design and development techniques. Detailed study of their specified site for semester design project on the Data Collection- Analysis of various factors influencing the site- Preparation of Site Analysis diagram -Analysis of built and open space relationship- concept development- circulation network analysis- Site development.

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Familiarize knowledge on the site layout and planning principles that govern the proposed development
- CO2** Students able to understand the importance of surveying and the different methods of surveying with hands on exercise.
- CO3** Preparation of site drawings and analysis of the site for preparing the feasibility of the proposed project
- CO4** Skill development on the site selection criteria with the context and typology specific
- CO5** Preparation of the matrix diagram with the available factors of site context and design development techniques.
- CO6** Exercise on site analysis, site design and development for the given land parcel.

TEXT / REFERENCE BOOKS

1. Dr.B.C.Punmia, A. K. (1983). Surveying Volume 1. New Delhi: Standard book house.
2. Joseph De Chiara, L. E. (1984). Time-Saver Standards for Site Planning. McGraw-Hill .
3. Joseph De Chiara, L. K. (1975). Urban planning and design criteria. Van Nostrand Reinhold .
4. Kevin Lynch, G. H. (1984). Site Planning. Cambridge: MIT Press.
5. Nicholas T. Dines, K. D. (1998). Time-saver standards for landscape architecture: design and construction data. McGraw-Hill.
6. Shahani, P. B. (1979). Text Book of Surveying: V. II. Oxford & I B H Publication.
7. White, E. T. (1983). Site Analysis: Diagramming Information for Architectural Design. Architectural Media.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100**Exam Duration: 3****Hrs.****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA2301	MATERIALS AND CONSTRUCTION STUDIO - II		L	T	P	Credits	Total Marks
			1	1	3	3	200
Continuous Assessment	End Semester Examination	Min Pass Marks					
		Continuous Assessment	End Semester Examination				
150	50	75	25				

COURSE OBJECTIVES:

To trace the various stages involved in timber processing and the associated defects.

To comprehend the various types of timber joinery adopted in the movable and fixed barriers in the external walls.

To figure out the ways through which timber is utilized in the built environment.

MODULE I TIMBER AS A BUILDING MATERIAL**30 Hrs.**

Introduction to timber, types of trees for timber production, processing of timber, defects of timber, conservation and preservation of timber, timber as a building material construction (types, seasoning, defects), manufactured timber - Mangalore tiles, madras terrace roofing, applications of timber in contemporary architecture

MODULE II TIMBER JOINERY**45 Hrs.**

Timber joinery details – doors, Drawings on Methods of construction using natural timber in joinery works including methods of fixing and options for finishing, fixing details. - Different types and methods of fixing - Windows (paneled, louvered, glazed, pivoted and sliding windows) - Doors (paneled, glazed, sliding, folding, louvered and pivoted) - Ventilators (top hung, louvered, and glazed) - Hardware for doors, windows and ventilators and application for a simple structure with schedule of joinery windows, partitions, paneling, truss, simple staircase – thumb rules

Max. 75 Hours

Modules	Assignments	Suggestive Outdoor / hands on Workshop	Construction plates	No.	Remarks
I	Applications of timber in building, Timber in vernacular and contemporary architecture -case studies	Carpentry Workshop Understanding of joineries (doors, windows, chairs, tables)	Types of timber trusses and Madras terrace roofing	1	Facilitates Architectural design IV
II	Sketching of various joineries in timber Sketching –trusses, staircase in vernacular houses	Report – Observe the activity of a carpenter who is in the process of making a joinery and document the same	Timber joinery details	1	
			Types of timber joinery in doors, windows and ventilators	3	
			Partitions and paneling	1	
			Design and develop joinery details for the outcome of Architectural design II.	1	

COURSE OUTCOME:**On completion of the course the student will be able to****CO1** Explain the treatment of timber the various applications in buildings.**CO2** Demonstrate the types of joinery adopted in doors, windows and furniture**CO3** Design timber partitions and paneling.**CO4** Illustrate the utilization of timber in roofs and simple staircases.**CO5** Design and develop timber joineries in architectural designs.**TEXT / REFERENCE BOOKS**

1. Arora, S. P., Arora, S. P., & Bindra, S. P. (1984). Text Book of Building Construction: Including Engineering Materials. Dhanpat Rai and Sons.
2. Chudley R., (1999). Construction Technology (Volume 1), Longman publications 3rd Edition.
3. Watson, D.A. (1972). Construction Materials and Processes, McGraw Hill.
4. Ching, F.D.K. (2000). Building Construction Illustrated, John Wiley & Sons
5. McKay W.B. (1981). Building construction, Volume 1 and 2, Longman UK
6. Rangwala S.C. (2000). Building Construction, AnandCharotar Publishing House, India
7. Sharma S.K. (1998). A Text book of Building Construction, S. Chand and company, New Delhi
8. Bayliss R. (1969). Carpentry and Joinery (Volume 1), Hutchinson Technical Education Publishers
9. Kumar, S. (2010). Building Construction, Standard Publishers Distributors

10. Herzog, T., Natterer, J., Schweitzer, R., Volz, M., & Winter, W. (2012). Timber construction manual. Walter de Gruyter.

SARA2302	COMPUTER AIDED ARCHITECTURAL GRAPHICS - I		L	T	P	Credits	Total Marks
			1	0	2	2	100
Continuous Assessment	End Semester Examination	Min Pass Marks					
		Continuous Assessment	End Semester Examination			Total	
70	30	35	15			100	

COURSE OBJECTIVES:

To expose the students to various aspects of computer applications used in Architectural Design and Construction.

To provide students with the digital skills necessary to efficiently undertake Architectural assignments.

To develop a proficiency in using computers as a tool for systematic research through analysis and validation and presentation of completed design works

MODULE 1 INTRODUCTION

4 Hrs.

Introduction to various computer aided tools used in Architecture, Advantages and Disadvantages of each - 2D Vector vs Raster graphics- 3D modeling for exploration and presentation- Tools used for converting 2D to 3D - List of techniques used in the field, Possibilities & Importance of each.

MODULE 2 2D DRAFTING TOOLS

16 Hrs.

Introduction to CAD Interface - Basic Understanding of coordinates - Model & Paper space - Understanding drawing commands using mouse and keyboard - Setting up limits and Understanding of Function keys - Exploring drawing unit settings (Imperial & Metric)- Line types: Multiline, Polyline, etc. - Line Styles: Dashed, Dotted, etc. - Understanding of Line Weights, Transparent Overlays, hatching utilities - Use of Color - Styles, Blocks and Symbol Library - Annotations & Dimensions - Control of Drawing - Plot and publish settings - Resources and References

MODULE 3 3D MODELLING

20 Hrs.

Introduction to Sketchup Interface- Importing 2D drawing file into Sketchup - Adjusting Sketchup Settings - Creating and Editing Shapes and Forms - Creating Extrusions, Sweeps and Revolves - Layering, Grouping and Components - Creating textures - Applying materials to objects - Creating and saving styles - Creating plans and sections from 3d model –Geo locating model - Save and Export options - Extensions and Plug-in- Resources and References

MODULE 4 VISUALIZATIONS FOR PRESENTATIONS

16 Hrs.

Importance of presentations in Architecture - Use of Visuals and Process Diagrams in Architecture - Tools used for presentations - Introduction to Photoshop- Interface and Tools- Composing an Image- Artistic vs Technical- Importing and rendering 2d drawings- Textures and tiling- Layer management and Overlaying- Creating depth in 3 dimensional visuals: Lighting, Shadows and Reflections- Masking and cutting- Adding people, trees, sky, objects- Styles and effects- Techniques of Photo Montage Visualizations- Post production corrections- Save formats- Resources and References

MODULE 5 CONSTRUCTIVE ASSIGNMENTS

4 Hrs.

Draft Recreate 2D drawings of the previous semester's-built form in AutoCAD and create a 3D Sketchup model for the same. Represent in presentation format using Photoshop as a tool and submit as a portfolio for the end semester viva voce.

Max. 60 Hours

COURSE OUTCOME:

On completion of the course the student will be able to

- CO1 Achieve proficiency in the basic computer skills relevant in the architectural profession
- CO2 Construct 2D orthographic projections in CAD
- CO3 Visualize design concepts in-the-round and make simple and complex 3D objects
- CO4 Retrieve and present drawings and visualizations appropriately for multiple usages across various platforms
- CO5 Develop diagrams and visuals to express architectural ideas and concepts.
- CO6 Process images and create photo montages for presentation visualizations.

TEXT / REFERENCE BOOKS

1. AutoCAD Architecture User's Guide. (2011). Autodesk, Inc.
2. Grabowski, R. (2001). The Illustrated AutoCAD 2002 Quick Reference. Cengage Learning.
3. SketchUp Hands-on: Student Coursebook. (2016). 3dvinci.
4. Tickoo, S. (1999). AutoCAD 2000: A Problem Solving Approach. Delmar Learning; 1 edition .
5. Watt, A. (1991). Fundamentals of three-dimensional computer graphics. Computers and Geosciences.

SARA9301	DESIGN STUDIO III		L	T	P	Credits	Total Marks
			0	1	9	6	300
Continuous Assessment	End Semester Examination	Min Pass Marks					
		Continuous Assessment	End Semester Examination				
200	100	100	50				

COURSE OBJECTIVES:

- To understand the relationship between the site and its setting with the built environment
- To generate solutions for a given low rise, multi room space program that are semantic with socio cultural and site-specific context, choice of material and the psychological requirements of the end user.
- To develop an architectural expression which is responsive to the people and environment

STAGE I

The art of decoding and creating spatial configuration of a single use space by understanding human physical, psychological and socio-cultural needs.

STAGE II**Knowledge acclimatization (Phase I) :**

Critical analysis as a tool to enable the mind by critiquing selected works of architects for the core values and principle Design and decoding it from a user perspective. Review of literature to give the students the buoyancy to solve the given program.

Iteration and Ideation (Phase II)

Resolving the given Design Program by experimentation and multiple iterations leading to three-dimensional composition by understanding the layers of space making.

Realization (Phase III)

The creation of workable plans and the art of realizing through legible drawings as a medium to communicate the vision, reflecting creative approach drawn from data analysis and climatic consideration to the specific context. Use of a variety of materials and techniques to represent the design.

DESIGN INTEGRATION

Application of the knowledge gained by the students from core courses like Principles of Site Planning and Climatology in developing spatial configurations and its physical relationships.

SUGGESTED TYPOLOGIES (One major & one minor design program.)

Low rise environment like residence / primary health center / school / library / banks / community halls / showroom etc.,

TUTORIAL	SOFT SKILLS	8 Hrs.
L		

Personal Skills-Integrity, adaptability - People's skills- teamwork, communication, respect - Workplace skills- Interpersonal skills- Initiative and enterprise- Professional Skills - Learning Technology - Listening Skills - Motivation skills - Leadership skills- Interpersonal and Team Skills Emotional Intelligence Skills - Expressing ideas -Training and Feedback.

Max. 150 Hours

COURSE OUTCOMES:**On completion of the course the student will be able to**

- CO1** Assess the site and surroundings and its relationship with the activity, space for the given architectural program.
- CO2** Analyze and evaluate a design of given space by dissecting the case studies and evolve inferences.
- CO3** Application of anthropology and spatial data for arriving at requirements of the given space.
- CO4** Apply the knowledge on climate responsive building design and implement appropriate design strategies.
- CO5** Build a Process for Design evolution and communicate through drawings – plan, elevation and sections and final presentation with renderings.
- CO6** Evaluation of the design through creation of miniature models and experimentation of space design and 3D through the explored models.

TEXT / REFERENCE BOOKS

- Alexander, C. (1977). A pattern language: towns, buildings, construction. Oxford university press..

- De Chiara, J. (2001). Time-saver standards for building types. McGraw-Hill Professional Publishing.
- Alpern A. (1982), Handbook of specialty Elements in Architecture, Mc Graw Hill Book.
- Mills.E.D. (1985), Planning - The Architects Handbook, 10th Edition, British Library Cataloguing.
- Rafael.M. (2005), Theoretical Anxiety and Design Strategies in the Work of Eight Contemporary Architects, MIT Press

SEMESTER 4

SCIA1405	BUILDING STRUCTURES - III	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

To analyze and understand the design and detailing of RCC Staircases.

To Analysis of Foundations. To design various shallow foundations.

To understand the various types of pile foundations.

To understand the principles of retaining Walls and Flat Slabs. To analyze and design the cantilever retaining wall and flat slab.

UNIT 1 STAIRCASE 10 Hrs.

Definitions - riser, tread, waist slab, floor and mid-landing slabs, Loads on staircase. Types of staircases, design of staircase - Design illustration for doglegged and open well staircases.

UNIT 2 SHALLOW FOUNDATIONS 10 Hrs.

Definitions - Shallow foundations and deep foundations, Safe bearing capacity of soil, angle of repose, minimum depth of foundation. Types of isolated foundations- wall and column footings, design of isolated square and rectangular footing for axial loads only. Design of wall footing - Combined Footings - Analysis and design of combined rectangular footing. The Requirement and design procedure for raft foundation.

UNIT 3 PILE FOUNDATIONS AND RETAINING WALLS 10 Hrs.

Theory: types of piles: under reamed piles, bored and precast piles, Types of pile caps for columns, water tank and chimneys. (no design calculation) - Retaining walls-types, their uses. Analysis and design of cantilever RCC retaining walls - checking stability.

UNIT 4 FLAT SLABS 10 Hrs.

Definition, types of Flat slabs, advantages, concept of post-tensioned flat slab, and design of flat slab without Drop panel by direct design method.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS 5 Hrs.

Demonstrate comprehensive understanding of building structural, preparation of assignments & group discussions

Max. 45 Hours

COURSE OUTCOME:

On completion of the course the student will be able to

- CO1** Understand the components and loads acting on staircase and the Design illustration of Dog-legged and Open well Staircases. Design the dog-legged and open well Staircases.
- CO2** Design the Isolated (Square and Rectangular), Combined Footings and Design procedure of Raft Foundation. Design the isolated, combined and raft foundations.
- CO3** Understand the different types of Pile Foundation and provision of Pile cap for various works and Design of Cantilever Retaining Wall.
- CO4** Understand the different types of Pile Foundation and provision of Pile cap for various works.
- CO5** Learn the different types of Flat Slabs. Design the reinforced concrete cantilever retaining wall.
- CO6** Learn the Design of Flat Slab without drop panel by direct design method. Design the Flat Slab without drop panel by direct design method.

TEXT / REFERENCE BOOKS

- Krishnaraju N (1986). Advanced Reinforced Concrete Design, CBS publishers and distributors.
- Shinha N.L. & Roy S.K (1983). Fundamentals of Reinforced Concrete, S.Chand and company, New Delhi
- Varghese P.C. (2001) Limit State Design of Reinforced concrete, Prentice Hall of India Private Limited, New Delhi, 2001
- Pillai U.S. & Menon, M (2003). Concrete Design, Tata Mcgraw Hill, 2003
- Jain,A.K.(1983). Reinforced Concrete Limit State Design, Nem Chand and Bros., Roorkee.
- Park R and Paulay T. (1975), Reinforced Concrete Structures, John Wiley & Sons, New York.

IS CODES

- IS 456:2000 Plain and Reinforced Concrete-Code of Practice
- IS 875 (1-5) : 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures

3. SP 34: 1987 Handbook on concrete reinforcement and detailing

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3****Hrs.****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1401	HISTORY, CULTURE AND BUILT ENVIRONMENT -IV	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

To study about the growth of Islam in India and the world-and its impact on art and architecture in India with specific reference to monuments built.

Develop the understanding of evolution of a temporal building typology through the exhaustive study of a specific type, viz., religious architecture from across the world.

To study the events this led to the emergence of Renaissance in Europe.

To comprehend the rich vocabulary of structural systems, architectural manifestation and critically analyze the built forms and the limitations of the building process.

To study the architectural methods practiced in India are a result of examination and implementation of its established building traditions and outside cultural interactions.

UNIT 1 EARLY INDO ISLAMIC PERIOD**6 Hrs.**

Advent of Islam in Indian subcontinent - Overview of Development based on political history - Establishment of Delhi Sultanate - Evolution of Architecture under Slave, Khalji, Tughlaq, Sayyed and Lodi dynasties with important examples focusing on construction techniques. Shift of power to the provinces and evolution of Regional Architecture with Examples- Bengal, Gujarat and Malwa, Deccan- Bijapur and Gulbarga with examples.

UNIT 2 INDO ISLAMIC PERIOD**6 Hrs.**

Political history of Mughals- Evolution of Architecture and Urbanism - Mughal gardens - shape grammar and fractal - Babur, Humayun, Akbar, Jahangir, Shahjahan, Aurangzeb- Study of important examples. Decline of Mughal Empire - Cross cultural influences across India - Secular Architecture of the princely states like Oudh and Vijayanagar.

UNIT 3 RENAISSANCE CLASSICISM**10 Hrs.**

Idea of rebirth and revival – Humanism – Development of thought – the Renaissance patron – Urbanism Renaissance architecture: Brunelleschi and rationally ordered space – ideal form and the centrally planned church: Alberti and Donato Bramante – Merchant Prince palaces: Villa Capra Vicenza – Mannerist architecture: The Renaissance in transition – Michaelangelo : Library at S. Lorenzo, Florence, Capitoline Hill – Inigo Jones- rococo Architecture - interiors – hotels.

UNIT 4 COLONIAL ARCHITECTURE**4 Hrs.**

Colonialism and its impact - Indo-Saracenic Architecture and the works of Chisholm: Senate House- Chennai, Victoria Public hall -Chennai, Napier Museum- Trivandrum, Edwin Lutyens' Planning of New Delhi Showcasing Imperial power.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**4 Hrs.**

Map the role of tangible and intangible factors that shaped the architecture during the Islamic and Renaissance era.

Sketches / models of different ages-built forms, columns, details and architectural developments. Comparative analysis of provincial style with regional architecture.

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to****CO1** Outline the planning principles and the construction techniques adopted during the early Islamic period.**CO2** Summarize the evolution of Mughal architecture and the factors that influence the secular buildings of Princely states.**CO3** Discuss the manifestations of fractals and shape grammar in Mughal architecture**CO4** Appreciate the architectural language developed by famous architects during the Renaissance era.**CO5** Explain the salient features of churches constructed during the Renaissance period with a focus on architectonics.**CO6** Appraise the influence of colonial architecture that etched in Indian context.**TEXT / REFERENCE BOOKS**

1. Fletcher, B. (1986). A History of Architecture, University of London, The Athlone Press

2. Tadgell, C. (1990). The History of Architecture of India from the Dawn of Civilization to the end of the Raj, Orient Longman, UK, London.
3. Brown, P. (1983). Indian Architecture (Islamic Period), Taraporevala and Sons, Bombay.
4. Grover, S. (1981). The Architecture of India (Islamic period), Vikas Publishing House Pvt. Ltd., New Delhi.
5. Volwachen, A. (1969). Living Architecture, India (Islamic Period), Macdonald & Co.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA 1402	BUILDING SERVICES - II	L	T	P	Credit s	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To outline the basic principles of Electricity and its application in simple buildings.
- To understand planning and design aspects of electrical services for building typologies.
- To familiarize electrical layout with appropriate fixtures and luminance.
- To integrate the learning in the architectural design.

UNIT 1 INTRODUCTION TO ELECTRICITY**4 Hrs.**

Introduction to Relationship between phase & line, voltage and currents (with calculation units), Electrical supply system – Power Plant, HT Distribution, Sub-station-transformer-street pillar box, Sources of power supply - Power supply network diagram, Source to demand -Types of power supply based on consumer demand - Basic terminologies and units, Electrical system components - Estimation of power demand for different building typologies - Architectural spaces for electrical systems like Sub stations, electrical rooms, Transformer yard etc., - Single/Three phase supply - Earthing for safety, types of earthing – ISI specifications

UNIT 2 ELECTRICITY IN BUILDINGS**10 Hrs.**

Supply load, Demand load, HT/LT service connections, Ring Mains gear (RMG), Transformer, Power Factor, MV panel room, Switch gear, Main Boards & sub distribution boards, Energy meters, System of connection for appliances, fittings & accessories, Conduits and pipes, safety methods, planning electrical layout and wiring for buildings. Designing the electrical layout for residential building, Needs and types of power backup systems: Diesel gensets, Uninterruptible power supply systems, Photovoltaic cells, Architectural spaces for DG's and UPS - Integration of photovoltaic cells in buildings

UNIT 3 INTRODUCTION TO LIGHTING**6 Hrs.**

Basic terminologies and units –Luminous flux, candela, solid angle illumination – visual tasks and factors affecting visual tasks, MSCP, MHCP, colour temperature, colour rendering, space height ratio – modern theory of light – special features and minimum level of illumination for various tasks, Lighting principles, classification of lighting based on activity, source and fixture - Design requirements for different building typologies such as residential, commercial institutional spaces etc - Recommendation from NBC - Case studies.

UNIT 4 LIGHTING**6 Hrs.**

Artificial Lighting: Requirements & design, type of lamps, fixtures, types of bulbs, energy efficient lighting options, preparing a lighting scheme with legend, glare, lighting schemes, types of lighting arrangements, Lumen's method of lighting, luminaire arrangement- various types of Lighting, Lighting for stores, offices, residences, minimum level of illumination required for physically challenged and visually challenged-ECBC requirements.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**4 Hrs.**

Suggested Assignment: Brochure collection of electrical systems and fittings and presentation - Incorporation of studied concepts in the respective semester's Architecture Design studio - Students are expected to have additional sheets on electrical wiring, fittings and lighting drawings

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Summarize the relationship between phase and line, voltage & currents and understand the basics about electrical supply system, principles & practices.
- CO2** Understand distribution, supply and connection of various accessories and appliances and prepare an electrical layout for special buildings.
- CO3** Clarify and discuss basic principles, characteristics of light.
- CO4** Analyze and understand natural lighting in space planning and various measurements of light.
- CO5** Identify and appraise various types of lighting for different interior spaces of varied building typologies.
- CO6** Ability to acquire skill required for the students to apply Electrical and Lighting aspects in his/her designs.

TEXT / REFERENCE BOOKS

1. Benjamin Evans, Daylight in Architecture, McGraw-Hill Book Company, New York, 1981
2. Hopkinson R.G., Architectural Physics-Lighting, H.M. Stationery Office, London, 1963

3. R.G.Hopkinson&J.D.Kay, The lighting of Buildings, Faber & Faber, London, 1969
4. Derek Philips, Lighting in Architectural Design, McGraw Hill. New York, 1964
5. Millet Marietta, Light Revealing Architecture, Van Nostrand Reinhold, London, 1996
6. Pritchard D.C., Lighting, Longman scientific & Technical, Harlow, 1995
7. Peter Trezenza, and David Loe, The Design of Lighting, E & FN Spon, London, 2nd edition, 2004,
8. B.Rajaroo, Electricity for architects.
9. Energy Conservation Building Code user guide – ECBC, Bureau of Energy Efficiency, New Delhi, India

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1403	VERNACULAR ARCHITECTURE	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

- To understand the relationship between regional culture and built environment.
- To assimilate the association between environment, culture, geographical settings and their transformation in building typologies.
- To explore the various provocative facts about buildings and its relevance to built form, function and aesthetics.

UNIT 1 UNDERSTANDING VERNACULAR ARCHITECTURE 10 Hrs.

Definition of Vernacular architecture – classification of vernacular Architecture - Determinants of Vernacular Architecture - elements of Vernacular Architecture – approaches to the study of Vernacular architecture - an overview, Aesthetic, Architectural and Anthropological studies - Vernacular principles in contemporary design.

UNIT 2 APPROACHES AND CONCEPTS IN DIFFERENT REGIONS 10 Hrs.

Methodology to survey and study of Vernacular architecture - review of land, geography, topography, cultural and contextual responsiveness in detail - understanding the elements of vernacular architecture and its unique attributes in the tropics, desserts and hilly region - An overview of vernacular architecture in the tropics, deserts and hilly region - settlement pattern and spatial planning, built form and orientation, cultural aspects, symbolism, colour, art, construction materials techniques of the tropics, desserts and hilly region.

UNIT 3 VERNACULAR ARCHITECTURE IN THE TROPICS 10 Hrs.

Analyzing architecture in Tropics - The Traditional Malay House, Houses in Thailand, and Traditional Architecture in Indonesia - Architecture in Kerala (Houses & Palaces), Tamilnadu (Houses / palaces in Chettinad region) Evolution of the Bungalow from the traditional hut in Bangla.

UNIT 4 VERNACULAR ARCHITECTURE IN DESERTS AND HILLS 10 Hrs.

Architecture in North Africa, Arabia and Middle East Europe - Deserts of Kutch and Rajasthan; Havelis of Rajasthan and Gujarat, Bohra Houses, Subterranean Architecture of Gujarat. Major hill settlements in various regions of the world - Architecture of Houses in North East India - Hill Architecture in Kashmir, house boats - Vernacular architecture in Nepal.

UNIT 5 EXPLORE VERNACULAR ARCHITECTURE 5 Hrs.

Visual observation and brief documentation of small areas/streets, photo documentation of parts of small settlements with rich cultural and architectural characteristics - case studies of leading architects work (vernacular practices)

Max. 45 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Memorize and recreate the fundamentals of Vernacular Architecture and its process.
- CO2** Understand and describe the environmental, social, cultural and economic aspects influencing regional architecture.
- CO3** Understand and discuss various theoretical aspects of vernacular Architecture, relate their interconnections and influence in different settlement patterns and spatial planning across the country.
- CO4** Explore the various approaches of regional Architecture, compare and contrast different construction materials and techniques employed in regional Architecture.
- CO5** Assess various concepts of vernacular Architecture with assorted examples from different regions.
- CO6** Construct and demonstrate diverse regional design concepts and to recommend for application.

TEXT / REFERENCE BOOKS

- Oliver, P. (Ed.). (1997). Encyclopaedia of vernacular architecture of the world (Vol. 3). Cambridge: Cambridge University Press. Amos Rapoport, House Form and Culture, Englewood Cliffs, N.J., Prentice Hall, 1969
- Fathy, H. (1986). Natural energy and vernacular architecture, University of Chicago Press, Chicago and London, 1986
- Fry M. & Drew J., (1964) Tropical Architecture in the Dry and Humid Zones. Londres: Bestford
- Jain. K & Jain. M. (1992), Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad
- Auroville Charter, Auroville Architecture: Towards New forms, Second Edition, Prisma Publications, 2003
- Pramar V.S. (1989) Haveli - Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad,
- Kennedy, J. F., Smith, M. G., & Wanek, C. (Eds.). (2014). The Art of Natural Building--Completely Revised, Expanded and Updated: Design, Construction, Resources. New Society Publishers.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3**

- PART A** : 2 questions each from unit 1 to unit 4, each carrying 5 marks : 08 x 05 = 40 Marks
- PART B** : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks : 04 x 15 = 60 Marks

SARA2401	MATERIALS AND CONSTRUCTION STUDIO - III		L	T	P	Credits	Total Marks
			1	1	3	3	200
Continuous Assessment	End Semester Examination	Min Pass Marks					
150	50	Continuous Assessment	End Semester Examination				
		75	25				

COURSE OBJECTIVES:

To explore the types of concrete and the applications in the built forms.

To understand the various contexts in which concrete is used in constructing walls, roofs and foundations along thumb rules.

To comprehend the ways to prevent the entry of water and dampness in buildings.

MODULE I APPLICATIONS OF CONCRETE IN CONSTRUCTION**40 Hrs.**

Introduction to reinforced cement concrete, suitability requirements for aggregates, grading of aggregates, reinforcement, admixture - Mix proportioning, batching, mixing, transporting, placing, compaction, Ready Mix Concrete, curing formwork - Quality control, tests for concrete, joints in concrete including role of expansion joint, vacuum dewatering, concrete finishes, Centering, Scaffolding, formwork.

Introduction to concrete and its applications – deep foundations, framed structure, expansion joints, slab, WPC, DPC, staircase, cold storage, RCC Columns and Foundations - Different Types of foundations - Detailing of columns - Shallow (Mat and Raft foundation), spread (Square, rectangle, circle, combined, strip and ring foundation), deep (pile, piers, caissons) .Super Structure - Beams, sill level, detailing of apertures (lintels, sunshades, arches etc.) - Roofs (one way slabs, 2-wayslab, continuous, flat slab, coffer slab etc.) – Staircases – thumb rules

MODULE II SPECIAL CONCRETE AND APPLICATIONS IN CONSTRUCTION**35 Hrs.**

Introduction to special concrete and its applications – light weight, foam, ferrocement, Construction methods for different types of Special Concrete like Pre and post tensioning and precast concrete - Ferro cement, Lightweight concrete, high density, fiber reinforced polymer concrete. Detailing of Ferro cement water tanks, toilet units, slabs, waffle slab, filler slab, funicular shell, and other precast systems. Design and detailing of building materials and components developed by research organizations like CBRI, SERC, NBO, and BMTPC.

Max. 75 Hours

Modules	Assignments	Suggestive Outdoor / hands on Workshop	Construction plates	No	Remarks
I	Applications of concrete in buildings – foundation, flooring, shear walls, sill, lintels, slabs, planter box, retaining wall	Report – students have to visit and study the building in construction with respect to the thrust area and give a brief report with sketches and photographs.	Deep foundation – types, grouping	1	Facilitates Architectural design V
			Types of slabs – one way, two way, coffered, flat slab	2	
			Staircase – dog legged staircase	1	
			WPC, DPC, cold storage, expansion joint	1	
II	Sketching – types of staircases, domes and shells	Emphasis is on the details related to barrier free environment. Ferrocement Workshop	Swimming pool and terrace gardening	1	
			Application of concrete in the outcome of Architectural design III	1	

COURSE OUTCOME:

On completion of the course the student will be able to

CO1 Explain the applications of concrete in the built forms along with the thumb rules.

CO2 Categorize the types of special concrete and the respective utilization in building construction.

CO3 Explain the components of the concrete staircase and the design thumb rules.

CO4 Develop the details for cold storage, swimming pool and terrace gardens.

CO5 Integrate the applications of concrete and special concrete in architectural design studios.

TEXT / REFERENCE BOOKS

1. Arora S.P. & Bindra S.P. (1990) A Text Book of Building Construction, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1990
2. Punmia B.C. (2005). A Text book of Building Construction, Laxmi Publications Pvt. Ltd., New Delhi
3. Chudley R. (1999). Construction Technology, Volume 1, Longman publications 3rd Edition.
4. McKay W.B (1981). Building Construction, Volumes 1,2 and 3, Orient Longman, UK, 1981
5. Rangwala S.C. (1982). Engineering Materials, Anand Charotar Publishing House
6. Kumar, S. (2010). Building Construction, Standard Publishers Distributors, 2010
7. Kind-Barkauskas, F., Kauhsen, B., Polónyi, S., & Brandt, J. (2013). Concrete construction manual. Walter de Gruyter.

SARA2402	COMPUTER AIDED ARCHITECTURAL GRAPHICS - II		L	T	P	Credits	Total Marks
			1	0	2	2	100
Continuous Assessment	End Semester Examination	Min Pass Marks					
		Continuous Assessment	End Semester Examination		Total		
70	30	35	15		100		

COURSE OBJECTIVES:

To create 3 dimensional visualizations for effective representation of architectural design

To develop advanced proficiency in software for architectural design, presentation and building information management.

MODULE 1 COMPUTER RENDERING FOR VISUALIZATIONS**20 Hrs.**

Computer Rendering as a technique for Visualizations- Photorealistic vs Stylized Visuals - Introduction to V-Ray - 5 Step Render Workflow - Framing: Photographic Composition - Lighting: V-ray lights, Sun and Professional lighting - Materials: Creation, Properties and Setup - Final Render: Settings for Interiors and Exteriors, Day and Night, Render Elements - Post Production: Corrections and Techniques - Exploring Global Settings, Camera, Environment, Output, Indirect Illumination, VFB channels

MODULE 2 INTRODUCTION TO 3D MASSING**4 Hrs.**

Introduction to Revit - Building Information Modelling - Interface- Working with a Project- Navigation between Views, Basic Drawing and Editing- General Drawing Tools

MODULE 3 EDITING AND MODIFYING TOOLS**16 Hrs.**

Basic Modifying Tools Setting up Levels and Grid - Creating Levels- Importing CAD files- modifying walls - Adding Interior Walls, Doors and Windows - Loading Families - Creation and modifying on Floors - Roof -Stairs -Ramp -Ceiling -Railings

MODULE 4 COMPONENT TOOLS**16 Hrs.**

Setting up Sheets - Placing and Modifying Views - Printing Sheets, Annotation - Working with Dimensions - Working with Text - Adding Detail Lines and Symbols, Tags and Schedules - Adding Tags- Rooms and Room Tags - Working with Schedules - Creating Legends, detailing in Revit - Setting up Detail Views - Creating and Annotating - Details -Keynoting and Keynote - Legends - Patterning.

MODULE 5 CONSTRUCTIVE LEARNING**4 Hrs.**

Draft the previous semester-built form in Revit and create a 3D model for the building and represent over all into presentation format with computer render visualizations submitted as portfolio at end semester viva voce.

Max. 60 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Create photorealistic and stylized imagery of architectural objects through computer rendered perspectives
- CO2** Apply efficient workflows for modeling, texturing, lighting and rendering processes required to create architecture visualizations
- CO3** Utilize Revit software for conceptual form finding and massing exercises.
- CO4** Articulate the purpose of BIM and how it is applied in the Autodesk Revit software.
- CO5** Implement representation of objects in architecture model, and work with elevation, section, and 3D views.
- CO6** Generate customizations and templates for repetitive modelling functions.

TEXT / REFERENCE BOOKS

1. Eddy Krygiel, P. R. (2012). Mastering Autodesk Revit 2013 Architecture. Sybex.
2. Lisa DaNae Dayley, B. D. (2013). Photoshop CC Bible. John Wiley & Sons.

SARA9401	DESIGN STUDIO IV	L	T	P	Credits	Total Marks
		0	1	11	7	300
Continuous Assessment	End Semester Examination	Min Pass Marks				
		Continuous Assessment		End Semester Examination		
200	100	100		50		

COURSE OBJECTIVES

To determine the role of anthropological issues that manifest itself in the creation of a community through a detailed investigation of a generic settlement at micro, Meso and Macro level. It sensitizes the mind about the symbiotic relationship between human need and built environment.

To understand the physical space as a manifestation of socio-cultural elements

Documenting a settlement with strong cohesive character and mapping various parameters through illustrative diagrams followed by a detailed analysis to generate logical conclusions.

METHODOLOGY PROPOSED

STAGE I

Perlustration and Social Audit (Phase I)

The exploration of the character of an identified settlement through observation, documentation of the physical, social, visual and Architectonic pattern and to transfer the recorded Field data into graphical representation for a holistic understanding.

Inquisition and Mapping (Phase II)

The mapping of the onsite work in the studio and discreetly analyze the available data to decode relationship between human needs and the physical, social, visual and architectonic pattern of the settlement.

STAGE II

To propose logical solutions for the perceived problems the settlement faces with high degree of sensitivity to the documented information.

DESIGN INTEGRATION

Application of the knowledge gained by the students from core courses like Vernacular Architecture, History Culture and Built Environment and Building Materials in developing spatial configurations.

TUTORIAL	READING & WRITING SKILLS	8 Hrs.
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Reading skills: Model of reading to learning, reading tactics and strategies, reading purposes – associated apprehensions, reading for meaning (critical reading), reading outcomes, Reading Space and its qualities - writings on architectural design. Precise Writing - Building a Resume - Presenting Data in Verbal and Nonverbal modes

Max. 150 Hours

SUGGESTED TYPOLOGIES

The study could be carried out in a rural or a semi urban settlement which has strong character and lifestyle, influencing the built form.

COURSE OUTCOMES

On completion of the course the student will be able to

- CO1** Comprehend the morphology of a rural settlement over a period of time by understanding elements influencing it.
- CO2** Illustrate the nature and values of generic design as well as the interrelationship between human, society and environmental factors.
- CO3** Apply various methods of conducting surveys and document the physical, visual characteristics and demographic aspects in a holistic manner.
- CO4** Construct a body of knowledge in the vernacular / traditional architecture by decoding local materials and construction techniques.
- CO5** Prescribe interventions for the transformation and give appropriate strategies to address aspirations of the community.
- CO6** Integrate sensitivity in design approach in community-oriented projects with respect to context, collective values and needs.

TEXT / REFERENCES BOOKS

- Rapoport, A. (1969), House Form and Culture, Foundations of Cultural Geography, Prentice Hall, Newyork.
- Fathy, H. (1986), Natural Energy and Vernacular Architecture: Principles and Examples with reference to Hot Arid Climates, University of Chicago Press, Chicago and London.
- Rapoport, A. (2005), Culture, Architecture, and Design, Locke Science Publishing.
- Taj M.H.&Gandhi.N (2009), Foundation for Architecture, Art & Design Book press
- Madhavan,C. (2005), History and Culture of Tamil Nadu: Up to c. AD 1310, D. K. Printworld.

SEMESTER 5

SCIA1507	BUILDING STRUCTURES - IV	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

- To comprehend the potential of steel as a material in construction industry.
- To get an understanding of various types of steel sections and methods of joints used.
- To learn the methodology for using steel columns, beams and roof trusses

UNIT 1 STEEL SECTIONS AND JOINTS**10 Hrs.**

Introduction to limit state design of steel structures: concept of Limit state method of design, safety factors, types of steel sections available, rolled steel sections, properties and uses - Types of Steel Joints: Bolted joints - Design of simple bolted joints for axial tension and compression. (no problems on eccentric joints) - Welded joints - Introduction to welded joints, types of weld- advantages of welded joints - Strength of a fillet weld, Design of simple joints under tension /compression (no problems on eccentric joints)

UNIT 2 DESIGN OF STEEL BEAMS**10 Hrs.**

Introduction to Structural Steel Framing and Steel Spanning Systems - Steel section and Connections and Beams - Design of simple laterally supported beams using I - Sections and channel Section.

UNIT 3 DESIGNS OF COLUMNS**10 Hrs.**

Steel sections and Connections in Columns: Compound and Composite Columns - Column Behaviour under axial load - end conditions - slenderness Ratio, permissible stress - Design using simple section - Design of column bases.

UNIT 4 TUBULAR TRUSS & CONSTRUCTION**10 Hrs.**

Trusses - Different types of tubular trusses, steel sections used for tubular trusses - Analysis and design of individual elements of tubular truss.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**5 Hrs.**

Demonstrate comprehensive understanding of building structural, preparation of assignments & group discussions

Max. 45 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Ability to analyze the interaction between forces and concept of equilibrium
- CO2** Understand various types of steel sections, their applicability and methods of joints.
- CO3** Ability to calculate the shear force & bending moment due to loading on simply supported beams.
- CO4** Design of steel columns including foundation detail.
- CO5** Design of tubular trusses under various conditions
- CO6** Understand the methods of using steel in construction through case studies

TEXT / REFERENCE BOOKS

- Krishna Raju N, Advanced Reinforced Concrete Design, CBS publishers and distributors, 1986
- Duggal S.K, limit state Design of Steel Structures, Tata McGraw Hill Publishing company Ltd. New Delhi, 2010
- Francis D.K. Ching, Barry S. Onouye, and Douglas Zuberbuhler, Building Structures Illustrated: Patterns, Systems and design, John Wiley and sons, Inc., New York, 2009
- Subramanian N., Steel Structures - Design And Practice, Oxford Publications, 2010
- Bhavikatti S.S., Design of steel structures by limit state method as per IS 800 - 2007, I K International Publishing House Pvt. Ltd., 2009
- Arya A.S. and Ajamani J.L., Limit state Design of Steel Structures, Nem Chand & Sons, Roorkee, 2009

IS CODES

- IS : 800: 2007 Code of practice for general construction in steel
- IS 816: 1969 Code of practice for use of Metal Arch Welding for general construction in Mild steel

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1501	HISTORY, CULTURE AND BUILT ENVIRONMENT -V	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To explore the architectural marvels constructed during the modern era.
- To comprehend the philosophies of the master architects during the 19th century.
- To study in detail the different post-modern directions in architecture.

UNIT 1 EARLY MODERN ERA**6 Hrs.**

Neo classism-manifestation through works of Boullée and Ledoux, Salt works of Chaux, Napoleonic Cemeteries, Bank of England, Impact of Industrialization, Construction Materials and Technologies, Industrial Exhibitions, Crystal Palace, Eiffel Tower, Gallery des Machines, Chicago School-Louis Sullivan, Public sector Architecture, Panoptic prisons and London Law Court.

UNIT 2 MODERN ERA**8 Hrs.**

Artistic movement of the 20th century-Arts and Crafts Movement - Art Nouveau and the works of Gaudí, Horta, Guimard, Macintosh- Bauhaus-Walter Gropius -CIAM- Cubism- Constructivism and its influence on Architecture, Adolf Loos and the Arguments on Ornamentation- Expressionism and the works of Mendelson - Destijl: Ideas and works.

UNIT 3 INSTITUTIONS, PHILOSOPHIES AND THE MASTERS**8 Hrs.**

Emergence of modern-factors contributing to modern architecture - major architects and buildings of modern architecture through the Design philosophies - Organic Architecture- F.L. Wright: Programmatic Functionalism-Le Corbusier: Development of international style: Mies van der Rohe, Philip Johnson, Louis I Kahn, Eero Saarinen and SOM.

UNIT 4 CRITIQUING MODERNISM**4 Hrs.**

Brutalism - Archigram, Constructivism, Deconstructivism, Writings of Jane Jacobs - Kenneth Frampton, Robert Venturi - Christopher Alexander, Charles Jencks - Deconstructivism as new architectural movement -Ideas and works of Eisenmann, Hadid, Gehry, Libeskind and Tschumi.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**4 Hrs.**

Map the design philosophies and approaches of British architects in India. Sketches / models of exhibition buildings and the manifestations of art movement in buildings. Comparative studies of buildings constructed by master architects in the 19th century.

Max. 30 Hours**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Outline the planning principles and the construction techniques adopted during the indosaracenic era.
- CO2** Summarize the architectural exemplars during the Neo Classicism era.
- CO3** Outline the salient features and construction techniques adopted in the industrial exhibitions.
- CO4** Explain the manifestations of art movements in architecture.
- CO5** Discuss the philosophies of master architects with examples
- CO6** Explain the transition observed in exemplars of architecture during the modern era.

TEXT / REFERENCE BOOKS

1. Frampton, F. (1994). Modern Architecture: A Critical History, Thames and Hudson, London.
2. Benevelo, L. (1971). History of Modern Architecture, Routledge and Kegan Paul, London.
3. Gideon, S. (1978). Space, Time and Architecture: The Growth of a New Tradition, Harvard University Press,
4. Metcalf, T. (1989). An Imperial Vision, Faber and Faber, London.
5. Gideon, S. (1978). Space, Time and Architecture: The Growth of a New Tradition, Harvard University Press

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1502	BUILDING SERVICES-III	L	T	P	Credit s	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

To develop the understanding of the advanced building services such as Air conditioning, Electromechanical conveyance system, fire and safety.

To comprehend the services through service core in the design of multi-storey buildings.

To integrate the learning in the architectural design

UNIT 1 PRINCIPLES OF AIR CONDITIONING SYSTEMS**6 Hrs.**

Basic principles, laws and terminologies related to AC - refrigeration systems, components of refrigeration system: compressor, condenser, control devices, evaporator, filters, and cooling tower. Vapor compression cycle, Concepts of cooling load, calculation of cooling load-conductivity, transmission heat load, internal heat gain, concepts of zoning, room air distribution-types of outlets.

UNIT 2 AIR CONDITIONING SYSTEMS**8 Hrs.**

Window air conditioners, Package units, direct expansion air conditioning systems - Split units, centralized plants and chilled water plants, Comparison of various systems - Space requirements for A/c units, AHU's & a/c plant, ducting, testing and maintenance on ducts and pipes- Energy saving through design, operation and maintenance - Emerging technologies - VAV, VRV/VRF, Heat Recovery systems, etc., Protection of Ozone Layer-ecofriendly refrigerants. Selection criteria, design / structural considerations and energy requirements for above-mentioned air-conditioning systems - ECBC requirements.

UNIT 3 ELECTROMECHANICAL CONVEYANCE SYSTEMS**4 Hrs.**

Types of conveying systems: Elevators, Escalators, Travelators - Elevators: Types, Components, Design criteria, Traffic analysis, roundtrip time, Estimation of no. of lifts required for different building, typologies as prescribed by NBC - Escalators: Types, components, Design standards and specification from NBC - Travelators: Types, components, Range - Minimum and maximum distance to be covered, Design standards and specification as per NBC.

UNIT 4 FIRE SAFETY AND SERVICE CORE**8 Hrs.**

Introduction, fire triangle, Fire Hazards, Classification of fire, methods of firefighting, fireload, Fire resistance grading, Grading for buildings, fire safety decision tree, Protection for structural components-Firefighting equipment - alarms, detectors, suppression systems, fire point, hydrant & hoses - Firefighting services-Site planning, Fire protection concepts in buildings, design of fire escape routes, design of egress, Requirements for fighting fire in high rise buildings, NBC planning consideration, staircase enclosure, lifts & lifts enclosures, fire lift, basements, air conditioning. Service cores - Definition, design approach, functions of service core, service core types and placements-Service cores-toilets, elevator, electrical, air conditioning, staircases, exits & life safety considerations.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**4 Hrs.**

Case studies/ Field visits and their critical appraisal through plates Discussion on various manufactures of Elevators & Escalators on their product categories and specification - Determining air conditioning load, identifying appropriate system developing layout, for their current design exercise - Coordination with other services, architectural and structural designs. Case studies and their critical appraisal - Application of fire and safety norms and regulations in their current design exercise. Space planning for air conditioning systems, conveyance systems, firefighting and service core.

Max. 30 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understand the fundamental principles of air conditioning systems and its operation in buildings.
- CO2** Develop comprehensive knowledge on various types of Air conditioning systems and expertise on selection of appropriate system for a specific building typology
- CO3** Develop comprehensive knowledge of architectural space planning for air conditioning systems.
- CO4** Understand design strategies involved in planning and sizing of electromechanical conveyance systems.
- CO5** Develop comprehensive knowledge on fire behavior, principles of firefighting, fire detection system, its integration with building and its importance in space planning.
- CO6** Develop comprehensive knowledge on service core design in multistoried buildings.

TEXT / REFERENCE BOOKS

1. Thomas D. Eastop and William Edward Watson, Mechanical services for buildings, Longman scientific and technical publisher, 1992
2. Paul Lang, Principles of Air Conditioning, Delmar publisher, 1995
3. Arora C.P, Refrigeration and Air Conditioning, Tata McGraw Hill, 2000
4. M.H. Lulla, Airconditioning for Architects, Chennai
5. Jain V.K., Fire safety in buildings, New Age International Pvt. Ltd. Publishers, 2010
6. Subramaniam K., Lift Technology- An Insight on Design Basics and its Evolution, EVB, 2010
7. William H. Severns and Julian R. Fellows - Air conditioning and Refrigeration - John Wiley and Sons, London - 1988
Andrew H. Buchanan - Design for fire safety - John Wiley and Sons Ltd., New York.
8. Bureau of Indian standards - National building Code of India.
9. Energy Conservation Building Code user guide - ECBC, Bureau of Energy Efficiency, New Delhi, India.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100**Exam Duration: 3****Hrs.****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA1503	THEORIES OF THINKING AND DESIGN PROCESS	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES:

To introduce 'design' as an integral feature of a larger context in the current scenario.

To give a deeper understanding of the nature of design problems, outcomes and techniques that enhances creative thinking.

To explore the various channels to creativity and the philosophies of famous architects.

UNIT 1 INTRODUCTION TO DESIGN**10 Hrs.**

Definition of Design, Understanding of Design, Purpose and nature of good design, evaluation of design, types of Design classifications, role of a designer, Scale, process and production; Context for design problems, design process, stages in the design processes, from different considerations - Broadbent, Christopher Alexander, Wade.

UNIT 2 DESIGN PROBLEMS, PROCESSES AND OUTCOMES**10 Hrs.**

Context for the rise of the Design Methodology Movement, Different approaches in design- synchronous and asynchronous approaches, regression and escalation, participatory approach to design, design as process involving time and people, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design, different types of designs and the thrust given to the various solutions.

UNIT 3 DESIGN THINKING**10 Hrs.**

Understanding the terms creativity, imagination etc. types of creativity, Theories on thinking, convergent & divergent thinking, lateral & vertical thinking, six hats thinking by Edward de Bono. Creative techniques like checklists, brainstorming and types, diagramming, mapping, ziz-zo-ziz, morphological analysis, SCAMPER, parametric exploration, etc, design puzzles & traps, blocks in creative thinking. Introduction to various theories in Design such as aesthetic theory, proxemic theory. Theory related to human behaviour and environmental design.

UNIT 4 CHANNELS TO CREATIVITY**10 Hrs.**

Types of concepts, process of creativity, tangible and intangible channels to creativity in Architecture and Design - the obscure, metaphors, transformation, paradox, precedents, nature, association with other arts, literal interpretation, materials, geometry, origami, literature and poetry etc. Philosophies of famous Architects and Designers.

UNIT 5 CONSTRUCTIVE ASSIGNMENTS**5 Hrs.**

Literature studies of diverse design processes evolved by contemporary architects with a focus on both tangible and intangible channels to creativity.

Max. 45 Hours**COURSE OUTCOME:**

On completion of the course the student will be able to

CO1	Apply the elements and principles of design in aesthetic and utilitarian art.
CO2	Analyse the types of design problems to develop 'problem driven outcomes.
CO3	Explore the various approaches to enhance thinking skills.
CO4	Interrogate techniques to identify new directions in design thinking.
CO5	Analyze the tangible and intangible approaches to creativity in architecture.
CO6	Generate new channels to evolve ideas conceptually

TEXT / REFERENCE BOOKS

- Alexander, C. (1977). Pattern Language, Oxford University Press
- De Bono, E. (1970). Lateral Thinking: Creativity step by step, Harper & Row
- Rendell, J. (2006). Art and architecture: a place between (pp. 1-240). London: IB Tauris..
- James C. S. & Catanese, A.J. (1979). Introduction to Architecture, McGraw Hill Inc.
- Antoniades, A.C (1982)., Poetics of architecture: Theory of design, John Wiley & Sons, New York,
- Heath, T. (1984). Method in Architecture, John Wiley & sons, New York.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Hrs.****Exam Duration: 3****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****: 08 x 05 = 40 Marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SARA2501	MATERIALS AND CONSTRUCTION STUDIO IV		L	T	P	Credits	Total Marks
			1	1	3	3	200
Continuous Assessment	End Semester Examination	Min Pass Marks					
150	50	Continuous Assessment	End Semester Examination				
		75	25				

COURSE OBJECTIVES:

To comprehend the properties and the types of nonferrous materials.

To synthesize the ways through which the nonferrous materials are used in fixed as well as movable barriers in the built form as well as the environment.

To develop ways to adopt nonferrous materials in architectural design.

MODULE I GLASS AND PLASTICS FOR ARCHITECTURAL APPLICATIONS 35 Hrs.

Classification of glass - Composition of glass, its properties and uses - Various types of glass e.g., plate glass, figured glass, float glass (toughened glass, laminated glass), tinted glass, reflective glass, wired glass, foam glass, glass block, fiberglass, float glass, obscured glass etc. - Decorative glass, insulated glass (sound, heat) - properties and application in building industry, glazing and energy conservation measures.

Thermal Insulation- Heat transfer and heat gain by materials -vapor barriers and rigid insulation. Blanket, poured and reflective insulation - properties and uses of (spun glass, foamed glass, vegetable fibers, mineral fibers, foamed plastics, and vermiculite and glass fibers)

Plastic: Properties, types and uses as building material - Polymerization, thermoplastics, thermosetting plastics, elastomers- Plastics in construction (polythene, polypropylene, polyvinyl chloride, PVC poly-structure, Polyethylene (Low density and high density), polycarbonate, acrylic flooring, PVC tiles, roof lights, domes, and handrails, curtain wall, jali work, applications of uPVC

MODULE II ALUMINIUM FOR ARCHITECTURAL APPLICATIONS 40 Hrs.

Aluminium, windows and ventilators - Methods of construction - typical details showing fixing of framing members, glass panes, roller position (in case of sliding window), hinge arrangement (in casement window), locking arrangement and related hardware, thumb rules

Cladding - Construction methods using Aluminum cladding (includes other ACP materials), shop front handrails - Structural Glazing, curtain walls.

Max. 75 Hours

Modules	Assignments	Outdoor / hands on	Construction plates	No.	Remarks
I	Collection of brochures for different types of glass	Report – student have to visit and study the applications of glass and plastics for architectural applications	Thermal insulation and expansion joints	1	Facilitates Architectural design VI
II	Collection of brochures for various aluminium sections and applications, Case studies for application of aluminum in buildings	Report – students have to visit and study aluminum installations in the interiors with respect to the thrust area and give a brief report with sketches and photographs.	Aluminium joinery	1	
			Aluminium door & windows	3	
			Partitions and false ceilings	1	
			Curtain wall and ACP	1	
	Sketches – fixing details, wall systems, doors and windows for uPVC, glass and plastics wall systems		Application of concrete in the outcome of Architectural design III / IV.	1	

COURSE OUTCOME:

On completion of the course the student will be able to

CO1 Categorize the applications of nonferrous materials in buildings.

CO2 Explain the various types of aluminium joinery in movable barriers in load bearing and non-load bearing

CO3 Develop aluminium joinery for space dividers and false ceilings in the interiors.

CO4 Explain the utilization of plastics and glass for appropriate applications in buildings.

CO5 Devise ways to incorporate nonferrous materials in architectural design studios.

TEXT / REFERENCE BOOKS

1. Rangwala S.C. (1982). Engineering Materials, AnandCharotar Publishing House
2. Ahuja T. D and Birdie G.S., Fundamentals of Building Construction, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1999

3. Punmia B.C, A Text book of Building Construction, Laxmi Publications Pvt. Ltd., New Delhi, 2004.

4. Boyne, Architects working details, Volumes I, II, III, IV, & V, The Architectural Press, London, 1959

SARA9501	DESIGN STUDIO V		L	T	P	Credits	Total Marks
			0	1	12	7	400
Continuous Assessment	End Semester Examination	Min Pass Marks					
		Continuous Assessment	End Semester Examination		Total		
250	150	125	75		200		

COURSE OBJECTIVES

To expose the students on facilities to be provided to urban communities and train them to deal with the challenges posed in the design of multi-functional public buildings in an urban setting.

To build upon the foundational design skills with more complex constraints and context. It integrates aspects of Architectural theory, Modern building technology, and Computation into the design process

To understand and resolve the structural design and use of appropriate materials

METHODOLOGY PROPOSED

STAGE I

Studying the design aspects and parameters involved in medium rise buildings with focus on context, user analysis, bye laws and regulations. Analysis of various approaches and strategies to design problem solving using creative thinking techniques, theories related to human behavior and environmental design, climate responsive and barrier free environment principles.

STAGE II

Phase I

Conceptualize and develop novel solutions to built-environment by evolving innovative forms for the perceived Architectural program by using three-dimensional approach through study models, 3d sketches, digital models and exploration of computer aided drawings and presentation.

Phase II (Iteration and Ideation)

Resolving the given design program by experimentation and multiple iterations leading to three-dimensional composition by understanding the layers of space making.

Phase III

Communicate the final outcome through high standard graphical representations (legible Architectural drawings) along with integration of structures and materials

DESIGN INTEGRATION

Application of the knowledge gained from core courses like theories of thinking, climatic design in developing architectural solutions. Computational and presentation skills previously acquired may be incorporated.

TUTORIAL	PERSONAL BRANDING	6 Hrs.
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Choosing factors to align based on Vision and mission- Social presence and development- Creativity, Critical thinking, Problem solving; Motivation, Persuasion, Negotiation.

Max. 195 Hours

SUGGESTED TYPOLOGIES:

The focus is on creating complex-built form, connecting multiple spaces and users in a mid-rise built environment like Nursing Homes / Club house/ Museums/ Memorial Complex / Cultural Centre, etc.,

COURSE OUTCOME

On completion of the course the student will be able to

CO1 Examine and infer from suitable literature and live case studies appropriate to the design typology.

CO2 Proposition of precise understanding of the important local bye laws and Standards applicable to the specific typology.

CO3 Developing an appropriate design intent based on notions, ideas with the three-dimensional perception as part of the design process.

CO4 Apply the different techniques of creative thinking in design problem solving.

CO5 Curate a deeper understanding of the need for climate responsive design and universal design.

CO6 Integrate structural grid, parking, services and landscape in architectural design.

TEXT / REFERENCE BOOKS

- De Chiara, J., & Crosbie, M. (2017). *Time-saver standards for building types* (4th ed.). McGraw-Hill Education.
- Neufert, E. (2019). *Architects' data* (5th ed.). Wiley Blackwell.
- Gauzin-Muller, D. (2002). *Sustainable architecture and urbanism*. BirkhauserVerlag AG.
- Krishnan, A., Baker, N., Yannas, S., & Szokolay, S. (2017). *Climate responsive architecture: A Design Handbook for Energy Efficient Buildings* (1st ed.). McGraw Hill Education.

FIRST SEMESTER

SMT 1103	MATHEMATICS	L	T	P	Credits	Total Marks
		3	1	0	4	100

COURSE OBJECTIVES

- To develop the mathematical skills of students in solving differential equations and to study the properties of lines and planes in space, along with sphere and to provide as a tool to understand 3D material
- To familiarize the students with integration and coordination techniques of various building services during different phases of a project.

UNIT 1 TRIGONOMETRY, GEOMETRY AND MENSURATION**11 HRS.**

Trigonometric (sine, cosine and tan) functions, hyperbolic functions, exponential functions, Area of plane figures, Volume of solid figures, Ratio and proportion, Golden ratio, Fibonacci sequence.

UNIT 2 BASIC STATISTICS AND PROBABILITY**13 HRS.**

Arithmetic mean, median, mode, standard deviation and variance, regression and correlation, elementary probability theory - Conditional probability.

UNIT 3 VERTICAL TRANSPORTATION**8 HRS.**

Second and higher order linear differential equations with constant coefficients - differential equations with variable coefficients of Euler type.

UNIT 4 FUNCTIONS OF TWO VARIABLES**12 HRS.**

Introduction to partial derivatives, Taylor's Theorem with remainder, Maxima and Minima (Simple Problems)

UNIT 5 INTEGRAL CALCULUS**12 Hrs.**

Integration of rational, trigonometric and irrational functions, properties of definite integrals, reduction formulae for trigonometric functions.

Max. 60 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

- CO1:** Explore practical problems to obtain solutions involving trigonometric and geometry functions.
CO2: Understand the properties of basic statistics and probability
CO3: Understand second and higher order linear differential equations.
CO4: Understand functions of more than one variables, along with Taylors theorem
CO5: Solving differential equation of Integral calculus

TEXT / REFERENCE BOOKS

1. Grewal B.S., Higher Engineering Mathematics, 36th Edition, Khanna Publishers, 2002
2. Kreyszig E., Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons, 2001
3. Narayanan S., Manicavachagom Pillay .T.K. and Ramanaiah G., Advanced Mathematics for Engineering students, Volume I, 2nd Edition, S.Viswanathan Printers and Publishers, 1992
4. Veerarajan T, Engineering Mathematics (for First Year), 2nd Edition, Tata McGraw Hill Publications, 2008
5. Kandasamy P., Engineering Mathematics for First Year, IX Revised Edition, S. Chand and company, 2010

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.**

PART A: 2 questions from each unit, each carrying 4 marks.

: 10 x 02 = 20 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 12 marks

: 05 x 12 = 60 Mark

SCI 1051	MECHANICS OF STRUCTURES	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES

- To analyze and understand the behaviour of materials.
- To comprehend the geometric properties of structural sections.

UNIT 1 FORCES**15 HRS.**

Definition - Coplanar - Concurrent - Non-Concurrent - Parallel Forces - Triangular and Parallelogram Law of Forces - Equilibrium of Forces - Conditions for Static Equilibrium - Concept of Transfer of Forces in Beams, Cables, Arches & Domes. Various Types of Load - Dead, Live, Wind, Impact, Earthquake etc& their Effect on Structures. Various Types of Structural Members -Support Conditions-- reactions moments for plane frame trusses.

UNIT 2 ELASTIC PROPERTIES**10 HRS.**

Definition -Stress, Strain - Tensile, Compressive & Shear - Linear & Lateral Strain - Poisson's ratio - Stress Strain Curve for Mild Steel & High Tensile Steel -modulus of Elasticity, bulk modulus, modulus of Rigidity and their Relationships - Application to Uniform Sections. Analysis of Plane frame trusses by method of Joints.

UNIT 3 GEOMETRICAL PROPERTIES OF SECTIONS**10 HRS.**

Area - Centroid - C.G of Various Sections (Including Cutout Holes) - Moment of Inertia - Parallel & Perpendicular Axis Theorem - Moment of Inertia of Various Section - Section Modulus.

UNIT 4 SHEAR FORCE & BENDING MOMENTS**10HRS.**

A Definition - Relation between Loading, Shear Force & Bending Moment - Simply Supported, Cantilever and Overhanging Beams Subjected to Concentrated, uniformly distributed and uniformly varying loads and their Combinations.

Max. 45 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Understanding the interaction between forces and concept of equilibrium concept significance of elastic properties in resisting forces

CO2: Analyze simple Trusses

CO3: Calculation of Inertia on various sections

CO4: Ability to calculate the shear force & bending moment due to loading on simply supported beams.

TEXT / REFERENCE BOOKS

1. Junnarkar S.B. and Shah H.J., Mechanics of Structures (Volume I), 21st edition, Anand Charotar publishing house, India, 1995
2. Bansal R.K., Strength of Materials, Laxmi Publications Pvt Limited, India, 1990
3. Rajput R.K., Strength of Materials, S. Chand and company, New Delhi, 1996
4. Punmia P.C., Strength of materials and Theory of structures, Vol 1, Laxmi publications, Delhi, 1994
4. Ramamrutham S. and Narayan.R., Strength of Materials, Dhanpat Rai & Sons, Delhi, 1990

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.**

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Marks

SAR 1101	SOCIETY CULTURE AND ENVIRONMENT	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To introduce the basic concepts / theories of formation of society, role of architecture in built environment and the relationship between man and the environment.
- To construct knowledge on the fundamentals of art and its reflection in culture, theories and solutions related to society and culture.
- To familiarize the students with community, various factors influencing various communities in a society and its impact on environment.

UNIT 1 CULTURE AND ARTS**6 HRS.**

Role of art, art reality, perception, representation categories of art in terms of media and technique, paintings, sculpture, film- basic characteristics and development of each field, aspects of literature, performing arts - theatre, dance, music with examples from different cultural contexts.

UNIT 2 CULTURE AND SOCIETY**8 HRS.**

Evolution of civilization and cultures, groups, society, culture, environment and time, Levels of social organization & the evolution of various social groups over time, human habitat to be related with culture and various contexts with examples in different eras.

UNIT 3 CONSTRUCTION AND CULTURE**8 HRS.**

Role of intuition, innovation, inventiveness, creativity and ingenuity in construction, the origin of the Architect and the master builder, emergence of the specialist, designer and builder relationship, culture of construction workers.

UNIT 4 BUILT ENVIRONMENT**8 HRS.**

Introduction to history and theory of built forms - Geographical location, politics, religion, materials and construction techniques with examples in different contexts. Understanding human cultural development, built form and cultural context, expression of the underlying value systems and relationship with the built form.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Map the relationship between community, art, architecture and the environment.

CO2: Understand various cultural contexts and development of various art forms and its representation during different time period.

CO3: Compare various social groups over different time period and human habitat related with various context and culture.

CO4: Identify and appraise the emergence of the Architect – the master builder.

CO5: Analyse & Interpret different cultural context, its development and their relationship with built forms.

CO6: Interrelate the role of culture and human behaviour in a society and their response to environment.

TEXT / REFERENCE BOOKS

1. Jeff Lewis, Cultural studies: The basics, Sage Publications, India Pvt. Ltd., 2008
2. Donald E. Mulligan, Craig Knutson, Construction and Culture: A Built Environment, Stipes Pub, 2004
3. Kathy S. Stolley, The Basics of Sociology, Greenwood press, 2005
4. Amos Rapoport, The Meaning of the Built Environment: A Nonverbal Communication Approach, University of Arizona Press, 1990
5. Amos Rapoport, Culture, Architecture and design, Locke Science Publishing Company, Inc, 2003

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1102	BUILDING MATERIALS	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To expose the students to various building materials, their properties and uses.
- To introduce different components and elements of buildings.
- To interrelate the relationship between structure, characterization, properties, and processing of materials.

UNIT 1 INTRODUCTION**6 Hrs.**

Introduction to building and various building materials, Definition of building, building types and Introduction to various types of Buildings as per NBC - Types of Building Materials - Natural and Manufactured.

UNIT 2 NATURAL BUILDING MATERIALS**10 Hrs.**

Soil- Definition of soil, Types of soil, soil classification, excavation techniques, test for soil, sand and its classification. Stone-Classification of rocks, various types of building stones and their physical properties, Quarrying techniques, Tests for stone, Deterioration & Preservation of stone, various stone finishes and joints. Timber- Classification, Physical properties and uses, defects in timber, conservation, seasoning, decay and preservation of timber and treatment of timber.

UNIT 3 CLAY AND BRICK**6 Hrs.**

Clay- properties, various uses of clay products like floor types, roof tiles, hollow clay blocks - Brick - properties and uses, manufacturing process, types of bricks.

UNIT 4 LIME AND CEMENT**8 Hrs.**

Lime - properties and uses, manufacturing process - Cement - ingredients, properties and uses, tests for cement, varieties of cement.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Possess the skills and techniques necessary for Building materials construction practice.

CO2: Identify suitable materials for use in building construction based on its properties.

CO3: Acquire knowledge about different components and elements of buildings.

CO4: Gain a comparative knowledge of material properties and possible applications in construction.

CO5: Appreciate the uses of stone, timber, clay, brick, lime and Pozzolana products in building construction.

CO6: Select appropriate ingredients of proper quality for cement concrete as per required codes.

TEXT / REFERENCE BOOKS

1. Arora S.P. and Bindra S.R., A text Book of Building Construction, Dhanpat Rai & Sons, New Delhi 1994
2. Barry R., The construction of Buildings (Volume 1), Orient Longman, London, 1969
3. Chudley R., Construction Technology (Volume 1), Longman publications 3rd Edition - 1999
4. All you wanted to know about soil stabilized mud blocks, HUDCO, New Delhi, 1989
5. Rangwala S.C., Engineering Materials, Anand Charotar Publishing House, 1982
6. Schroeder W.L., Soils in Construction, John Wiley and Sons, New York, 1980
7. Sushil Kumar, Building Construction, Standard publishers and Distributors, 2010

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 4051	DESIGN STUDIO I ARCHITECTURAL PRINCIPLES I (Basic Design)	L	T	P	Credits	Total Marks
		2	0	9	8	400

COURSE OBJECTIVES

- The studio aims at widening the avenues of creativity and allows inquiring more on lateral thinking.
- The emphasis is on understanding the process of design as a proactive and analytical tool toward generating alternatives which forms the foundation for future design by designing a meaningful space.

MODULE I SHAPE AND ITS MANIPULATION**36 Hrs.**

Shape - Primary shapes or circle, triangle and square- Family of shapes - Developing shapes from given geometric shape and working out compositions from them - Understanding colour - use of colour - its application - symbolism using colours - Texture - study of textures Colour - The design exercises shall be aimed at developing the skills to create visually pleasing colour schemes based on principles of colour theory, colour symbolism, harmony and contrast, Impact of light in modulating colours.

MODULE II PRINCIPLES OF DESIGN-ORDERING PRINCIPLES AND SCALE/PROPORTION 42 Hrs.

Ordering principles - Axis, Symmetry, Hierarchy, Datum, Rhythm, Repetition, Transformation, Balance, Contrast, and Pattern - Application of various ordering principles of design in two dimensions. Human & Dramatic Scale - Definition - Means by which they can be achieved with suitable example- Anthropometrics - Anthropological studies and important dimension of man at different activities and reach. Proportioning systems - Classical orders, Golden Section - Type of proportion with suitable example - Form Derived using Proportions – silhouette.

MODULE III FORM AND ITS COMPONENTS AND DERIVATION**42 Hrs.**

Articulation and its role as a form modifier - edges and corners, surfaces-The properties of form:-Transformation of form- dimensional, subtractive and additive- centralized, linear, radial, clustered and grid forms for arriving at new shapes and compositions. Interlocking of forms- interlock of forms differing in geometry (circle, square or triangle) or orientation (rotated grid).

MODULE IV CONCEPTS OF SPACE –SPATIAL RELATIONSHIPS&ORGANIZATION**45 Hrs.**

Concepts of space- form- space relationships- Visual & Emotional effects of geometrical forms& their derivatives - Spatial relationships - Space within a space, interlocking spaces, adjacent spaces and spaces linked by a common space, Spatial organization centralised, linear, radial, clustered, grid.

Max : 165 Hours**COURSE OUTCOMES****On completion of the course the student will be able to****CO1:** Facilitate for free expression and creativity in two and three dimensional expressions**CO2:** Understanding the basic characteristics of different techniques, mediums and its practical applications. - To develop an insight towards sensibility and aesthetic appreciation.**CO3:** Comprehend thorough understanding of colour scheme, scale and proportion.**TEXT / REFERENCE BOOKS**

1. Pramod V.S., Design Fundamentals in Architecture, Somaiya Publication Pvt. Ltd., 1973
2. Carolyn M. Bloomer, Principles of visual perception, Van Nostrand Reinhold, 1976
3. Francis D.K. Ching, Form - Space – order, Van Nostrand Reinhold company New York, 1979
4. Senner Gottfried, The four elements of Architecture, Cambridge University press, London. UK, 1984
5. Antony J.Catanese and James C. Snyder, Introduction to Architecture, Mc Graw Hill, New York 1988
6. Mark Dekay, Brown G.Z., Sun, wind and Light: Architectural design strategies, John Wiley and sons, 3rd edition, 2014

SAR 4052	ARCHITECTURAL DRAWING I	L	T	P	Credits	Total Marks
		0	0	4	3	200

COURSE OBJECTIVES

- To introduce the students the basics of architectural graphics in terms of both two dimensional and three dimensional drawing which helps to enhance skills to express more complex objects through graphical presentation
- To involve students in a number of exercises to understand the representation of Dimensional forms through isometric and axonometric drawings.

UNIT 1 INTRODUCTION GEOMETRIC DRAWING

10 HRS.

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

UNIT 2 GEOMETRICAL DRAWING-PLANE GEOMETRY

18 HRS.

Construction and development of planar surface - square, rectangle, polygon, etc. Introduction of multi-view projection-projection of points, lines and planes, Description of Plane Curves: Ellipse, Parabola and Hyperbola.

UNIT 3 GEOMETRICAL DRAWING - SOLID GEOMETRY

18 HRS.

Multi-view projection of solids -cube, prism, pyramids, cones, cylinders etc.; Sections of solids, true shape of solids.

UNIT 4 GEOMETRICAL DRAWING – AXONOMETRIC PROJECTION

14 HRS.

Axonometric, Isometric, plan oblique and elevation oblique projection of planes, solids and combination of solids, introduction to scales.

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

MAX : 60 HOURS

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Comprehend basics of 2d and 3d drawings,

CO2: Understand graphical representation of simple and complex objects and apply concepts of 2d and 3d projection in parallel axonometric and isometric projections

CO3: Analyze complex plan elevation and section convert it to on to 3d representation and vice versa

CO4: Check application of these techniques to simple objects / furniture/ built space

CO5: Compose and express complex objects as drawings

TEXT / REFERENCE BOOKS

1. Francis D.K. Ching, Architectural Graphics, John Wiley and Sons, 2009
2. Fraser Reekie & Tony McCarthy, Reekie's Architectural Drawing, Architectural Press, 1995
3. Morris I. H, Geometrical Drawing for Art Students, Orient Longman, Madras, 2004
4. Leslie Martin C., Architectural Graphics, The Macmillan Company, New York, 1978
5. George A Dinsmore, Analytical Graphics, Van Nostrand, Company Inc., Canada, 1968

SAR 4053	ART STUDIO WORKSHOP I	L	T	P	Credits	Total Marks
		0	0	4	3	200

COURSE OBJECTIVES

- The studio aims at inducing soft and hard skills, visual expression and representation, imaginative thinking and creativity through hands on workshops.

WORKSHOP I**15 HRS.**

Introduction to art- Elements and principles of Art -Types of Art & Painting-Visual effects of drawing- Composition Approach to sketching- Study of light and shadow.

WORKSHOP II**15 HRS.**

Drawing Skills - Freehand exercise on artistic expression through One Point Perspective, Two Point Perspective and Three Point Perspective- Both Interior & Exterior of the buildings and Nature-Scale drawing.

WORKSHOP III**15 HRS.**

ADVANCED HANDSKILL :Sketching Memory drawing and Creative sketching Rendering, Outdoor sketching Methods and techniques use Pencil, Pen and Ink to prepare drawings in Outdoor areas Drawing from imagination Exercises for gaining confidence and enhancing the creativity Watercolour Painting method in which the paints are made of pigments

WORKSHOP IV**15 HRS.**

PAPER CRAFT : Paper Model Paper collage & conceptual portrayal of abstract forms Origami Forms made by cuts and folds for better understanding of sculpting techniques Paper masks The Art of coloring to express their thoughts and ideas in better Quilling The Art of rolled paper to investigate patterns and forms found in nature

MAX : 60 HOURS**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: To be familiar with the grammar of art and identify various techniques

CO2: To involve and illustrate them in a series of freehand exercises both indoor and outdoor

CO3: To produce composition to represent form, proportion, scale, etc. using diagramming

CO4: To distinguish elements of Art - Line, Form, Colour, Composition, Texture etc.

CO5: To determine methods to achieve complex 3d compositions into models applying origami and paper crafting techniques

CO6: To design and generate abstract forms using model making techniques

TEXT / REFERENCE BOOKS

1. Ching Francis, Drawing a Creative Process, Van Nostrand Reinhold, New York, 1992
2. Alan Swann, Graphic Design School, Harper Collins, 1991
3. Moiva Huntly, The artist drawing book, David & Charles, UK, 1994
4. Frank W., The Artist guide to Composition, David & Charles, U.K., 1994
5. Caldwell peter, Pen and Ink Sketching, B.T.Batsford Ltd., London, 1995
6. Enstice W., Drawing, Pearson Education, 2003
7. Ian Sideway, Mastering the Art of Drawing, Anness Publishing, 2011
8. John Hamilton, The Complete Book of Sketching, Chancellor Press, 2003

SECOND SEMESTER

SCI 1106	Building Structures I	L	T	P	Credits	Total Marks
		2	1	0	2	100

COURSE OBJECTIVES

- To analyze and understand the behavior of building elements.
- To comprehend the geometric properties of structural sections.

UNIT 1 LIMIT STATE METHOD OF DESIGN AND COLLAPSE FLEXURE**10 HRS.**

Historic perspective and definition of structure-System of load transferring from various structural elements of building to ground. Principles, Characteristics of load and strength in Limit State Method of design, partial safety factor, stress block parameters-balance, under and over reinforced beams, analysis and design of singly and doubly reinforced beams, analysis and design of under reinforced flanged beams, clear cover for durability and fire resistance, reinforcement details for beams in flexure.

UNIT 2 LIMIT STATE OF COLLAPSE - SHEAR**8 HRS.**

Effect of shear, design of rectangular and flanged beams for shear-minimum shear requirement- Details of shear reinforcement as per provisions of codes.

UNIT 3 SLABS AND CONTINUOUS BEAMS**6 HRS.**

Design of simply supported one way and two way slabs-continuous one way and two way slabs-continuous rectangular beams as per provisions of IS codes.

UNIT 4 LIMIT STATE OF COLLAPSE - COMPRESSION**6 HRS.**

Design of columns for axial loading-square and rectangular sections with lateral ties, circular section with lateral and spiral ties, Design of columns for uniaxial bending, reinforcement details for columns.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Understanding the principles of load, safety factors and balance in beams

CO2: Analyze simple shear in beams

CO3: Explore slabs and continuous beams and their limit state

TEXT / REFERENCE BOOKS

1. Junnarkar S.B. and Shah H.J., Mechanics of Structures (Volume I), 21st edition, Anand Charotar publishing house, India, 1995
2. Sinha S. N., Reinforce Concrete Design, Tata McGraw-Hill publishing company Limited, New Delhi, 2004
3. Varghese P.C., Limit State Design of Reinforced concrete, Prentice Hall of India Private Limited, New Delhi, 2001
4. Ashok K. Jain, Reinforced Concrete Limit State Design, 4th Edition, Nem Chand, Roorkee, 1993
5. Ramachandra, Limit state design of Concrete Structures, Scientific Publishers, 2007

IS CODES

1. IS 456:2000 Plain and Reinforced Concrete-Code of Practice
2. IS 875 (1-5) : 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.**

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Marks

SAR 1103	VERNACULAR ARCHITECTURE	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To interrelate various traditions of different regions and introduce the cultural and geographical settings and its impact on built environment.
- To discuss different building typologies and understand the fundamentals of their form, function and aesthetics.
- To familiarize the students with various traditional built form with environmental, cultural and geographical settings.

UNIT 1 UNDERSTANDING VERNACULAR ARCHITECTURE**9 Hrs.**

Definition and classification of Vernacular architecture - Determinants of Vernacular Architecture - Vernacular Architecture as a process - Survey and study of Vernacular architecture: methodology, cultural and contextual responsiveness - approaches to the study of Vernacular architecture: an overview, Aesthetic, Architectural and Anthropological studies in detail - Vernacular principles in contemporary design.

UNIT 2 VERNACULAR ARCHITECTURE IN THE TROPICS**8 Hrs.**

Geographic belt between the Tropic of Cancer and the Tropic of Capricorn - land: geography, topographical influence, forestry, presence of water, Settlement Pattern and spatial planning, Building form & orientation, cultural aspects, symbolism, colour, art, construction materials techniques of the following - The Traditional Malay House, Houses in Thailand, Traditional Architecture in Indonesia - Architecture in Kerala (Houses, Theatres & Palaces), & Tamilnadu (Houses / palaces in Chettinad region) - Evolution of the Bungalow from the traditional hut in Bangla.

UNIT 3 VERNACULAR ARCHITECTURE IN THE DESERTS**7 Hrs.**

Settlement Pattern and spatial planning, Building form & orientation, cultural aspects, symbolism, colour, art, construction materials techniques of the following - Architecture in North Africa, Arabia and Middle East Europe - Deserts of Kutch and Rajasthan; Havelis of Rajasthan and Gujarat, Bohra Houses, Subterranean Architecture of Gujarat

UNIT 4 VERNACULAR ARCHITECTURE IN THE HILLS**6Hrs.**

Historical perspective of hill architecture and its unique attributes and concerns - Major hill settlements in various regions of the world - A broad view of traditional hill architecture of medieval European settlements and other places -An overview of vernacular hill architecture of Himachal Pradesh - Architecture of Houses in North East India - Geographical regions of Kashmir, Hill Architecture, house boats - Vernacular architecture in Nepal.

Max. 30 Hours**COURSE OUTCOMES:****On completion of the course, student will be able to–**

CO1: To classify and understand various determinants of vernacular Architecture, and understand cultural and contextual responsiveness of vernacular architecture.

CO2: To understand various geographical and topographical characteristics and its influence in different settlement patterns and spatial planning across the country.

CO3: To compare traditional Architecture of various regions and its evolution over a period of time.

CO4: To understand and demonstrate about different construction materials and techniques , Architectural style in deserts and hilly regions.

CO5: To examine assorted examples from settlements in desert regions and hilly areas and analyze different cultural context and its impact on built forms.

CO6: To interrelate the role of climate and material and its impact on vernacular buildings and its spatial planning.

TEXT / REFERENCE BOOKS

1. Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997
2. Amos Rapoport, House Form and Culture, Englewood Cliffs, N.J., Prentice Hall, 1969
3. Hassan Fathy, Natural Energy and Vernacular Architecture - Principles and Examples with reference to Hot Arid Climates, University of Chicago Press, Chicago and London, 1986.
4. Fry M. and Drew J., Tropical Architecture in the Dry and Humid Zones. Londres: Bestford, 1964
5. Kulbhushan Jain and Minakshi Jain, Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad, 1992
6. Auroville Charter, Auroville Architecture: Towards New forms, Second Edition, Prisma Publications, 2003
7. Pramod V.S., Haveli - Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad, 1989
8. Joseph F. Kennedy, The Art of Natural Building, Design, Construction, and Resources. Gabriola Island, BC: New Society Publishers, 2001

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1104	ART AND AESTHETICS	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To understand that Aesthetics, or the philosophy of art, is a theoretical endeavor to explicate the essence of art by defining its nature, its specific function, and the grounds for its recognition and appreciation.

UNIT 1 ART**6 HRS.**

Definition of Art, Theory of origin and evolution, Different Art Forms, Elements of Art-Line, Form, Colour, Composition, Texture, Material, Medium, Content and Style.

UNIT 2 AESTHETICS**10 Hrs.**

Historical development of Art, Traditional Theories-Imitation, Representation and Expression Aesthetics; Contemporary Theories- Marxist, Institutional, Existential and Phenomenal, Romantic Individualism and Art Movements-Realism, Impressionism, Expressionism, Cubism, Futurism, Constructivism, Abstract Art-Theory of Abstraction by Kandinsky and Mondrian, Surrealism.

UNIT 3 ART CRITICISM**6 Hrs.**

Different art critiques, Art, Imagination and beauty, study of the powerful, recurrent ideas concerning art, critical method and the nature of representation.

UNIT 4 INDIAN ART AND AESTHETICS**8 Hrs.**

Nature of Indian Art and Aesthetics, The Emergence of New Trends in Indian art: Raja Ravi Varma and Amrita Sher-Gil, Kolkata School: Havell and Abanindranath, The Revivalist Trend in India and the Role of Bengal School, Art Circles of 20th Century: Progressive Artists Group- Mumbai and Kolkata, Shilpi Chakra- Delhi, Cholamandala- Chennai form.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Produce creative works that demonstrate innovation in concepts, formal language and/or materials

CO2: Describe, analyze and interpret created artwork

CO3: Recognize elements of design in works of art

CO4: Analyze, interpret and evaluate the form and content of works of art

CO5: Handle materials effectively

CO6: Create original objects of art in a specific medium

TEXT / REFERENCE BOOKS

1. Malcom Gee, Art criticism since 1900, Manchester University Press, 1993
2. Peter Lamarque and Stein Haugom, Aesthetics and the philosophy of art: The analytic tradition an anthology, Blackwell publishing Ltd., 2004
3. Paul Crowther, Defining art creating the canon: artistic value in an era of doubt, Oxford publishers, 2011
4. Rathan Parimoo and Sandip Sarkar, Historical development of contemporary Indian art, 1880 - 1947, Lalit kala akademii publishers, 2009
5. Zerffi G.G., A manual of the historical development to art, Hardwick & Bogue Publishers, 1876

**End semester examination question paper pattern
(To be distributed uniformly among all the units)**

Max. Marks: 100**Exam Duration: 3 Hrs.**

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Marks

SAR 1105	MATERIALS AND CONSTRUCTION I	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce the natural materials used for basic shelters.
- To comprehend the potential of load bearing structures in construction industry
- To familiarize the students with flooring materials.

UNIT 1 BASIC SHELTERS**6 Hrs.**

Construction of shelters using natural materials - Bamboo, straw bales, reeds, casuarina, Palmyra Palm, mud blocks - Climate specific influences on shelters - openings in temporary shelters - articulation of openings, doors and window - openings with brick jalli, bamboo split & mat finishes - Roof in temporary shelters - Thatch roof, pan tiles - Fixing details - fencing.

UNIT 2 SIMPLE LOAD BEARING STRUCTURES - BRICK MASONRY**12 Hrs.**

General introduction of various components of building from foundation to roof- Principles of load bearing Construction - simple brick footing - principles of bonding, English and Flemish bond, rat trap bond, T-Junctions (1 and 1 1/2, 2 bricks), L - Junctions, Cross junction (2 bricks), Brick piers, Cavity walls, rat trap bond, plinth and Sill details, brick arches and lintels, compound walls.

UNIT 3 SIMPLE LOAD BEARING STRUCTURES - STONE MASONRY**4 Hrs.**

Stone foundation - random rubble/ ashlar, copings, stone piers, plinth and sill details, stone arches and lintels, stone fencing, Dhajji wall construction.

UNIT 4 FLOORING**8 Hrs.**

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

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

- CO1:** Identify suitable materials for use in building construction.
- CO2:** Acquire knowledge about different components and elements of buildings.
- CO3:** Gain a comparative knowledge of material and possible applications in construction.
- CO4:** Construct knowledge on various construction techniques.
- CO5:** Produce detailed drawings in order to communicate the design better
- CO6:** Interpret site visits and outline details graphically.

TEXT / REFERENCE BOOKS

1. Arora S.P. and Bindra S.P., Text book of Building Construction, Dhanpat Rai & Sons, New Delhi, 2012
2. Chudley R., Construction Technology (Volume 1), Longman publications 3rd Edition, 1999
3. Don A. Watson, Construction Materials and Processes, McGraw Hill, 1972
4. Francis D.K Ching, Building Construction Illustrated, John Wiley & Sons, 2000
5. All you wanted to know about soil stabilized mud blocks, HUDCO, New Delhi, 1989
6. McKay W.B., Building construction, Volume 1 and 2, Longman UK, 1981
7. Rangwala S.C., Building Construction, Anand Charotar Publishing House, India, 2000
8. Sharma S.K., A Text book of Building Construction, S. Chand and company, New Delhi, 1998

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SCI 1801	STRUCTURES STUDIO I	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- To understand technical details of reinforcement of beams, lintels and sunshades
- To comprehend and explore the structural details of one way and two way slabs.

STUDIO WORK

Drafting exercises on reinforcement detailing of simply supported rectangular beams - Flanged beams, lintels and sunshades - Detailing of shear reinforcement for simply supported rectangular and flanged beams.- Simply supported one way and two way slabs, continuous one way and two way slabs and continuous rectangular beams - Reinforcement detailing of square and rectangular sections with lateral ties, reinforcement detailing of circular sections with lateral and helical ties.

Max. 30 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Understanding the principles of load, safety factors and balance in beams

CO2: Analyze loads in beams

CO3: Explore slabs and continuous beams and their limit state

TEXT / REFERENCE BOOKS

1. Junnarkar S.B. and Shah H.J., Mechanics of Structures (Volume I), 21st edition, Anand Charotar publishing house, India, 1995
2. Sinha S. N., Reinforce Concrete Design, Tata McGraw-Hill publishing company Limited, New Delhi, 2004
3. Varghese P.C., Limit State Design of Reinforced concrete, Prentice Hall of India Private Limited, New Delhi, 2001
4. Ashok K. Jain, Reinforced Concrete Limit State Design, 4th Edition, Nem Chand, Roorkee, 1993
5. Ramachandra, Limit state design of Concrete Structures, Scientific Publishers, 2007

IS CODES

1. IS 456:2000 Plain and Reinforced Concrete Code of Practice
2. IS 875 (1-5) : 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures

SAR 1801	CONSTRUCTION STUDIO I	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- To understand technical details of temporary shelters, openings.
- To comprehend and explore the different types of bonds in wall

STUDIO WORK

Drawing Exercises on openings in temporary shelters - articulation of openings, doors and window - openings with brick jalli, bamboo split & mat finishes - Roof in temporary shelters - Thatch roof, pan tiles -Fixing details - fencing - simple brick footing - principles of bonding, English and Flemish bond, rat trap bond, T-Junctions (1 and 1 1 / 2, 2 bricks), L - Junctions, Cross junction (2 bricks), Brick piers, Cavity walls, rat trap bond, plinth and Sill details, brick arches and lintels, compound walls - Stone foundation - random rubble / ashlar, copings, stone piers, plinth and sill details, stone arches and lintels, stone fencing, Dhajji wall construction.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

- CO1:** Analysing the various techniques adopted in the openings for temporary shelters
- CO2:** Construct knowledge on various brick construction techniques.
- CO3:** Acquiring skill relating to application of stone in construction.

TEXT / REFERENCE BOOKS

1. Junnarkar S.B. and Shah H.J., Mechanics of Structures (Volume I), 21st edition, Anand Charotar publishing house, India, 1995
6. Sinha S. N., Reinforce Concrete Design, Tata McGraw-Hill publishing company Limited, New Delhi, 2004
7. Varghese P.C., Limit State Design of Reinforced concrete, Prentice Hall of India Private Limited, New Delhi, 2001
8. Ashok K. Jain, Reinforced Concrete Limit State Design, 4th Edition, Nem Chand, Roorkee, 1993
9. Ramachandra, Limit state design of Concrete Structures, Scientific Publishers, 2007

IS CODES

1. IS 456:2000 Plain and Reinforced Concrete Code of Practice
2. IS 875 (1-5) : 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures

SAR 4054	DESIGN STUDIO II ARCHITECTURAL PRINCIPLES II	L	T	P	Credits	Total Marks
		1	0	9	8	400

COURSE OBJECTIVES

- To enable the students, understand the principles of composition and its importance in Architecture
- To understand role of transformation of form in Architecture
- To know the importance of spatial qualities.

MODULE I**PRINCIPLES OF COMPOSITION****12 Hrs.**

Qualities of - Dominance, Unity, Harmony, Punctuating Effect, Dramatic Effect, Climax, Contrast, Accentuation, Fluidity.

MODULE II**DETERMINANTS IN ARCHITECTURE****18 Hrs.**

Socio cultural determinants - Climate as determinant- climate shaping form with examples from history-Structure & Building materials as determinants--Culture temporal & regional influences as determinant in Architecture - Beliefs, Aspiration, values of the user-Definition of personal space, territory, etc., examples from past and modern era.

MODULE III**ANALYZING ARCHITECTURE****24 Hrs.**

Articulation and its role as a form modifier - edges and corners, surfaces-The properties of form -Transformation of form-dimensional, subtractive and additive - centralized, linear, radial, clustered and grid forms for arriving at new shapes and compositions. Interlocking of forms - interlock of forms differing in geometry (circle, square or triangle) or orientation (rotated grid).

MODULE IV**EXPLORING ARCHITECTURE****96 Hrs.**

The Art of Space Making - Analysing spatial qualities - spatial in quest of a pavilion Design (e.g. Gazebo, Kiosk, Shop, Security Cabin, a Police Booth - developing the Tectonic Vocabulary.

Max. 150 Hours**COURSE OUTCOMES****On completion of the course the student will be able to****CO1:** Understanding the principles of composition**CO2:**Analysing the various determinants and its importance in design consideration**CO3:**Importance of articulation in Architecture**CO4:**Exploration of transformation of form through studies and creating models**CO5:**Visualizing and creating modules for interlock of forms**CO6:**Developing vocabulary of space making through visualizing and model making**TEXT / REFERENCE BOOKS**

Mark Dekay G.Z. Brown, Sun, wind and Light: Architectural design strategies, John Wiley and sons, 3rd edition, 2014

Talbot Hamlin, Forms and functions of 20th century Architecture (Volume 2) , Columbia University press, Newyork,1952

Pramar V.S Design Fundamentals in Architecture, Somaiya Publication Pvt. Ltd., 1973

Francis D K Ching, Form - Space - order - Van Nostrand Reinhold company, Newyork, 1979

Antony J Catanese& Snyder, Introduction to Architecture, McGraw Hill Books Co. New York 1988

Senner Gottfried, The four elements of Architecture, Cambridge University press London, UK, 1984

Leland M. Roth, Understanding Architecture: Its Elements, History, and Meaning, Westview Press, 2014

SAR 4055	ARCHITECTURAL DRAWING II	L	T	P	Credits	Total Marks
		0	0	4	3	200

COURSE OBJECTIVES

- To train the Students in the concept of Measured drawing, Documentation, Perspective Drawing , Sciography, Representation skills, and Techniques for Construction
- To aid as a tool towards effective visualization and presentation of Ideas.
- Enhancing their drawing skills for application in architectural design.

UNIT 1 MEASURED DRAWING**15 HRS.**

Introduction to fundamentals of architectural scales and drawings, line value, lettering, drawing representation, format for presentation methods and technique of measuring buildings and their details. Measured drawing of simple objects like furniture, door, windows, column etc.

UNIT 2 PERSPECTIVE**15 HRS.**

Characteristic of perspective drawing. Concepts and methods of perspective drawing. One point and two point perspective of simple geometrical forms like cube, prism. One, two and three-point perspective of building interiors and exteriors. Introduction to shortcut perspective method.

UNIT 3 SCIOGRAPHY**12 HRS.**

Principles of shade and shadow- construction of shadow of simple geometrical shapes - point, line and planes. Construction of sciography on building shadows of architectural elements.

UNIT 4 DOCUMENTATION**18 HRS.**

Documentation of a small scaled building of unique architectural character like kiosks, coffee shops, and Parlour etc.

MAX : 60 HOURS**COURSE OUTCOMES**

On completion of the course the student will be able to

- CO1:** Comprehend the conversion of scale.
- CO2:** Measurement of simple objects and converting them into drawing, by the usage of scales.
- CO3:** Equipping the students with knowledge of perspective drawing methods.
- CO4:** Understanding the basics of sciography and creating shades and shadows for objects.
- CO5:** Generating drawings based on the understanding of perspective (comparing then by varying the view points) and sciography.apply it as a tool towards effective visualization and presentation.
- CO6:** Documentation of small scaled structures of unique architectural character.

TEXT / REFERENCE BOOKS

1. Bernard Alkins, Architectural Rendering, Walter Foster Art Books, 1986
2. Claude Batley, Indian Architecture, D.B. Taraporevale Sons and Co. Ltd., Bombay
3. Ernest Norling, Perspective drawing, Walter Foster Art Books, California, 1986
4. Francis D.K. Ching, Architectural Graphics, Van Nostrand and Reinhold Company, NY 1975
5. George A. Dinsmore, Analytical Graphics, Van Nostrand, Company Inc., Canada, 1968
6. John M. Holmes, Applied Perspective, Sir Isaac Pitman and Sons Ltd., London, 1954
7. Leslie Martin C., Architectural Graphics, The Macmillan Company, New York, 1964
8. Robert W. Gill, Basic Perspective, Advanced Perspective, Thames and Hudson, London, 1974

SAR 4056	ART STUDIO WORKSHOP II	L	T	P	Credits	Total Marks
		0	0	4	3	200

COURSE OBJECTIVES

- The studio aims at inducing soft and hard skills, visual expression and representation, imaginative thinking and creativity through hands on workshops.

WORKSHOP I PAINTING**15 HRS.**

Studies from life and environment through direct experiences, the students will be expected to put down the visual observation and reactions with competence. Knowledge of forms, the structures of forms, light & shade, texture, colour variation, perspective etc.

WORKSHOP II (ELECTIVE)**CRAFT WORK****10 HRS.****Bamboo craft**

It is a type of work where useful and decorative devices are made completely by Hand or a Simple tool.

Tile making

Create expressive, unified and cohesive three dimensional forms.

Pottery making

Wonder of creation as they learn the art of pottery.

Art out of Waste

Creating crafts out of Waste materials.

WORKSHOP II (ELECTIVE)**SCULPTURE****15 HRS.****Ceramic work**

Sculpting techniques on a plane surface.

Soap and wax

The cutting of material such as soap or wax to form a figure or design.

Clay modelling

Clay modelling will be able to sculpt or make any kind of a model.

Moulding process

Making of creative shape

WORKSHOP III (ELECTIVE)**VISUALIZATION TECHNIQUE****10 Hrs.****Concept**

A theoretical and practical approach in understanding an abstract or generic idea from Particular instances.

Storyboard/ Cartoon making

Graphical representation in the form of illustrations or images displayed in sequence for the purpose of pre-visualizing the area of student's interest. A series of drawings that tells a story.

WORKSHOP III (ELECTIVE)**VISUAL LITERACY****10 HRS.****Photography**

Representation of concept through images will be learnt by the students. The effect of light, shade and shadow can be learnt with easy understanding by the students.

Short film

It is a hands-on class for the students to introduce the art and craft of filmmaking. Students can learn different types of concepts through film making.

Set Design

Sample model by using different materials and techniques.

Max. 60 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: To distinguish elements of craft and paintings.

CO2: To determine methods to achieve complex 3d compositions into models applying origami and paper crafting techniques

CO3: To design and generate abstract forms using model making techniques

TEXT/ REFERENCE BOOKS

1. Kristin Peck, Art of Handmade Tile: Complete Instructions for Carving & Glazing, F + W Media, 2011
2. Jerry Yarnell, Painting Techniques, North Light Books, Cincinnati, Ohio, 2002
3. Anderson Turner, Pottery Making techniques: a pottery making illustrated handbook, American ceramic Society, 2004
4. Chapman G. and Robson P., Art from Packaging, Heinemann Library, 1997
5. Chapman G. and Robson P., Art from Rocks and Shells, Thomson Learning, 1995
6. Bruce Bam Baum, The Art of Photography, Wiley, 2010

THIRD SEMESTER

SCI 1211	BUILDING STRUCTURES II	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To construct knowledge on the analysis and design of brick masonry.
- To explore the different types of trusses and arches.
- To outline various cost effective construction techniques.

UNIT 1 STRUCTURAL MATERIALS-BRICK IN MASONRY & WALLS**10 HRS.**

Introduction to masonry bearing walls: solid walls, cavity walls - Masonry units - size, wall thickness, strength of bricks - Allowable Stresses: Effective Height: slenderness ratio: net permissible stresses - Analysis and design of masonry walls for axial and eccentric loads-Design of masonry piers for axial loads only.

UNIT 2 TIMBER TRUSSES**08 HRS.**

Introduction to sloped roofs: Ridges, hips, valleys and eaves □ Slope with respect to roofing materials □ Wood rafter span range: roof beams parallel to slope and perpendicular to slope: Trusses - types of trusses, properties and their span ranges □ analysis of truss to determine the Forces, deflection of truss □ joinery details of different members of timber truss. (No Design Problem)

UNIT 3 STRUCTURAL ELEMENTS**04 HRS.**

Arches: Introduction to arches, types of arches - Theory of arches - BM diagram for arches - Design of masonry arches using empirical equations - Drawings: types of arches. Floors and flooring: Principles of flooring and terracing - Types of floors: Bricks, stone, concrete colours with finishes - Wooden floors: Study of relevant IS Codes

UNIT 4 COST EFFECTIVE CONSTRUCTION TECHNIQUES**08 Hrs.**

Introduction to cost effective construction techniques, need for cost effective construction techniques - Roofing Types - Ferro cement roofing system, filler slab roofs - Pre-cast roofs- Funicular shells, advanced types of flooring - steel fibre reinforced flooring, epoxy flooring, vacuum flooring, linoleum flooring, ESD flooring.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Ability to analyze the interaction of forces and the concept of equilibrium in masonry walls and piers.

CO2: Various types of timber trusses with respect to span and analysis to determine the action of forces.

CO3: Comprehend the theory of arches, types and the structural behavior.

CO4: Acquire knowledge on the various cost effective construction techniques.

CO5: Understand the types of flooring and terracing.

TEXT / REFERENCE BOOKS

1. Dayaratnam P, Brick and Reinforced Brick Structures, Oxford & IBH publishing, 1987
2. Arya A.S., Structural design in steel, masonry & timber, Nem Chand and sons, Roorkee, 1978
3. Francis D.K. Ching, Barry S. Onouye, and Douglas Zuberbuhler, Building Structures Illustrated: Patterns, Systems and design, John Wiley and sons, Inc., New York, 2009
4. Gautam Bhatia, Laurie Baker Life works and writings, HUDCO Publications, Viking, 1991
5. Appropriate Building systems, Instruction manual, Building materials technology Promotion council, New Delhi, 1993

IS CODES

1. IS 883:1994 code of practice for design of structural timber in building
2. IS 1905:1987 code of practice for structural use of reinforced masonry
3. IS 2366:1983 code of practice for nail - jointed timber construction

**End semester examination question paper pattern
(To be distributed uniformly among all the units)**

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A : 2 questions from each unit, each carrying 5 marks.****: 08 x 05 = 40 Marks****PART B : 2 questions from each unit with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SAR 1201	HISTORY OF ARCHITECTURE I	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To develop an insight into the architecture of prehistoric era and early civilizations
- To impart perception about the social, religious and political character of various indigenous civilizations and how it influenced the built form and settlement
- To emphasize the combined influence of geography, climate, religions, beliefs and culture in shaping the built environment.

UNIT 1 NEOLITHIC ARCHITECTURE**08 Hrs.**

Paleolithic & Neolithic - Elements and types of settlements, Nucleus and growth of settlements, Culture, Evolution of shelter, Factors influencing Architecture- Khirkitia, Catal Huyuk, Early Indus settlements, Harappa and Mohenjodaro, Stonehenge, Architectural character - Ziggurat of Ur; Palace of Sargon, Khorsabad.

UNIT 2 BRONZE AGE**06 HRS.**

Ancient Egypt, history, religious and funerary beliefs and practices, biomorphism, monumentality, Tomb Architecture: Evolution of the pyramid from Mastaba, Pyramids-Giza, Temple Architecture, Temple of Ammon Ra- Karnak, Temple of Abu Simbel.

UNIT 3 EARLY IRON AGE**08 HRS.**

Aryan civilization, Evolution of City States, Greece: The Geometric period, Emergence of Greek Temple, Shape grammar, Theater Epidaurus, orders, optical illusion, Examples: Parthenon, Erechthion, Evolution of Republic states, The founding of Rome, Pompei.

UNIT 4 MIDDLE IRON AGE**08 Hrs.**

Mauryan dynasty, Asokan pillar, Development of Mahayana Buddhism, Symbolism, Sanchi complex, Amaravati stupa, Chaitya halls and Viharas, Lomas Rishi Cave, Rani Gumpha- Udaigiri, Takht-i- Bahai, Chaitya halls at Karle, Baja, Ajanta and Ellora caves.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Brief on major monuments and works of art and architecture covered.

CO2: Acquire knowledge of the basic terminology for chronological periods.

CO3: Distinguish and criticize the role of architecture within the chronological developments across the geographies by executing a comparative analysis

CO4: Evaluate the parameters involved in the formulation of various societies within the civilizations

CO5: Summarize the role of different building materials and constructions techniques used across the globe ancient period in fabricating new built environment.

CO6: Appraising the combined influence of geography, climate, culture and religious beliefs in the formation of various civilizations.

TEXT / REFERENCE BOOKS

1. Mark M.Jarzombek, Vikramaditya Prakash, A global history of architecture, Wiley, 2011
2. Lloyd / H. W. Miller, History of world Architecture series, Faber Ltd., London, 1986
3. Sir Bannister Fletcher, A History of Architecture, University of London, The Antholone Press, 1986
4. Spiro Kostof, A history of Architecture - settings and Rituals, Oxford University Press London 1985
5. Christopher Tadgell, The History of Architecture of India from the Dawn of Civilization to the end of the Raj, Longman UK, London, 1990
6. Percy Brown, Indian Architecture (Buddhist Period), Volume I, Taraporevala and Sons, Bombay, 1983
7. Satish Grover, The Architecture of India (Buddhist period), Vikas Publishing House Pvt. Ltd., New Delhi, 1981
8. Volwahren, Living Architecture: India (Buddhist Period), Macdonald & Co, London, 1969

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Mark

SAR 1202	BUILDING SERVICES I	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To understand the basic principles of water supply and sanitation and to enable them to understand the piping system (pipe above ground and underground) for different types of buildings.
- To provide exposure to planning, design and execution aspects of building services for effective co-ordination during pre-construction and construction phase of projects.
- To explain water supply and sanitary systems for residence & high-rise structures.

UNIT 1 WATER SUPPLY ENGINEERING**8 HRS.**

Water sources-surface & groundwater sources, Quantity and quality of water-demand projection, per capita consumption of water, Nature of impurities, water treatment systems, tests - Water Distribution Methods of Distribution, Systems of Supply of Water, Layout of Distribution Pipes-Internal water supply in Buildings Types of Pipes, Laying of pipes - Above & Below Ground, Jointing, Testing-Prevention of Water Wastage - Preparing Water Supply Schemes, standards for water supply.

UNIT 2 PLUMBING**6 Hrs.**

House Drainage, Domestic Sanitary Installations, traps, various Systems of House Plumbing, Rain water harvesting and systems, Drainage of Sub-soil water, Layout of Drainage system, connection to sewers, Standards for Sanitary Conveniences.

UNIT 3 SEWAGE TREATMENT**8 Hrs.**

Aryan civilization, Evolution of City States, Greece: The Geometric period, Emergence of Greek Temple, Shape grammar, Theater Epidaurus, orders, optical illusion, Examples: Parthenon, Erechthion, Evolution of Republic states, The founding of Rome, Pompei.

UNIT 4 ENVIRONMENTAL SANITATION**8 Hrs.**

Environmental sanitation-the importance of sanitation classification of waste, disposal of refuse, composition, collection, conveyance of refuse disposal systems in towns & recovery of refuse Sewerage system - sewage -definitions and importance of quantity of sewage, storm water and design of sewers-systems of sewerage-dry and water carriage systems, patterns of collection, sewers - materials used, shapes of sewers, construction & maintenance of sewers, sewer joints, sewer appurtenances.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Ability to Estimate the required water consumption through per capita consumption of water.

CO2: Calculating the sewage outcome from a building & they will propose septic tank or STP depending upon its need.

CO3: Judicial use of thumb rules to apply in the design of water supply as well as for execution of the same.

CO4: Visit to STP in the campus to understand the process & quality of treated water.

CO5: Interaction between consultant and students, in handling and installation techniques of plumbing line.

TEXT / REFERENCE BOOKS

1. Fair G.M., Geyer J.C. and Okun D.A., Water and Waste Engineering, Volume 2, John Wiley and sons, Inc. New York, 1968
10. Manual on water and treatment, 2nd Edition, CPHEEO, Ministry of works and Housing, New Delhi, 1980
11. Rangwala S.C., water supply and sanitary Engineering, Anand Charotar publishing house, 1981
12. Venugopala Rao P., Textbook of Environmental Engineering, Prentice Hall of India Pvt. Ltd., 2002
13. Husian S.K., Textbook of Water Supply and Sanitary Engineering, Oxford & IBH, 2006

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Mark

SAR 1203	SITE PLANNING AND ANALYSIS	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To establish the process involved in analyzing a site and its parameters
- To analyze and identify the criteria in selecting an appropriate site.
- To evolve a methodology for site responsive design.

UNIT 1 PRINCIPLES OF SITE PLANNING**8 Hrs.**

Definition of plot, site, region, site planning, units of measurements-Factors influencing a site-Onsite and offsite factors-Topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available- sources of water supply and means of disposal system-Organization of vehicular and pedestrian circulation, types of roads, hierarchy of roads, networks, patterns, road widths, turning radii, street intersections- movement material, design consideration- Site zoning regulations- Land use regulations-Development control rules of local bodies- building setbacks- FSI- FAR-plot coverage- OSR- parking regulations and standards.

UNIT 2 SITE SELECTION AND ANALYSIS**8 Hrs.**

Study of microclimate: Influence of vegetation, wind, landforms and water as modifier of microclimate-Site selection process- Site selection criteria for housing development, commercial and institutional projects- Importance of site analysis- systemic process of site analysis- site suitability analysis- Analysis of natural, cultural, aesthetic factors and visual characteristics- Site analysis diagram- matrix analysis, composite analysis- Grading Contours-contour maps using GIS- slope Analysis, grading process, grading criteria.

UNIT 3 SITE DESIGN AND SITE DEVELOPMENT**8 Hrs.**

Site context- contextual analysis responding to programmatic, functional, environmental, aesthetic factors. Integrated approach to design of building and open spaces-relationship of space and mass, enclosure and spatial perception, spatial enclosure- Sense of space- Introduction to land use mapping, existing master plans- types of plans-site layout- Development of Master plan- Site plan.

UNIT 4 CASE STUDIES**6 Hrs.**

Data Collection- Detailed analysis of various factors influencing the site- Preparation of Site Analysis diagram- Analysis of built and open space relationship- concept development- circulation network analysis- Site Development Plan for projects in hilly areas, Housing development, Commercial, institutional spaces and factory buildings.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to****CO1:** Understanding the parameters and terminology involved in Site Analysis .**CO2:** Evaluating the criteria involved in site selection.**CO3:** Appraising the site profile with its contextual complexity like contours, slope analysis**CO4:** Critical understanding of case studies in site planning to draw inferences**CO5:** Total understanding and logical process to develop a site.**TEXT / REFERENCE BOOKS**

1. Charles W. Harris, Nicholas T. Dines, Time Savers standards for Landscape Architecture, 1997
2. Edward T.White, Site Analysis: Diagramming information for Architectural design, 1983
3. Joseph DeChiara and Lee Coppleman, Planning Design Criteria, Van Nostrand Reinhold Co Newyork, 1968
4. Kevin Lynch and Gary Hack, Site planning, MIT Press, Cambridge, 1984
5. Punmia B.C, Surveying, Volume1, Standard Book House, New Delhi, 1983

END SEMESTER EXAM QUESTION PAPER PATTERN

(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1204	CLIMATOLOGY	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To comprehend the role of climate in shaping a climate responsive built form
- Facilitating the learning of Climatic Design.

UNIT 1 CLIMATE AND COMFORT**6 Hrs**

Global climatic factors - earth rotation - axis inclination - radiation at earth's surface - earth's thermal balance - wind thermal forces - Components of climate - geographic belt between the tropic of cancer and the tropic of Capricorn - Thermal comfort factors and indices - Site Climate - elements of climate - temperature - humidity - precipitation - sky conditions - solar radiation - Impact of rainfall on design of buildings.

UNIT 2 CLASSIFICATION OF CLIMATE**7 Hrs**

Koppen Climate Classification System - Atkinson climate classification - characteristics of tropical climates - warm humid climate, warm humid island climate, hot dry desert climate, hot dry maritime desert climate, composite / monsoon climate, tropical upland climate, climate graph.

UNIT 3 THERMAL PROPERTY OF BUILDING ENVELOPE**10Hrs**

Thermal quantities - heat flow rate, conductivity (k-value) & resistivity - conductance through a multi-layered body, surface conductance - transmittance - calculation of U-value - convection, radiation, concept of sol-air temperature & solar gain factor - introduction to periodic heat flow in building, time lag & decrement factor.

UNIT 4 VENTILATION AND DAYLIGHTING**7 Hrs**

Functions of ventilation - stack effect due to the thermal forces, wind velocity - wind rose, wind pressure - Air movement through buildings - Air movement around buildings - factors affecting air flow, Wind shadow etc. - Thermally induced air currents.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Understanding climate in detail.

CO2: Interpretation of climate characteristics based on different zones, elements and the factors affecting climate.

CO3: Differentiation between Macro Climate & Micro Climate

CO4: Analyzing the thermal properties of building envelope and evaluating the performance of the envelope, based on its 'U' value by applying the concept of periodic heat flow, time lag and decremental factor.

CO5: Understanding the basics of ventilation and day lighting and the important role played by them in designing of buildings.

CO6: 'Climatology' facilitates the learning of 'Climatic design'

TEXT / REFERENCE BOOKS

1. Arvind Krishan, Nick Baker, Simons Yannas, Szokolay S.V., Climatic Responsive Architecture - A Design Handbook for Energy Efficient Buildings, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2001
2. BIS, SP 41: Handbook on Functional Requirements of Buildings (Other than Industrial Buildings), 1987
3. Koenigsberger O.H., Ingersol T.G., Mayhew A. and Szokolay S.V., Manual of Tropical Building and Housing, Orient Longman Pvt. Ltd, 2004
4. Martin Evans, Housing, Climate and Comfort, Architectural Press, London, 1980.
5. Mark Dekay and Brown G.Z, Sun, wind and Light: Architectural design strategies, 3rd edition, John Wiley and sons, 2014
6. Richard Hyde, Climate Responsive Design: A study of buildings in moderate and hot humid climates, E & FN Spon, London, 2000.

WEBSITES

1. <http://koeppen-geiger.vu-wien.ac.at>
2. <http://plea-arch.org/wp-content/uploads/PLEA-NOTE-1-SOLAR-GEOMETRY.pdf>

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Mark**

SAR 1205	MATERIAL AND CONSTRUCTION II	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce the student to various assembly systems and explore possibilities in timber construction
- To prepare the student to utilize the basic fundamentals and apply a modern day approach to building problems
- To provide an understanding of various materials and its applications in the industry

UNIT 1 MANUFACTURED BUILDING MATERIALS**8 Hrs.**

Classification of glass - Composition of glass, its properties and uses - Various types of glass e.g. plate glass, figured glass, float glass (toughened glass, laminated glass), tinted glass, reflective glass, wired glass, foam glass, glass block, fiber glass, float glass, obscured glass etc - Decorative glass, insulated glass (Sound, Heat) - properties and application in building industry, glazing and energy conservation measures.

UNIT 2 TIMBER IN CONSTRUCTION**6 Hrs.**

Timbers -Methods of construction using natural timber in joinery works including methods of fixing and options for finishing - Exercises involving the above through drawings - Introduction to simple trusses - Mangalore tiles, madras terrace roofing, - fixing details.

UNIT 3 TIMBER JOINERIES**12 Hrs.**

Different types and methods of fixing - Windows (panelled, louvered, glazed, pivoted and sliding windows) - Doors (panelled, glazed, sliding, folding, louvered and pivoted) - Ventilators (top hung, louvered, and glazed) - Hardware for doors, windows and ventilators and application for a simple structure with schedule of joinery.

UNIT 4 PROTECTIVE COATINGS**4 Hrs.**

Paints and Varnishes - Composition, manufacture and properties and uses of ordinary paints, enamels, distemper, plastic emulsion, special paints- fire retardant, luminous and bituminous paints, defects in paints- Varnishes and wood preservatives, method of distempering wall surfaces, painting of timber and iron work. Composition, characteristics, preparation, Primer, Painting different surfaces.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to**

- CO1:** Holistic understanding of types of joinery used in timber construction and their method of construction
- CO2:** Construct knowledge on various roofing techniques
- CO3:** Exploring timber joinery details related with openings such as doors and windows
- CO4:** Criticize the various methods of timber construction depending on strength and application
- CO5:** Generate detailed drawings in order to communicate the design better

TEXT / REFERENCE BOOKS

1. Arora. S.P and Bindra S.R, A text Book of Building Construction, Dhanpat Rai & Sons, New Delhi 1994
2. Bayliss R., Carpentry and Joinery (Volume 1), Hutchinson Technical Education Publishers, 1969
3. Chudley R., Construction Technology (Volume 1), Longman publications 3rd Edition, 1999
4. Francis D.K Ching, Building Construction illustrated, John Willey & Sons, 2008
5. Klangs Dukeeborg, Bambus - Bamboo, Karl Kramer Verlag Stuttgart Germany, 2000
6. McKay W.B., Building Construction, Volume 1, 2 and 3, Orient Longman, UK, 1981
7. Rangwala .S.C., Engineering Materials, Anand Charotar Publishing House, 1982
8. Sushil Kumar, Building Construction, Standard Publishers Distributors, 2010

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SCI 1802	STRUCTURES STUDIO II	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- To illustrate the types of trusses, joinery details and cost effective construction techniques.

STUDIO WORK

Drawing on types of trusses, joinery details of different members of timber truss - Cost effective construction Techniques

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Design of timber trusses and Detailing through drafting and sketching.

CO2: Practical understanding on the design of structural elements

SAR 1802	CONSTRUCTION STUDIO II	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- To work out various assembly systems and explore possibilities in timber construction
- To understand various roofing materials in the market and its applications in the buildings.

STUDIO WORK

Drawings on Methods of construction using natural timber in joinery works including methods of fixing and options for finishing - Exercises involving the above through drawings - Mangalore tiles, madras terrace roofing, - fixing details. - Different types and methods of fixing - Windows (panelled, louvered, glazed, pivoted and sliding windows) - Doors (panelled, glazed, sliding, folding, louvered and pivoted) - Ventilators (top hung, louvered, and glazed) - Hardware for doors, windows and ventilators and application for a simple structure with schedule of joinery

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Thorough understanding of joinery details by attempting new details.

CO2: Importance of clarity in details in communicating the design

CO3: Comprehensive understanding by preparing schedule of joinery with specifications and hardware.

CO4: Quantifying material requirement through schedule of joinery.

SAR 4057	DESIGN STUDIO III	L	T	P	Credits	Total Marks
		0	0	14	9	400

COURSE OBJECTIVES

To study the role of anthropological issues that manifest itself in to creation of a community through a detailed investigation of a generic settlement at micro, Meso and Macro level. It sensitizes the mind about the symbiotic relationship between human need and built environment.

FOCUS

Documenting a settlement with strong cohesive character and map various parameters through illustrative diagrams followed by a detailed analysis to generate logical conclusions.

METHODOLOGY PROPOSED

The studio consist of four phase

- Phase I** : Workshop on physical and social surveying
- Phase II** : The students should go for an onsite study of the identified settlement, observe, document and record information. The students should transfer field data in to graphical representation which helps in understanding the settlement holistically.
- Phase III** : The students map the onsite work in the studio and discreetly analyze the available data to understand the physical, social, visual and Architectonic pattern.
- Phase IV** : To propose logical solution for the perceived problems the settlement faces with high degree of sensitivity to the documented information.

DESIGN INTEGRATION

The knowledge students acquire from Vernacular Architecture course would act as a catalyst for initiating the contemplation process.

COURSE OUTCOMES

On completion of the course the student will be able to

- CO1:** Ability to collect, assimilate and integrate knowledge in a holistic manner.
- CO2:** Sensitivity towards the nature and values of unselfconscious and collective design as well as the interconnectedness of human society and environment.
- CO3:** Ability to observe and analyse changes in the above.
- CO4:** Ability to project future transformations and give possible/ appropriate ways to address issues, if any.
- CO5:** Sensitivity in design approach in community oriented projects with respect to context, collective values and needs.

Max. 210 Hours

TEXT / REFERENCES BOOKS

1. Amos Rapoport, House Form and Culture, Foundations of Cultural Geography, Prentice Hall, Newyork, 1969
2. Hassan Fathy, Natural Energy and Vernacular Architecture: Principles and Examples with reference to Hot Arid Climates, University of Chicago Press, Chicago and London, 1986
3. Amos Rapoport, Culture, Architecture, and Design, Locke Science Publishing, 2005
4. Masud Taj H., Nari Gandhi, Foundation for Architecture, Art & Design Book Press, 2009

FOURTH SEMESTER

SCI 1212	BUILDING STRUCTURES III	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- This course provides a proper understanding of the design and detailing of RCC Staircases, Foundations, Retaining Walls and Flat Slabs

UNIT 1 STAIRCASE**6 HRS.**

Definitions - riser, tread, waist slab, floor and mid-landing slabs, Loads on staircase. Types of staircases, design of staircase - Design illustration for doglegged and open well staircases

UNIT 2 SHALLOW FOUNDATIONS**12 HRS.**

Definitions - Shallow foundations and deep foundations, Safe bearing capacity of soil, angle of repose, minimum depth of foundation. Types of isolated foundations- wall and column footings, design of isolated square and rectangular footing for axial loads only. Design of wall footing - Combined Footings - Analysis and design of combined rectangular footing. The Requirement and design procedure for raft foundation.

UNIT 3 PILE FOUNDATIONS AND RETAINING WALLS**8 HRS.**

Theory: types of piles: under reamed piles, bored and precast piles, Types of pile caps for columns, water tank and chimneys. (no design calculation) - Retaining walls-types, their uses. Analysis and design of cantilever RCC retaining walls - checking stability.

UNIT 4 FLAT SLABS**4 HRS.**

Definition, types of Flat slabs, advantages, concept of post-tensioned flat slab, and design of flat slab without Drop panel by direct design method.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to**

CO1: Understand the components and loads acting on staircase and the Design illustration of Dog-legged and Open well Staircases

CO2: Design the Isolated (Square and Rectangular), Combined Footings and Design procedure of Raft Foundation

CO3: Understand the different types of Pile Foundation and provision of Pile cap for various works and Design of Cantilever Retaining Wall

CO4: Learn the different types of Flat Slabs and Design of Flat Slab without drop panel by direct design method

TEXT / REFERENCE BOOKS

1. Krishnaraju N., Advanced Reinforced Concrete Design, CBS publishers and distributors, 1986
2. Shinha N.L., and Roy S.K., Fundamentals of Reinforced Concrete, S.Chand and company, New Delhi, 1983
3. Varghese P.C., Limit State Design of Reinforced concrete, Prentice Hall of India Private Limited, New Delhi, 2001
4. Unnikrishnan Pillai S., and Devadas Menon, Concrete Design, Tata McGraw Hill, 2003
5. Ashok K. Jain, Reinforced Concrete Limit State Design, Nem Chand and Bros., Roorkee, 1983
6. Park R and Paulay T, Reinforced Concrete Structures, John Wiley & Sons, New York, 1975

IS CODES

1. IS 456:2000 Plain and Reinforced Concrete Code of Practice
2. IS 875 (1-5) : 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures
3. SP 34: 1987 Handbook on concrete reinforcement and detailing

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1206	HISTORY OF ARCHITECTURE II	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To understand the development of Architecture during the late Iron Age and medieval period.
- To introduce the student to Romanesque & gothic architecture and progression through late Iron Age and Early Middle Age.
- To get an insight into the monumental Architecture and the influences, both natural and manmade.

UNIT 1 LATE IRON AGE**6 Hrs.**

Republic and empire, Roman religion, Urban planning, Art and Architecture, Forums and Basilicas, principles of reuse in construction, Enclosure, orders and Manipulation of space Examples- Forum Romanum, Pantheon, Colosseum, Circus Maximus, Thermae of Caracalla.

UNIT 2 EARLY MIDDLE AGE**8 Hrs.**

Feudalism, Monasticism, Guilds, Medieval monasteries, Medieval Domestic Architecture, Cluny- Romanesque churches, Development of vaulting, Abbaye Aux Homes, Tower of London, Dunham Cathedral, Birth and spread of Christianity, Early Christian Worship and burial, Basilican concept- St. Peters Rome, St. Clement, Rome, Centralised Plan - St.Vitale - Ravenna, Hagia Sophia.

UNIT 3 MIDDLE AGE**8 Hrs.**

Evolution of temples, fractals in temples, Borobudur temple, Durga temple- Aihole, Ladh Khan Temple, Tigawa temple, Papanatha Temple, Virupaksha Temple, Lingaraja Temple, Jagannath Temple- Puri, Jain Temple- Mt.Abu, Shore temple and Rathas -Mahabalipuram, Brihadeeshwara Temple, Meenakshi Amman Temple - Madurai, Srirangam Temple.

UNIT 4 LATE MIDDLE AGE**8 Hrs.**

Political and social changes, Re-Emergence of the city, Crusades, Scholasticism, Development of Gothic Architecture, fractals in cathedrals, Structural developments in France and England- Notre Dame- Amiens, Notre Dame- Paris, Westminster Abbey, Milan Cathedral, Wooden roofs in Churches and Domestic Architecture.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1:Understanding of utilitarian and monumental Architecture of late Iron Age

CO2:Insight into developments in early middle age, with focus on medieval monasteries and churches

CO3:Understanding of the Architecture of early middle Age with thrust on Romanesque and gothic Architecture.

CO4:Comprehension of the Architecture of middle Iron Age, especially the Dravidian period.

CO5:Appraisal of the combined influence of natural and manmade factors on the Architecture

TEXT / REFERENCE BOOKS

Mark M.Jarzombek, Vikramaditya Prakash, A global history of architecture, Wiley,2011

Lloyd / H. W. Miller, History of world Architecture series, Faber Ltd, London, 1986

Sir Bannister Fletcher, A History of Architecture, University of London, The Antholone Press, 1986

Percy Brown, Indian Architecture (Hindu Period), Taraporevala and Sons, Bombay, 1983

Satish Grover, The Architecture of India (Hindu period), Vikas Publishing House Pvt. Ltd., New Delhi,1981

Volwahren, Living Architecture – India (Hindu Period), Macdonald & Co, 1969

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Marks

SAR1207	BUILDING SERVICES II	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To outline the basic principles of physics of Electricity and its application in simple buildings.
- To understand planning and design aspects of electrical services for building typologies.
- To familiarize electrical layout with appropriate cross section of wires and luminance.

UNIT 1 INTRODUCTION TO ELECTRICITY**8 Hrs.**

Electrical supply system, Supply voltages & classification, voltage tolerance, cables, voltage drop-Electric installations: Relationship between phase & line, voltage and currents. Electrical installation: Principles & practices, Distribution, circuits, building Wiring, use of single phase, two phase, three phase etc. System of connection of appliances & accessories, service connections, generators, invertors -Case studies on electric core.

UNIT 2 ELECTRICITY IN BUILDINGS**8 Hrs.**

Main Boards & sub distribution boards for multi storied buildings, Standby power supply distribution, transformers, safety methods, principles and practices- Earthing: definition, types, lighting arrestor and I.S.I specifications planning electrical layout and wiring for buildings. Communication networking and electrical layout for special buildings like Exhibitions, theatres and stadiums - Designing the electrical layout for a building, layout, factors and constraints.

UNIT 3 INTRODUCTION TO LIGHTING**6 Hrs.**

Characteristics of light, visual task, factors affecting visual task, synthesis of light, sources Measurements of lighting, Intensity, flux, Work surface, laws of illumination, MSCP, MHCP, colour temperature, colour rendering, space height ratio, depreciation factor, utilization factor day light factor, Natural lighting in architecture.

UNIT 4 LIGHTING**8 Hrs.**

Artificial Lighting: Requirements & design, type of lamps, fixtures, preparing a lighting scheme with legend, glare, lighting schemes, types of lighting arrangements, Lumen's method of lighting, luminaire arrangement-Specific Lighting: Flood Lighting, concealed lighting, outdoor lighting, mood lighting, accent lighting, LEDs-Lighting for stores, offices, residences, minimum level of illumination required for physically challenged and visually challenged.

Max. 30 Hours**COURSE OUTCOMES:****On completion of the course the student will be able to**

CO1: To summarize the relationship between phase and line, voltage & currents and understand the basics about electrical supply system, principles & practices.

CO2: To understand distribution, supply and connection of various accessories and appliances and prepare an electrical layout for special buildings.

CO3: To clarify and discuss basic principles, characteristics of light.

CO4: To understand natural lighting in space planning and various measurements of light.

CO5: To identify and appraise various types of lighting for different interior spaces of varied building typologies.

TEXT / REFERENCE BOOKS

1. Benjamin Evans, Day light in Architecture, McGraw-Hill Book Company, New York, 1981
2. Hopkinson R.G., Architectural Physics-Lighting, H.M. Stationery Office, London, 1963
3. Millet Marietta, Light Revealing Architecture, Van Nostrand Reinhold, London, 1996
4. Pritchard D.C., Lighting, Longman scientific & Technical, Harlow, 1995
5. Peter Trezenza, and David Loe, The Design of Lighting, E & FN Spon, London, 1998

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1208	CLIMATIC DESIGN	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To integrate the climate data in the design of built environment.
- To understand and evaluate built form based on climate parameters
- To understand the various passive heating and cooling techniques

UNIT 1 SOLAR CHARTS AND SHADING DEVICES**10 Hrs.**

Introduction to Sun path diagrams - Angles of Incidence - Horizontal and Vertical Shadow angles - Shadow Mask - Exercises on plotting shadow angles on sun-path diagrams, Design of solar shading devices for different orientations.

UNIT 2 DESIGN STRATEGY FOR FLOORS, WALLS AND ROOFS**6 Hrs.**

Building skin thickness - mass surface absorptance - daylight reflecting surfaces - exterior surface colour - floors, walls and roofs- size and orientation, location, materials, shape and colours and layers (windows) - insulation outside - external and internal shading - glass types.

UNIT 3 PASSIVE DESIGN STRATEGIES**7 Hrs.**

Passive heating design strategies - heat loss control - passive solar heating - windows - glazed walls - roof space collectors - transitional spaces - glazed atriums - Passive cooling design strategies - wall and roof openings for convective cooling - natural and architectural means of evaporative cooling - radiative cooling through roof - ground cooling and building underground - transitional spaces - courtyards, patio, veranda.

UNIT 4 DESIGN WITH CLIMATE**7 Hrs.**

Climate data analysis for various zones - hot and dry - hot and humid - warm and humid - moderate - cold and cloudy - cold and dry - composite - climatic context - landscape and vegetation - solar radiation - mean temperature - relative humidity - precipitation - winds - sky conditions - miscellaneous.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Familiarize with the sun as a main design element and imparting knowledge on the sun path diagrams.

CO2: Upgrade the knowledge on heat transfer and the building elements involved in heat transfer of buildings.

CO3: Understand the materials and design strategies involved in design of the roof, walls and flooring.

CO4: Impart knowledge on the passive design strategies for climate responsive and environmentally sensitive buildings.

CO5: Analyse with the climate data and its components for various regions and design strategies implemented in different climatic zones.

TEXT / REFERENCE BOOKS

1. Koenigsberger O.H., Ingersol T. G., Mayhew A. and Szokolay S.V., Manual of Tropical Housing and Building Part1 - Climatic Design, Orient Longman Pvt. Ltd., Chennai, 2004.
2. Martin Evans, Housing, Climate and Comfort, Architectural Press, London, 1980
3. Arvind Krishan, Nick Baker, Simons Yannas, Szokolay S.V., Climatic Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2001.
4. Mark Dekay and Brown G.Z., Sun, wind and Light: Architectural design strategies, 3rd edition, John Wiley and sons, 2014
5. Richard Hyde, Climate Responsive Design: A study of buildings in moderate and hot humid climates, E & FN Spon, London, 2000
6. Vinod Gupta, Energy and Habitat: Town Planning and Building Design for Energy Conservation, John Wiley and sons, 1984
7. David Wright, The Passive Solar Primer: Sustainable Architecture, Schiffer Publishing Ltd., 2008

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1209	MATERIALS AND CONSTRUCTION III	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To understand the basic requisites of RCC structures and their construction techniques
- To appraise the importance of construction methods on damp and water proofing of concrete structures.
- To construct knowledge on the special types of concrete and exposure on building materials and components.

UNIT 1 CONCRETE AND ITS APPLICATIONS**8 Hrs.**

Introduction to reinforced cement concrete, suitability requirements for aggregates, grading of aggregates, reinforcement, admixture - Mix proportioning, batching, mixing, transporting, placing, compaction, Ready Mix Concrete, curing formwork - Quality control, tests for concrete, joints in concrete including role of expansion joint, vacuum dewatering, concrete finishes, Centring, Scaffolding, formwork.

UNIT 2 FRAMED STRUCTURES**10Hrs.**

RCC Columns and Foundations - Different Types of foundations - Detailing of columns - Shallow (Mat and Raft foundation), spread (Square, rectangle, circle, combined, strip and ring foundation), deep (pile, piers, caissons) .Super Structure - Beams, sill level, detailing of apertures (lintels, sunshades, arches etc.) - Roofs (one way slabs, 2-wayslab, continuous, flat slab, coffer slab etc.) – Staircases.

UNIT 3 DAMP AND WATER PROOFING OF CONCRETE STRUCTURE**6 Hrs.**

Construction methods for damp-proofing and water proofing for walls, roofs, basements, retaining walls, swimming pools, sump, terrace floor details - Water tanks, terrace gardening, etc. -Exercises of the above through case studies and drawings. Emulsified asphalt, vinyl, epoxy resins, chemical admixtures, bentonite clay etc.- properties.

UNIT 4 SPECIAL CONCRETE AND ITS APPLICATIONS**6Hrs.**

Construction methods for different types of Special Concrete like Pre and post tensioning and precast concrete - Ferro cement, Lightweight concrete, high density, fiber reinforced polymer concrete. Detailing of Ferro cement water tanks, toilet units, slabs, waffle slab, filler slab, funicular shell, and other precast systems. Design and detailing of building materials and components developed by research organizations like CBRI, SERC, NBO, and BMTPC

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to****CO1:**Acquire the skills and techniques on concrete structures in construction practice.**CO2:**Obtain more knowledge about concrete mix proportion processes.**CO3:**Recognize suitable foundations used in building construction.**CO4:**To interpret the construction methods for damp-proofing and water proofing in various building components.**CO5:**Appreciate the uses of special concrete structure and its applications in construction industry**TEXT / REFERENCE BOOKS**

Arora S.P. and Bindra S.P, A Text Book of Building Construction, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1990

Punmia B.C., A Text book of Building Construction, Laxmi Publications Pvt. Ltd., New Delhi, 2005

Chudley R., Construction Technology, Volume 1, Longman publications 3rd Edition, 1999

McKay W.B, Building Construction, Volumes 1,2 and 3, Orient Longman, UK, 1981

Rangwala S.C, Engineering Materials, Anand Charotar Publishing House, 1982

Shetty M.S, Concrete Technology, S. Chand and company, New Delhi, 1986

Sushil Kumar, Building Construction, Standard Publishers Distributors, 2010

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

Max. 30 Hours

SCI 1803	STRUCTURES STUDIO III	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- Illustrate the types of staircases and footings
- Explore the various types of footing

STUDIO WORK

Drawings of doglegged and open well staircases - Drafting exercises on types of footing, details of reinforcement for isolated square and rectangular footings. - Combined and raft foundation - reinforcement detailing for combined rectangular footing - Under reamed pile with single and double bulb. Pile caps for 2 to 9 group of piles, Types of retaining walls- cantilever and counter type - Drop panel, column capital and PT slab.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Ability to understand staircase types and footing

CO2: Practical understanding on the fundamentals of roof, piles and panels

SAR 1803	CONSTRUCTION STUDIO III	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- To sketch and understand the RCC structures and their construction techniques
- To draft and comprehend the various components in staircase
- To develop knowledge on damp proofing and exposure on building materials and components.

STUDIO WORK

Different Types of foundations- Detailing of columns - Shallow (Mat and Raft foundation),spread (Square spread , rectangle , circle , combined , strip and ring foundation) , deep (pile , piers , caissons) .Super Structure - Beams, sill level, detailing of apertures (lintels, sunshades, arches etc.) - Roofs (one way slabs, 2-wayslab, continuous, flat slab, coffer slab etc.) - Staircases, Exercises of the above through case studies and drawings of selected building types - exercise on damp-proofing and water proofing for walls, roofs, basements, retaining walls, swimming pools , sump, terrace floor details - Water tanks, terrace gardening, etc.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1:To sketch the different types of foundation and its details

CO2:Obtain knowledge to draft different types of slabsand its details

CO3:Drafting and labelling the various components in staircase and its details

CO4:To interpret the construction methods for damp-proofing and water proofing in various building components and sketching it to proper scale

CO5:Exercise on various construction details

SAR4058	DESIGN STUDIO IV	L	T	P	Credits	Total Marks
		0	0	13	9	400

COURSE OBJECTIVES:

- To apply the learning on function and aesthetics acquired during the previous semester.
- The studio helps to develop an Architectural expression which is responsive to the people and environment.

FOCUS

To understand relationship between spaces for a given program and solve the psychological requirements of a small multi room space.

METHODOLOGY PROPOSED

The studio consist of three phases

- Phase I** : Critical analysis of existing designs, along with review of literature will give the students the buoyancy to solve the given program.
- Phase II** : Design Projects will challenge students to explore by experimentation and three dimensional composition of primarily abstract compositions. These activities will make use of a variety of materials and techniques to build a solid base of skills.
- Phase III** : The creation of workable plans and the art of realizing. Legible drawings are made to communicate the vision.

DESIGN INTEGRATION

The knowledge students acquire from Vernacular Architecture course would act as a catalyst for initiating the contemplation process.

Max. 195 Hours

COURSE OUTCOMES:

On completion of the course the student will be able to

CO1 :Understanding the want and need for the activities in the given space.

CO2 :Application of anthropology and spatial data for arriving at requirements of the given space.

CO3 :Imparting knowledge on the design of given space by dissecting the case studies and evolved inferences.

CO4 :Study and analysis of site and surroundings, the relationship of the activity, space and given site for the architectural programme.

CO5 :Knowledge and implementation on climate responsive building design and implementation of passive design strategies.

CO6 :Process of Design evolution, preparation of drawings – plan, elevation and sections and final presentation with renderings.

CO7:Evaluation of the design through creation of miniature models and experimentation of space design and 3D through the explored models.

TEXT / REFERENCE BOOKS

- 1.Christopher W Alexander, A Pattern Language: Towns, Buildings, Construction, Oxford University Press, 1977
- 2.Joseph DeChiara, Time Saver Standard for building types, Mc Graw Hill, 2nd Edition, 1980
3. Alpern A., Handbook of speciality Elements in Architecture, Mc Graw Hill Book, 1982
4. Edward D. Mills, Planning - The Architects Handbook, 10th Edition, British Library Cataloguing in publication Data, 1985
5. Moneo Rafael, Theoretical Anxiety and Design Strategies in the Work of Eight Contemporary Architects, MIT Press, 2005

SAR4059	COMPUTER STUDIO I	L	T	P	Credits	Total Marks
		0	0	3	2	100

COURSE OBJECTIVES:

- To learn the fundamentals of image editing
- To expose the students to various aspects of computer applications into Architectural Design and Construction.
- To acquire knowledge in visual composition, productive techniques and drawing output using computer tools.

UNIT 1 INTRODUCTION TO IMAGE EDITING**12 Hrs.**

Basic Tools for Editing and Creating Graphics in ADOBE PHOTOSHOP - Layers (layer styles opacity- adjustment layers) Basic Retouching (Colour, manipulations, Levels, Curves, Seeing Colour accurately, Patch tool, Cropping, Reading palettes, Dust and scratches) - Advanced Retouching(smoothing skin, smoothing wrinkles, special colour effects: black and white, sepia, grainy).

UNIT 2 INTRODUCTION TO GOOGLE SKETCH UP & LUMION**12 Hrs.**

Importing AutoCAD drawing File in sketch up-Basic Tools for Editing and Creating- Material apply, rendering with advanced VRAY. Importing 3D MODEL in lumion-Basic Tools for Editing and Creating- Material apply, rendering with advanced rendering tool, final walk through making.

UNIT 3 INTRODUCTION TO VISUAL COMPOSITION USING COMPUTER TOOLS**14 Hrs.**

Understanding the drawing unit's settings, scales, limits, drawing tools, drawing objects, object editing and text, dimensioning in ACAD.

UNIT 4 PRODUCTIVE TECHNIQUES & DRAWING OUTPUT**7 Hrs.**

Transparent overlays, hatching utilities, line type, line weight and colour, Multiline, Polyline, etc. Styles, blocks and symbol library in ACAD, File management, retrieving data, attributes, Layout and plotting.

Max. 45 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the tool bar, layers, and the adjustments panel.

CO2: Understand the fundamentals of Google Sketch Up, and begin a new project using tools and concepts necessary to design and draw

CO3: Create drawing that encompasses the AutoCAD skills learned in the class.

CO4: Possess a basic knowledge of the communication needed to operate the system with the use of a computer aided drafting system for the production of drawings.

TEXT / REFERENCE BOOKS

1. Watt A., Fundamentals of Three-Dimensional Computer Graphics, Addis Wesley, Massachusetts, 1989
2. AutoCAD architectural user guide - Autodesk Inc., 1998
3. AutoCAD 2000: A Problem-Solving Approach, Sham tikoo. Pub: ThomsonLearning, 1999
4. Photoshop 7 Bible Professional Edition, Wiley John & Son INC, New York, Deke McClelland, 2000
5. Ralph Grabowski, The Illustrated AutoCAD 2002 Quick Reference
6. Jeffrey Harper, Mastering Autodesk 3ds Max, 2013

FIFTH SEMESTER

SCI 1312	BUILDING STRUCTURES IV	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To comprehend the potential of steel as a material in construction industry.
- To get an understanding of various types of steel sections and methods of joints used.
- To learn the methodology for using steel columns, beams and roof trusses

UNIT 1 STEEL SECTIONS AND JOINTS**10 Hrs.**

Introduction to limit state design of steel structures: concept of Limit state method of design, safety factors, types of steel sections available, Rolled steel sections, properties and uses - Types of Steel Joints: Bolted joints - Design of simple bolted joints for axial tension and compression. (no problems on eccentric joints) - Welded joints - Introduction to welded joints, types of weld- advantages of welded joints - Strength of a fillet weld, Design of simple joints under tension /compression (no problems on eccentric joints)

UNIT 2 DESIGN OF STEEL BEAMS**6 Hrs.**

Introduction to Structural Steel Framing and Steel Spanning Systems - Steel section and Connections and Beams - Design of simple laterally supported beams using I - Sections and channel Section.

UNIT 3 DESIGNS OF COLUMNS**8 Hrs.**

Steel sections and Connections in Columns : Compound and Composite Columns - Column Behaviour under axial load - end conditions - slenderness Ratio, permissible stress - Design using simple section - Design of column bases.

UNIT 4 TUBULAR TRUSS & CONSTRUCTION**6 Hrs.**

Trusses - Different types of tubular trusses, steel sections used for tubular trusses - Analysis and design of individual elements of tubular truss.

Max. 30 Hours**COURSE OUTCOMES:**

On completion of the course the student will be able to

- CO1:** Ability to analyze the interaction between forces and concept of equilibrium.
CO2: Understand various types of steel sections, their applicability and methods of joints.
CO3: Ability to calculate the shear force & bending moment due to loading on simply supported beams.
CO4: Design of steel columns including foundation detail.
CO5: Design of tubular trusses under various conditions.
CO6: Understand the methods of using steel in construction through case studies.

TEXT / REFERENCE BOOKS

1. Krishna Raju N, Advanced Reinforced Concrete Design, CBS publishers and distributors, 1986
2. Duggal S.K, limit state Design of Steel Structures, Tata McGraw Hill Publishing company Ltd. New Delhi, 2010
3. Francis D.K. Ching , Barry S. Onouye, and Douglas Zuberbuhler, Building Structures Illustrated: Patterns, Systems and design, John Wiley and sons, Inc., New York, 2009
4. Subramanian N., Steel Structures - Design And Practice, Oxford Publications, 2010
5. Bhavikatti S.S., Design of steel structures by limit state method as per IS 800 - 2007, I K International Publishing House Pvt. Ltd., 2009
6. Arya A.S. and Ajamani J.L., Limit state Design of Steel Structures, Nem Chand & Sons, Roorkee, 2009

IS CODES

1. IS : 800: 2007 Code of practice for general construction in steel
2. IS 816: 1969 Code of practice for use of Metal Arch Welding for general construction in Mild steel

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1301	HISTORY OF ARCHITECTURE III	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To study about the growth of Islam in India and the world-and its impact on art and architecture in India with specific reference to monuments built.
- To study the events this led to the emergence of Renaissance in Europe.
- To comprehend the rich vocabulary of structural systems, architectural manifestation and critically analyze the built forms and the limitations of the building process.

UNIT 1 EARLY INDO ISLAMIC PERIOD**8 Hrs.**

Advent of Islam in Indian subcontinent, Overview of Development based on political history, Establishment of Delhi Sultanate, Evolution of Architecture under Slave, Khalji, Tughlaq, Sayyed and Lodi dynasties with important examples. Shift of power to the provinces and evolution of Regional Architecture with Examples- Bengal, Gujarat and Malwa, Deccan- Bijapur and Gulbarga with examples.

UNIT 2 INDO ISLAMIC PERIOD**6 Hrs.**

Mughals in India, Evolution of Architecture and Outline of Mughal cities, gardens, shape grammar and fractals, Babur, Humayun, Akbar, Jahangir, Shahjahan, Aurangzeb- Important examples, Decline of Mughal Empire - Cross cultural influences across India and Secular Architecture of the princely states like Oudh and Vijayanagar.

UNIT 3 RENAISSANCE**8 Hrs.**

The Idea of rebirth and revival of Art, Fractals, Architectural character during Early & High renaissance - Study of the life and contribution of the following Architects in brief - Works of Brunelleschi - 'The Dome' of Florence Cathedral - Works of Alberti - Church of Sant' Andrea- Works of Bramante- St.Peter's Basilica (Vatican city) - Works of Andrea Palladio - Villa Capra (Vicenza) - Works of Inigo Jones - Durham's cathedral.

UNIT 4 RENAISSANCE CLASSICISM**8 Hrs.**

Outline the Renaissance in transition, Works of Michael Angelo - Laurentian Library (St Lorenzo, Florence); St. Peter's, Rome Outline the Architectural character - St. Paul's Cathedral; Chateau De Chambord; The Louvre, Paris- Study of the life and contribution of Sir Christopher Wren - Sheldonian Theatre (Oxford); St. Paul's Cathedral (London)- rococo Architecture - interiors – hotels.

Max. 30 Hours**COURSE OUTCOMES:****On completion of the course the student will be able to**

CO1: Construct knowledge on the influence of geography, climate, culture and religious beliefs in eastern and western context.

CO2: Understanding the various architectural terminologies adopted in the Islamic and Renaissance era.

CO3: Acquire the ability to assess and appreciate the evolution of architecture with respect to time around the globe.

CO4: Understanding of how political factors have a bearing on the shape of built forms with particular reference to invasion of Islamic rulers in India and emergence of new architectural style.

CO5: Appreciation of the role of different building materials and constructions techniques used across the globe renaissance period in fabricating new built environment.

CO6: Acquire the ability to comprehend the works of great master during Renaissance period.

TEXT / REFERENCE BOOKS

1. Sir Bannister Fletcher, A History of Architecture, University of London, The Antholone Press, 1986
2. Christopher Tadgell, The History of Architecture of India from the Dawn of Civilization to the end of the Raj, Orient Longman, UK, London, 1990
3. Percy Brown, Indian Architecture (Islamic Period), Taraporevala and Sons, Bombay, 1983
4. Satish Grover, The Architecture of India (Islamic period), Vikas Publishing House Pvt. Ltd., New Delhi, 1981
5. Volwahren, Living Architecture, India (Islamic Period), Macdonald & Co, 1969

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1302	BUILDING SERVICES III	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To understand the physics of sound, its characteristics & behavior both indoors and outdoors.
- To learn the principles of design with particular reference to acoustics in performing spaces.
- To explore the types of mechanical transportation systems and their usage in built environment along with the design parameters.

UNIT 1 INTRODUCTION**8 Hrs.**

Characteristics of sound-reflection, transmission, diffraction, absorption coefficient, reverberation time, geometric acoustics, free field, octave band, Sabine's formula, reverberation time calculation - Sound Absorption - acoustic materials & the properties, variable sound absorbers, prefabricated sound absorbing panels, suspended sound absorbers.

UNIT 2 ACOUSTICS**6 Hrs.**

Outdoor noise - built form, orientation, earth berms, sound shadow region-Indoor noise-measures to prevent sound transmission, leak, impact noise, false ceiling integrated systems & sound isolation

UNIT 3 DESIGN OF PERFORMING SPACES**8 Hrs.**

Design of auditoriums: placing auditorium floors and balcony, stage house details, rear wall treatment, orchestra pit, acoustical defects, sound amplifying systems, Design of Concert halls, open air theatre and Broadcasting studios.

UNIT 4 ELEVATORS & ESCALATORS**8 Hrs.**

Types of Lifts - Basic dimension, Traffic analysis, Roundtrip time, lift pit, machine room, types, lift operation, arrangement of lifts, quality & quantity of service - Escalators - basic dimension, Characteristics, arrangement and disposition-Conveyors and Walk ways.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

- CO1:** Knowledge on Science of Sound including different types of acoustic materials, their properties and design factors in the built environment based on the function.
- CO2:** Comprehend principles of acoustic design and its application in outdoor environment.
- CO3:** Art and Science of designing performing spaces and broadcasting studios with particular reference to acoustics
- CO4:** Methods to avoid sound transmission in interior spaces.
- CO5:** Judicial use of mechanical transportation devices in built environment.
- CO6:** Total understanding of design standards of diverse mechanical transportation systems like elevators and escalators.

TEXT / REFERENCE BOOKS

1. Siraskar K.A., Acoustics in Building Design, Orient Longman Ltd., 1972
2. Kandaswamy S., Architectural Acoustics and Noise Control, Allied publishers Pvt. Ltd., 2005
3. David Egan, Architectural Acoustics, J.Rose publishing classics, 2007
4. Marshall long, Architectural Acoustics, Elsevier academic press New York, 2006
5. William J. Cavanaugh, Gregory C. Tocci, Joseph A. Wilkes, Architectural Acoustics: principles and practice, Second edition, John Wiley & sons, 2009
6. Subramaniam K., Lift Technology- An Insight on Design Basics and its Evolution, EVB, 2010

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1303	URBAN COMMUNITIES AND BEHAVIOUR	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

- To introduce the basic concepts / theories of psychology relevant to architecture and the relationship between man and the environment.
- To construct knowledge on the fundamentals of designing public areas, theories, solutions and policies related to urban design.
- To familiarize the students with housing policies, need, demand and issues related to health and environment.

UNIT 1 INTRODUCTION**08 Hrs.**

Different perspectives on Urban Society - The concept of community, function and types. History of Urban Communities, Development, The fall of Urban Society. Introduction to environmental psychology, its importance in the field of architecture, understanding the principles of psychology, the roots and edges of environmental psychology- Theories and approaches in Environmental Psychology.

UNIT 2 URBAN METROPOLITAN SOCIETY**07 Hrs.**

Development of Urban Metropolitan Society, Projections of Urban population, Growth of Urban Areas, Dynamics of Metropolitan population growth, Contemporary Urban location theories, Lifestyle in city and suburbs, Urban Politics. The city, urban morphology, movement as motivating factor in design, monuments and dwelling, genius loci, street and square, urban conservation, responsive environments, pedestrian spaces and plazas, social life of small urban spaces, new urbanism, landscape urbanism, sustainable urban form.

UNIT 3 COMMUNAL FUNCTIONS - HOUSING, TRANSPORTATION AND HEALTH**07 Hrs.**

Housing Need, Different Housing types, Supply, Demand. Problem of Slums and squatter settlements. Urban transportation system. Health of Urban Population. Water Pollution, Air Pollution, Garbage and solid waste management. Concept of perception, visual perception, theories on environmental perception-environmental perception and design. Concepts of cognition. Environmental cognition and design. Environment and human response in relation to different environmental variables.

UNIT 4 PHYSICAL ENVIRONMENT AND HUMAN BEHAVIOUR**08 Hrs..**

Concept of personal spaces, personal space and human behavior. Personal space and environmental design. Concept of territoriality, territoriality and human behavior & territoriality and environmental design. Residential environment- Concept of Home. Neighborhood concept & Neighborhood satisfaction. Place attachment theory, Work place environment and behavior. Application of the knowledge in design of a residence, community neighborhood and other built environments.

Max. 30 Hours**Course Outcomes:**

CO1: Understanding the importance of environmental psychology in the field of architecture.

CO2: Illustrating the needs of urban society and how morphology plays a role in planning and design.

CO3: Interpreting the requirements of good urban neighbourhoods and public spaces.

CO4: Comparing lifestyle and social mobility of societies in the urban and rural areas.

CO5: Classifying various housing types and their requirements in an urban scenario.

CO6: Evaluating human perception and cognition w.r.t various environmental factors.

TEXT / REFERENCE BOOKS

1. Clifford T. Morgan, Introduction to Psychology, 7th edition, Tata McGraw Hill Publications, New Delhi, 2001
2. Robert G., Environmental Psychology: Principles and Practice, Optimal books, 2002
3. Alan S. Berger, The City: Urban Communities and their problem, Brown Company Publishers, 1978
4. Jake Miller, Edited by Joanne Randolph, Who's who in an Urban Community, Rosen Publishing, 2005
5. Zubir S.S. and Brebbia C.A., Sustainable City VIII, WIT Press, 2014
6. David Rudlin and Nicholas Falk, Sustainable Urban Neighbourhood, Architectural Press, 2009
7. Amos Rapoport, Human aspects of urban form: Towards a Man - Environment approach to urban form and design, Oxford Pergamon press, 1997

**End semester examination question paper pattern
(To be distributed uniformly among all the units)**

Max. Marks: 100**PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR 1304	MATERIAL AND CONSTRUCTION IV	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce the basic concepts of manufactured building materials and their applications in built environment including the techniques of thermal and sound insulation.
- To get an understanding on the terminology and materials used in false ceiling along with details for incorporating lighting and air conditioning.
- To familiarize the students with the methods of construction for a staircase using various materials like timber, steel, glass and composite materials.

UNIT 1 MANUFACTURED BUILDING MATERIALS**08 Hrs**

Plastic: Properties, types and uses as building material - Polymerisation, thermoplastics, thermosetting plastics, elastomers, - Plastics in construction (polythene, poly propylene, polyvinyl chloride, PVC poly-structure, Poly ethylene (Low density and high density), polycarbonate, acrylic flooring, PVC tiles), roof lights, domes, and handrails. Timber: Man-made timber products such as plywood, block boards, engineered wood etc. - Non Ferrous Metals - Different uses of Aluminium - Properties, Finishes (powder coating and anodizing) - Copper Alloys: Properties and uses of Brass & Bronze.

UNIT 2 JOINERY USING ALUMINIUM AND UPVC**06 Hrs.**

Aluminium, and UPVC doors, windows and ventilators - Methods of construction - typical details showing fixing of framing members, glass panes, roller position (in case of sliding window), hinge arrangement (in casement window), locking arrangement and related hardware. Cladding - Construction methods using Aluminium cladding (includes other ACP materials), shop front handrails - Structural Glazing, curtain walls.

UNIT 3 PARTITIONS AND PANELLING**08 Hrs.**

Partitions And Panelling (Timber, Aluminium, UPVC) - fixed partitions, sliding/folding partitions, wall panelling - Exercises of the above through drawings and case studies. Thermal Insulation- Heat transfer and heat gain by materials -vapour barriers and rigid insulation. Blanket, poured and reflective insulation - properties and uses of (spun glass, foamed glass, vegetable fibers, mineral fibers, foamed plastics, and vermiculite and glass fibres) - Cold Storage. Sound insulating and isolating materials, its types and properties - treatment for interior surfaces (Wall, Floor and ceiling) in Auditorium and other sound sensitive spaces.

UNIT 4 FALSE CEILING AND STAIRCASES (COMPOSITE MATERIALS)**08 Hrs.**

False Ceiling - terminology and details - soft boards, acoustic boards, Gypsum (manufacture, properties and uses, hybrid gypsum) on timber and steel or aluminium frame work, details of lighting and air conditioning grid panels, concealed lighting - under deck insulation Staircase - Methods of construction of staircases (timber, steel, glass, composite materials) - basic principles, finishes for staircases.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to**

CO1: A thorough understanding on various types of manufactured building materials including their manufacturing processes and their applications in building construction.

CO2: Ability to choose appropriate manufactured materials for various joineries in buildings including the fixing details.

CO3: Understanding the detailing of various types of partitions and paneling systems using manufactured materials.

CO4: Knowledge on detailing for thermal and sound insulation and its application in interior environment.

CO5: Complete understanding of the false ceiling systems in using manufactured materials including the fixing details incorporation of air conditioning and light systems

CO6: Design of staircases using materials like steel, glass and timber including the design standards and detail.

TEXT / REFERENCE BOOKS

1. Ahuja T. D and Birdie G.S., Fundamentals of Building Construction, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1999
2. Punmia B.C, A Text book of Building Construction, Laxmi Publications Pvt. Ltd., New Delhi, 2004.
3. Boyne, Architects working details, Volumes I, II, III, IV, & V, The Architectural Press, London, 1959
4. Amos Rapoport, Human aspects of urban form: Towards a Man - Environment approach to urban form and design, Oxford Pergamon press, 1997

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SCI 1804	STRUCTURES STUDIO IV	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- To sketch and illustrate the details of steel joinery and truss in construction.

STUDIO WORK

Drawings on types of bolted joints, designed bolted joint - Types of weld and welded joint - Steel in foundation, beams, and columns with column base. - Types of tubular Trusses, connections of various members of tubular Truss - tubular constructions.

Max. 30 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

- CO1:** Illustrate the types of steel joinery in foundation, beams and columns with details through sketches and scaled drawings.
- CO2:** Explore the various types of steel trusses and sections for different spans
- CO3:** Develop supporting system and joinery details using steel for a particular function.

SAR 1804	CONSTRUCTION STUDIO IV	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES

- To develop and strengthen the skills, revolving around the applications of nonferrous materials in construction field with technical information.

STUDIO WORK

Typical details showing fixing of framing members, glass panes, roller position (in case of sliding window), hinge arrangement (in casement window), locking arrangement and related hardware. Cladding - Construction methods using Aluminium cladding (includes other ACP materials), shop front handrails - Structural Glazing, curtain walls. Exercises of the above through case studies and drawings - Partitions And Panelling (Timber, Aluminium, UPVC) - fixed partitions, sliding/folding partitions, wall panelling Thermal Insulation- Heat transfer and heat gain by materials -vapour barriers and rigid insulation.- Cold Storage - Sound insulating and isolating - treatment for interior surfaces (Wall, Floor and ceiling) in Auditorium and other sound sensitive spaces.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Illustrate the construction techniques of manufactured materials and their applications in the built environment.

CO2: Ability to sketch the details of various types of partition and panelling using manufactured material.

CO3: Detailing of thermal and sound insulation and its application in interior environment and performance spaces

CO4: Sketch the false ceiling systems using manufactured materials including the fixing details incorporation of air conditioning and light systems and design for specific application.

SAR 4060	DESIGN STUDIO V	L	T	P	Credits	Total Marks
		0	0	13	9	400

COURSE OBJECTIVES

- To expose the students on services and facilities to be provided to urban communities and train them to deal with the challenges posed in the design of multi-functional public community building in an urban setting

FOCUS

Design of simple medium rise buildings in smaller sites with exploration of form integrated with function incorporating barrier free environment principles.

METHODOLOGY PROPOSED

To expose the students to the issues involved through visits to similar typologies / special lectures / orientation on urban challenges (limitation of land / regulations). Students will be encouraged to approach the problem with a three dimensional approach using study models, 3d sketches, etc. Students will work on manual presentations only.

DESIGN INTEGRATION

Students would be exposed to deal with different projects.

SUGGESTED TYPOLOGIES:

- Shopping arcades / malls / bazaar
- Auditorium / performing centres / museums / gaming parlour / club house
- Marriage halls / community halls / memorial complexes

Max. 195 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Developing an inclination to identify and analyse suitable literature and live case studies appropriate to the design typology

CO2: A thorough understanding of the important local bye laws and Standards applicable to the specific typology

CO3: Developing an appropriate design intent based on notions, ideas with the three dimensional perception as part of design process.

CO4: Integration of the structural grid, parking, services and landscape in architectural design.

TEXT / REFERENCE BOOKS

1. Joseph DeChiara, Time Saver Standard for building types, Mc Graw Hill, 2nd Edition, 1980
2. Donald Watson and Crosbie, Time Saver Standards for Architectural Design, MGH, 2005
3. National Building Code of India, Bureau of Indian Standards, 2005
4. Ernst and Peter, Neufert's Architect's Data, Blackwell publishing professional, 2002
5. Dawson John A. and Lord, Dennis, Nichols, Shopping Centre Development, Policies and Prospects, Nichols, 2005
6. Holme Siedle, James, Barrier Free Design : A Manual For Building Design, Architectural Press, 1996
7. Ham R., Theatres: Planning Guide For Design & Adaptation, Butter Worthy, 2005
8. Lawson F., Congress, Convention & Exhibition Facilities: Planning, Architectural Press, 2005

SAR 4061	COMPUTER STUDIO II	L	T	P	Credits	Total Marks
		0	0	3	3	100

COURSE OBJECTIVES:

- To expose the students to various aspects of computer applications into Architectural Design and Construction.
- To explore horizons of technical advances and advantages of computational technologies through the use of computer modeling, rendering and digital fabrication.
- To experience the built form and environment virtually through computer modeling and design construction.

UNIT 1 INTRODUCTION TO REVIT ARCHITECTURE**09 Hrs**

Introduction to Revit - Building Information Modelling - Interface- Working with a Project- Navigation between Views, Basic Drawing and Editing- General Drawing Tools- Editing Revit Elements.

UNIT 2 MODIFYING TOOLS**12 Hrs.**

Basic Modifying Tools Setting up Levels and Grid - Creating Levels- Importing CAD files- Creating Structural Grids- Adding Columns, Drawing and Modifying Walls- Creating Exterior Shell- Adding Interior Walls, Doors and Windows- Adding Doors and Windows- Loading Families - Creating Additional Part Sizes, Curtain Walls- Creating Curtain Walls- Adding Curtain Grids- Working with Curtain Wall Panels- Adding Mullions.

UNIT 3 COMPONENT TOOLS**12 Hrs**

Creating Views- Duplicating View - Adding Callout Views- Creating Elevations - Creating Sections, Floors- Creating Floors - Shaft Openings - Sloped Floors, Components - Adding Components, Reflected Ceiling Plans - Creating Ceilings - Soffits - Adding Ceiling Fixtures, Roofs - Creating Roofs - Roofs by Footprint- Reference Planes and Work Planes- Roofs by Extrusion, Vertical Circulation - Adding Stairs - Creating Ramps - Working with Railings - Construction Documentation.

UNIT 4 DIMENSIONING & TEXTING**12 Hrs.**

Setting up Sheets - Placing and Modifying Views - Printing Sheets, Annotation - Working with Dimensions - Working with Text - Adding Detail Lines and Symbols, Tags and Schedules - Adding Tags- Rooms and Room Tags - Working with Schedules - Creating Legends, Detailing in Revit - Setting up Detail Views - Creating and Annotating - Details -Keynoting and Keynote - Legends - Patterning..

Max. 45 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: To confidently present the individual's design intent, design process and enhance the presentation skill.

CO2: To generate more design possibilities.

CO3: To visualize designed built form and the environment virtually.

CO4: To manage time effectively.

TEXT / REFERENCE BOOKS

1. Eddy Krygiel, Mastering Autodesk Revit Architecture 2011- Wiley Publishing 2010
2. Phil Read, Mastering Autodesk Revit Architecture 2013
3. James Vandezande, Eddy Krygiel, Autodesk Revit Architecture 2013 essentials, 2013

WEBSITES

1. <http://lumion3d.com/>
2. <http://www.sketchup.com/>

SIXTH SEMESTER

SCI 1313	BUILDING STRUCTURES V	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To construct knowledge on the types of frames, analysis and design of frames in high structures.
- To explore the various types of shell, folded plates, pneumatic and tensile structures.
- To outline various concepts and principles of pre stressing systems and determination of resultant stresses in pre stressed members.

UNIT 1 HIGH RISE STRUCTURES**10 HRS.**

Theory and principles for structural design of high rise structures - Different loads and forces acting on high rise structures - Frame: types of frames, planning layout of frames for high rise buildings - Loads to be considered for design: methods of analysis for vertical and horizontal load - Theory of portal method, cantilever method, substitute frame method - Analysis of single bay frame by portal method for lateral loads and substitute frame method for vertical loads. Long span structures Structural issues - design issues, construction issues - Long span girders, launching and erection details, segmental Construction.

UNIT 2 SHELL, FOLDED PLATES**6 Hrs.**

Introduction to shell structures - various forms and classification of shells - Introduction to folded plates, types of folded plates - Elements of folded plates - structural action on folded plates (no design problems).

UNIT 3 PNEUMATIC AND TENSILE STRUCTURES**6 Hrs.**

Introduction to cable structures, principles of cable stayed bridges, Design principle of Masts and Trestles (no design problems).

UNIT 4 PRE-STRESSED CONCRETE**8 HRS.**

Introduction to pre-stressed concrete, concept and principles of Pre-stressing, materials, types, methods of pre-stressing, pre-stressing Systems - Layout of pre-stressed concrete beams, manufacturing of cast-in situ and pre cast members, application - Determination of resultant stresses at top and bottom of beam sections, estimation of loss of pre stress of PSC members.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to****CO1:** Ability to analyze the interaction of forces on high rise structures.**CO2:** Understand various types and related parameters to be considered in design of long span structures.**CO3:** Comprehend the fundamentals and classification of shells and folded plates.**CO4:** Acquire knowledge on principles of pneumatic and tensile structures.**CO5:** Understand the concepts and principles of pre stressed concrete members and ability to determine the forces acting on such members.**TEXT / REFERENCE BOOKS**

- Barry R., The construction of building, The English Language Book Society and Crosby Lockwood, London 1976
- Ramaswamy G.S., Design and Construction of Concrete shell roofs, Krieger, 1984
- Krishna Raju N., Advanced Reinforced Concrete Design" CBS publishers and distributors, 1986
- Rajagopalan N., Prestressed Concrete, Alpha Science International Ltd; 2nd revised edition, 2005.
- Krishna Raju N., Prestressed Concrete, Tata McGraw-Hill Education, 2006
- National building Code of India 1983, Indian Standards Institution, 1984

IS CODES

- IS 1343: 1980 Design of Pre-stressed Concrete

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A : 2 questions from each unit, each carrying 5 marks.****: 08 x 05 = 40 Marks****PART B : 2 questions from each unit with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SAR1305	MODERN ARCHITECTURE	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To develop an insight into the architecture of Colonial India and the modern era.
- To impart knowledge on the various movements beginning from neo classicism to futurism in architecture.
- To explore the architectural language evolved and developed by various pioneers through well known examples.

UNIT 1 ARCHITECTURE IN COLONIAL INDIA**8 Hrs.**

Colonialism and its impact, Early British Neo-classical Architecture, Indo-Saracenic Architecture and the works of Chisholm, Senate House- Chennai, Victoria Public hall -Chennai, Napier Museum- Trivandrum, Edwin Lutyens' Planning of New Delhi Showcasing Imperial power.

UNIT 2 EARLY MODERN ERA**6 Hrs.**

Neo classicism- Chiswick House, Chateau de Versailles, Works of Boullée and Ledoux, Salt works of Chaux, Napoleonic Cemeteries, Bank of England, Impact of Industrialisation, Construction Materials and Technologies, Industrial Exhibitions, Crystal Palace, Eiffel Tower, Gallery des Machines, Chicago School, Public sector Architecture, Panoptic prisons and London Law Court.

UNIT 3 MODERN ERA**8 Hrs.**

Arts and Crafts Movement - Art Nouveau and the works of Gaudí, Horta, Guimard, Macintosh, City Beautiful movement, Garden City movement, Skyscrapers, Bauhaus, CIAM, Cubism, Constructivism and its influence on Architecture, Adolf Loos and the Arguments on Ornamentation, Futurist Movement, Manifestos and the works of Sant'Elia Expressionism and the works of Mendelson, Taut, Polzeig, Destijl: Ideas and works, Utopian ideas of Paul Soleri.

UNIT 4 INSTITUTIONS, PHILOSOPHIES AND THE MASTERS**8 Hrs.**

Modernism, F.L.Wright, Alvar Alto, Rockefeller center, Le Corbusier, Architecture of Prestige- Eero Saarinen, SOM, Minoru Yamasaki, Paul Rudolph, Oscar Neimeyer, Kenzo Tange, John Utzon, Sullivan, Mies van der Rohe, Toyo Ito.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Acquiring knowledge of Indo Saracenic architecture in Colonial India.

CO2: Ability to understand the ideologies and approaches of neo classicism, arts and crafts movement, art nouveau and industrial revolution.

CO3: Constructing an in depth information on futurism with examples.

CO4: Summarization of the role of different building materials and constructions techniques developed during the modern era.

CO5: Exploring the concepts and approaches adopted by the master architects with examples.

TEXT / REFERENCE BOOKS

1. Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, London, 1994
2. Leonardo Benevolo, History of Modern Architecture, Routledge and Kegan Paul, London, 1971
3. Manfred Tafel / Francesco Dal Co., Modern Architecture, Faber and Faber, Electa, 1980
4. Siegfried Gideon, Space, Time and Architecture: The Growth of a New Tradition, Harvard University Press, 1978
5. Thomas Metcalf, An Imperial Vision, Faber and Faber, London, 1989

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 2 questions from each unit, each carrying 5 marks

: 08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Marks

SAR1306	BUILDING SERVICES IV	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

1. To develop an understanding of the advanced building services such as Air conditioning and fire safety system for multi storey building.
2. To give an insight to the advanced service integration system and their applications in building.
3. To foster the ability to choose appropriate systems and integrate the same in their design projects.

UNIT 1 INTRODUCTION TO AIR CONDITIONING SYSTEMS**8 HRS.**

Introduction to A/C conditions, basic of refrigeration systems, components of refrigeration system, compressor, condenser, control devices, evaporator, filters cooling tower. Vapour compression cycle. Concepts of cooling load, calculation of cooling load-conductivity, transmission heat load, internal heat gain, concepts of zoning, room air distribution-types of outlets

UNIT 2 AIR CONDITIONING SYSTEMS**6 Hrs.**

Types of window and split a/c. Package units, Factory made and split units, centralized plants and chilled water plants, Comparison of various systems-Space requirements for A/c units, AHU's & a/c plant, ducting, testing and maintenance on ducts and pipes.-Designing the Built Environment and selecting the materials and elements for energy efficient Air Conditioning, Protection of Ozone Layer.

UNIT 3 FIRE AND SERVICE CORES**10 Hrs.**

Introduction, fire triangle, methods of fighting fire, Classifying fire, objectives of fire safety, Fire Hazards, fire load, Fire resistance grading, Grading for buildings, fire safety decision tree, Protection for structural components-Fire fighting equipment - alarms, detectors, suppression systems, fire point ,hydrant & hoses – Fire fighting services-Site planning, Fire protection concepts in buildings, design of fire escape routes, design of egress, Requirements for fighting fire in high rise buildings - staircase enclosure, lifts & lifts enclosures, fire lift, basements, air conditioning, dampers. Service cores - Definition, design approach, functions of service core, service core types and placements-Service cores-toilets, elevator, electrical, air conditioning, staircases, exits & life safety considerations.

UNIT 4 SERVICE INTEGRATION**6 HRS.**

Integration of services - Water pump monitoring & control Electrical - power monitoring - fire alarm system –fire fighting system and monitoring - safety and security systems - FAS, PAS - access control system – fire fighter telephone system - CCTV surveillance system - Control of Computerized HVAC Systems - IBMS system and its components.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to**

- CO1:** Construct knowledge of the fundamentals of air- conditioning systems and applications in buildings.
CO2: An understanding of fire safety, fire fighting and prevention systems in building according to building codes in context.
CO3: Acquiring knowledge about fire fighting systems for a high rise building.
CO4: Ability to select appropriate fire fighting systems and their installation.
CO5: Understanding the fundamentals of service cores, its types and placement in a building.
CO6: An insight to the incorporation of IBMS system within a building and inculcate the concepts into their design projects

TEXT / REFERENCE BOOKS

1. Thomas D. Eastop and William Edward Watson, Mechanical services for buildings, Longman scientific and technical publisher, 1992
2. Paul Lang, Principles of Air Conditioning, Delmar publisher, 1995
3. Arora C.P, Refrigeration and Air Conditioning, Tata McGraw Hill, 2000
4. Jain V.K., Fire safety in buildings, New Age International Pvt. Ltd. Publishers, 2010

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A : 2 questions from each unit, each carrying 5 marks.****: 08 x 05 = 40 Marks****PART B : 2 questions from each unit with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SAR1307	THEORIES OF THINKING	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce 'design' as an integral feature of a larger context in the current scenario.
- To familiarize the young minds with the nature of design problems, methodology, creative techniques and the outcomes.
- To explore the various channels to creativity and the directions through which they are expressed in the built form and the environment.

UNIT 1 INTRODUCTION TO DESIGN**6 Hrs.**

Definition of Design, Understanding of Design, Purpose and nature of good design, evaluation of design, types of Design, classification, role of designer, Context for Architectural design problems, design process, stages in the design processes, from different considerations - Broadbent, Christopher Alexander, Wade.

UNIT 2 DESIGN PROBLEMS AND DIRECTIONS**8 Hrs.**

Context for the rise of the Design Methodology Movement, Different approaches in design, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design, different types of designs and the thrust given to the various solutions.

UNIT 3 DESIGN THINKING**8 Hrs.**

Understanding the terms creativity, imagination etc. Theories on thinking, convergent & divergent thinking, lateral & vertical thinking, six hat thinking by Edward de Bono. Creative techniques like checklists, brainstorming etc, design puzzles & traps, blocks in creative thinking. Introduction to various theories in Architecture such as aesthetic theory, proxemic theory. Theory related to human behaviour and environmental design.

UNIT 4 CHANNELS TO CREATIVITY**8 Hrs.**

Types of concepts, process of creativity, tangible and intangible channels to creativity in Architecture - the obscure, metaphors, transformation, paradox, precedents, nature, association with other arts, literal interpretation, materials, geometry, origami, literature and poetry etc. philosophies of famous architects.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Generalizing the spirit of the term 'design' in various contexts from multiple perspectives.

CO2: Understanding the types of design problems, need to decode the brief to evolve 'problem driven outcomes'.

CO3: Ability to compare and synthesize mapped design methodologies in various contexts.

CO4: Critically analyze the different types of thinking and creative techniques in different domains.

CO5: Acquiring knowledge to interpret the various channels to creativity and critically analyze the direction through which the ideas are translated in architectural domain.

TEXT / REFERENCE BOOK

- 1.Christopher Alexander, Pattern Language, Oxford University Press, 1977
- 2.Edward De Bono, Lateral Thinking: Creativity step by step, Harper & Row, 1970
- 3.Geoffrey Broadbent, Design in Architecture, Architecture & Human Sciences, John Wiley & sons, New York, 1973
- 4.James C. Synder and Anthony J. Catanese, Introduction to Architecture, McGraw Hill Inc., 1979
- 5.Anthony C. Antoniades, Poetics of architecture: Theory of design, John Wiley & Sons, Newyork, 1982
- 6.Tom Heath, Method in Architecture, John Wiley & sons, Newyork, 1984

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Marks

SAR1308	MATERIALS AND CONSTRUCTION V	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To introduce different steel components and the applications of steel in building construction.
- To outline the weather proofing in the current scenario.
- To understand architectonics of long span structures

UNIT 1 MANUFACTURED BUILDING MATERIALS - STEEL**6 Hrs.**

Iron: brief study on manufacture, composition, properties and uses of cast iron, wrought iron, pig iron - Steel: Composition, Properties, anticorrosive measures, mechanical and heat treatment of steel - Market forms of steel : Steel for Reinforcement - Hot rolled bars, CTD Bars, TMT bars , Welded wire fabrics; Steel for Pre stressed concrete; Structural steel; Stainless steel, steel alloys, current developments.

UNIT 2 STEEL DOORS/ WINDOWS/ VENTILATORS & TRUSSES**8 Hrs.**

Different types of doors and windows (open able, sliding etc., methods of construction using steel)- Design and detailing of steel rolling shutter. Design and detailing of steel roof trusses (north-light, tubular, butterfly truss etc.,) including construction methods for roof covering using steel, FRP, polycarbonate, cement fibre sheets etc. Visit to steel structure fabrication site.

UNIT 3 LONG SPAN STRUCTURES**8 Hrs.**

Long span roofs using different types and materials (stadium and auditoriums) .Methods of construction using cable structure- principle of cable stayed bridges -space frame structures. Methods of construction using Shell structures and folded plates - various forms and classification of shells and types of folded plates.

UNIT 4 ARCHITECTURAL DETAILING - LARGE GATHERING SPACES**8 HRS.**

Architectural Detailing in public spaces - Fundamentals Geometry Simple Types: Complex Types: Natural Lighting Envelope Landscaping Thermal Control Thermal Control Pressurization and Air Balance Fire Protection/Smoke Control.

Max. 30 Hours**COURSE OUTCOMES:**

On completion of the course the student will be able to

CO1: Exploring the knowledge in steel, creating awareness and applications with various finished materials.

CO2: Comprehending the various types of joineries in steel doors, windows, ventilators and trusses.

CO3: Ability to understand the construction techniques adopted in modern roof covering materials

CO4: Understanding of the construction practices of shell and folded plates.

CO5: Acquiring skill to develop architectural details for building envelopes incorporating lighting, landscape and thermal control measures in public gathering spaces.

TEXT / REFERENCE BOOKS

Punmia B C, Ashok Kumar Jain, Arun Kumar Jain, Comprehensive design of steel structures, Laxmi Publications Pvt. Ltd. 1998

Boyne, Architects working details, Vol. I, II, III, IV, & V, The Architectural Press, London, 1959

Ramaswamy G.S., Design and Construction of Concrete shell roofs, Krieger, 1984

Mohd. Hamdan Ahmad, Mohamad Tajuddin Haji Mohamad Rasdi, Design Principles of Atrium Buildings for the Tropics, University Technology Malaysia, 2000

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SCI 1805	STRUCTURES STUDIO V	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES:

- To illustrate the types of frames and planning layout of frames for high rise buildings.
- To demonstrate the various types of shells, folded plates and the fundamentals of pre stressed components.

STUDIO WORK

Drawings on types of frames, planning layout of frames for high rise - Long span structures Structural - Long span girders - various forms and classification of shells - types of folded plates - Layout of pre-stressed concrete beams.

Max. 30 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Ability to develop frame layout for high rise buildings through drafting and sketching.

CO2: Practical understanding on the fundamentals of shells, folded plates and pre stressed concrete beams.

SAR1805	CONSTRUCTION STUDIO V	L	T	P	Credits	Total Marks
		0	0	2	2	100

COURSE OBJECTIVES:

- To work out various assembly systems and explore possibilities of using steel in construction
- To understand and critically analyse the ways to design space frames, shells and folded plates in through case studies.

STUDIO WORK

Drafting exercise on different types of doors and windows (open able, sliding etc., methods of construction using steel) - Design and detailing of steel rolling shutter. Design and detailing of steel roof trusses (north-light, tubular, butterfly truss etc.) including construction methods for roof covering using steel, FRP, polycarbonate, cement fibre sheets etc. Visit to steel structure fabrication site. Exercises of the above through case studies and drawings - space frame structures. Methods of construction using Shell structures and folded plates - various forms and classification of shells and types of folded plates-Exercises involving the above through case studies and drawing - Architectural Detailing in public spaces - Fundamentals Geometry Simple Types: Complex Types: Natural Lighting Envelope Landscaping Thermal Control Thermal Control Pressurization and Air Balance Fire Protection/Smoke Control.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1:Thorough understanding of joinery details with steel by attempting new details.

CO2:Acquiring knowledge to incorporate FRP, polycarbonate, cement sheets in design.

CO3:Comprehensive understanding of principles and design approaches to be incorporated in shells and folded plates through case studies.

CO4:Analyzing the various construction techniques adopted in the envelope design for large gathering spaces.

SAR4062	DESIGN STUDIO VI	L	T	P	Credits	Total Marks
		0	0	14	9	400
		Continuous Assessment		Univ Viva		Min Pass Marks
		300		100		200

COURSE OBJECTIVES

- To explore the challenges posed in the designing group of buildings in large site and the importance of structure and service integration in architectural creations.

METHODOLOGY PROPOSED

To train the students on the various planning and infra-structure aspects of planning large sites through seminar / special lecture and visits to site.

DESIGN INTEGRATION

Steel & Glass Technology - the previous semesters Building Construction techniques will complement their design.

HVAC & Fire safety measures as per NBC - shall be integrated with the design.

Students would be exposed to a project of a bigger scale with two different stages.

SUGGESTED TYPOLOGIES

- Campus Planning for Institutions of higher learning
- Integrated Townships with residential / Community spaces and work spaces
- Large commercial complexes

Max. 210 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

Design of medium rise large buildings with reasonable complexities in site which are large involving macro level planning and the students will be exposed to the importance of architectural working drawings.

TEXT / REFERENCE BOOKS

1. Joseph DeChiara, Time Saver Standard for building types, Mc Graw Hill, 2nd Edition, 1980
2. Watson, Donald & Crosbie, Time Saver Standards for Architectural Design, MGH, 2005
3. National Building Code of India, Bureau of Indian Standards, 2005
4. Ernst and Peter, Neufert's Architect's Data, Blackwell publishing professional, 2005
5. Wakita/Linde, The Professional practice of Architectural working drawing, John Wiley & sons, 1984
6. Redstone, Louis. G., Institutional Buildings - Architecture of The Contro, MGH, 2005
7. Thompson, Arthur, Introduction To Construction Drawing, Edward Arnold, 2005
8. Donald Watson and Michael J., Time-Saver Standards For Architectural Design Data, MGH, 2005
9. Paul Silver and David Miles, Institutional Architecture, PBC International inc., 2005

SEVENTH SEMESTER

SAR4063	PROFESSIONAL TRAINING	L	T	P	Credits	Total Marks
		0	0	0	12	600

COURSE OBJECTIVES

- To give the student supervised opportunities to experience the essential practical aspects emphasized in an architect's office
- To provide opportunities to apply their acquired skills and knowledge in working life.

FOCUS

As per the norms laid by the Council of Architecture, India, a candidate has to undergo Professional Training for one semester in an approved architectural firm established not less than five years with a registered architect. A student is to undergo this Professional Training during the seventh semester. The evaluation of the performance of the students in Professional Training shall be as per the assessment procedure laid out in clause 12c (vi) in the regulations.

METHODOLOGY PROPOSED

- Procedure for practical training and evaluation mechanism has been evolved in consultation with practicing architects and the feed backs received.
- Monthly report & Final training report - 50% marks University Viva Voce - 50% marks

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Analyzing the strength and the field of interest while choosing the office for doing internship

CO2: Understand the challenges to be faced in the professional life.

CO3: Comprehend the interaction between theory and practice

CO4: Enabling the students to deal with clients, contractors, masons, etc.

CO5: Developing Leadership skills, team work, co-ordination abilities

SAR4064	EDUCATIONAL TOUR	L	T	P	Credits	Total Marks
		0	0	0	2	100

COURSE OBJECTIVES

- To give an opportunity to the students to experience both the contemporary and historical buildings and comprehend the site planning aspects and the context.

FOCUS

An educational tour to the places of architectural interest / building appraisal shall be organized as per the itinerary approved by the department. The documentation shall be done in the form of photographs / slides and sketches, presented in the form of a seminar and written report immediately after the tour / building appraisal. The students will be instructed to submit a Pre-Tour and Post Tour report of the selected zone. The tour will be in the form of choice based anyone state for a group of forty.

There will be a Minimum of two Assessments (pre tour and post tour) for the Educational Tour which carries a total of 50 Marks. Of these 45 marks will be awarded through assignments, documentation which includes drawings, sketches, pictures and report by the tour coordinator. The percentage of attendance secured by the candidate will carry a weightage of 5 Marks, which will be added to the internal assessment Marks of 45 thus making the total of 50 marks. Refer clause 12c (vii) in the regulations for assessment procedure.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1:Appreciating the monumental Architecture

CO2:obtain knowledge in historical construction techniques and materials.

CO3:Understanding and comparing the Architecture of historical and Contemporary buildings

CO4:Analyzing the tangible and intangible factors

CO5:Interpreting the architectural character of the buildings and premises visited.

EIGHTH SEMESTER

SAR1401	INTRODUCTION TO LANDSCAPE ARCHITECTURE	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce the fundamentals of Landscape architecture and landscape design elements.
- To familiarize the students about the evolution of Landscape Architecture across the history.
- To emphasize the various principles, elements and construction techniques of landscape design.
- To strengthen the students knowledge through case studies in Landscape Architecture

UNIT 1 INTRODUCTION TO LANDSCAPE**8 Hrs.**

Introduction to Landscape Architecture - its scope and role in Architecture and Planning-Landscape Interpretation-Landscape as nature, habitat, Artefact, system, problem, wealth, ideology, history, place and aesthetic-Hard and soft landscape elements-Functional and aesthetic consideration in design-Landscape Planning, Landscape Conservation, Urban Landscape.

UNIT 2 HISTORY OF LANDSCAPE ARCHITECTURE**6 Hrs.**

Introduction to landscape historic styles-Mughal gardens of India: Shalimar Bagh and TajMahal, Japanese gardens: Saihoji, Ryoanji & Katsura Imperial palace, Italian Renaissance gardens: Villa Lante At Bagnania, 19th century landscapes - Central Park at America.

UNIT 3 LANDSCAPE DESIGN AND CONSTRUCTION**8 Hrs.**

Basic principles of Landscape Design and the Visual composition-Plant selection-Structural characteristics of plants-Creating spaces with plants-Identification of native trees and Indian shrubs-Elements in Landscape design-Landscape engineering-Cutting and filling-Grading-retaining walls-Drainage-Constructions of verticals, walls, fencing, pools etc-pavements-ponds-fountains-sculpture-steps-ramps-underwater construction-precautions to river bank and coastal constructions

UNIT 4 URBAN LANDSCAPE**8 Hrs.**

Lighting in garden and ponds-Avenue lighting-terrace gardens-Terrace pool-Rock garden.-Landscaping for Residential areas, Children park and Institutional building-Landscape design for water front as road landscaping-avenues, Roof gardens-Landscape design of small project of dwelling level and neighborhood level including paving and street furniture design (area of 2000 to 3000 sq. meters).

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Explore the interactive relationship between humans and their environment.

CO2: Respond with a methodical approach to values and concerns associated with historical and contemporary landscape.

CO3: Develop an understanding of how to utilize the principles and elements of Landscape design.

CO4: Assert the role of Landscape design in ecological balance and impacts of human activities.

CO5: Elaborate on the construction techniques in Landscape Architecture and current practices.

CO6: Demonstrate an understanding of a range of scales from regional planning to garden design.

TEXT / REFERENCE BOOKS

1. Geoffrey and Susan Jellicoe, The landscape of Man, Thames and Hudson, 1987
2. Cliff Tandy Hand Book of Urban Landscape, The Architectural Press, London, 1971
3. John L. Motloch, Introduction to Landscape Design, 2nd edition, John Wiley & Sons, 2001
4. John O. Simonds, Landscape Architecture: A manual of site planning and design, Mc Graw Hill, 1983
5. Theodore D. Walker, Planting Design, John Wiley and sons, Canada, 1991

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1402	SPECIFICATION AND ESTIMATION	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce the fundamentals of specification and estimation in construction of buildings
- To understand and apply techniques, methods to determine the cost involved for various works
- To compare and analyse the various technologies and innovations
- To interpret valuation reports through case studies

UNIT1 SPECIFICATION AND SPECIFICATION WRITING**6 Hrs.**

Necessity & importance of specification, Types of Specification - Specification writing, Principles of Specification writing - Important aspects of the design of specification - sources of information - Classification of Specification - Brief Specification for 1st class, 2nd class, 3rd 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.

UNIT 2 ESTIMATION**10 Hrs.**

Types & purpose of estimation - Approximate estimate of buildings - Bill of quantities - 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 - 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.

UNIT 3 RATE ANALYSIS**8 Hrs.**

Analysis of rates for main items of work using current market rates for materials, labour, plants, tools and equipment, transportation, handling, storage and contractor's profit - Preparing rate analysis for P.C.C, R.C.C, brick work, stone work, plastering and finishes.

UNIT 4 ECONOMICS AND ARCHITECTURE**6 Hrs.**

Economics as a determinant to Architectural land & Built form - Construction Technology - Materials, technology, innovations, Labour - Site selection factors - Demand survey - Cost & sale value (guided by market)-Feasibility study and Government Proposals - Methods of contracting and its link to specification drafting - Business Environment and structure in practice - Valuation, depreciation and its implications - case studies.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Identify the importance of specification and estimation in construction

CO2: Categorize detailed specification and estimation for all stages of construction

CO3: Determine the rate analysis for various items of work involved

CO4: Compare and contrast construction technology and innovation

CO5: Integrate the knowledge learnt in preparing valuation reports

CO6: Justify market value based on current scenario

TEXT / REFERENCE BOOKS

1. Rangwala S., Estimating and Costing (Professional practice), Anand Charotar Publishing House, 1990
2. Estimating, Costing, Specification and Valuation in Civil Engineering, M. Chakraborti, 2006
3. Dutta B.W., Estimating & Costing, UBS Publishers Distribution Pvt. Ltd., India, 1991
4. Gurcharan Singh and Jagdish Singh, Estimating Costing and Valuation, Standard Publishers Distributors, 2012
5. Tamilnadu Building Practice, Volume I, Government Publication
6. P.W.D Standard Specifications and Schedule of rates, Government Publication

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1403	URBAN DESIGN	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce the determinants of urban form and study how the urban form of cities have changed over the years.
- To familiarize the students about the various urban design theories and their significance in present day context.
- To expose the students to the application of various urban design principals and initiatives through case studies.
- To introduce the students to the various stakeholders and their role in urban design initiatives.

UNIT 1 INTRODUCTION AND HISTORY OF URBAN FORM**8Hrs.**

Relationship between Architecture, Urban Design and City planning, Evolution of cities-prehistoric, classical, medieval, renaissance, industrial, modern, colonial & postcolonial and post-world war II urban projects, zoned city and its critics, inclusive urbanism, contemporary urban form, Comparative analysis of public spaces, their organization, location, distribution in towns

UNIT 2 URBAN DESIGN THEORY**7Hrs.**

The city, urban morphology, movement as motivating factor in design, Urban Design theories - monuments and dwelling, genius loci, street and square, urban conservation, collage city, responsive environments, checklist for pedestrian spaces and plazas, social life of small urban spaces, new urbanism, landscape urbanism, sustainable urban form and transit oriented development.

UNIT 3 PRACTICE THEORY**7Hrs.**

Urban Design as public policy, Case studies of contemporary cities, new towns, new urbanist settlements, transit villages, urban infill projects, public place making projects, eco and sustainable projects, brownfield and adaptive re use developments.

UNIT 4 URBAN DESIGN POLICY**8Hrs.**

Urban renewal policy, scope and challenges-Role of planning agencies, Government and quasi government agencies, urban project finance corporations and their role- existing legal framework for urban growth in residential, commercial, recreational and mixed use sectors, opportunities and limitations- urban design charettes - public participation in urban design - Emerging global policy practices for sustainable, equitable urbanism.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to**

CO1: To perceive or understand the relationship between various aspects of Architecture, Urban Design, Town Planning and the Environment.

CO2: To understand evolution of urban form over the years with relevant theories and case studies.

CO3: Compare different urban design theories and concepts and understand its application in real world scenarios in development of urban spaces.

CO4: To comprehend the role of different stakeholders including planning and government agencies in framing urban policy and its impact on development pattern.

TEXT / REFERENCE BOOKS

1. Morris A. E. J., History of Urban form: Before the Industrial revolutions, Rutledge , 1994
2. Spreiregen Paul D., Urban Design-The Architecture of Towns and Cities, Mc Graw Hill Book Company, Newyork, 1965.
3. Gordon Cullen, The Concise Townscape, Van Nostrand Reinhold, New York, 1961
4. Jan Gehl, Life between buildings: Using Public space, Island Press, 2011
5. Michael S. Bernick and Robert B. Cervero, Transit Villages in the 21st century, Mc Graw Hill Companies, Newyork, 1996
6. Edmund N. Bacon, Design of Cities Thames and Hudson, London, 1967

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR1405	CONTEMPORARY DIRECTIONS IN ARCHITECTURE	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To introduce the various concepts / theories of architecture Modernism.
- To construct knowledge on the fundamentals of design process & sustainable logics in architecture.
- To familiarize the students with the works & ideology of master architects in India.

UNIT 1 CRITIQUING MODERNISM**6Hrs.**

Brutalism - Archigram, Constructivism, Deconstructivism, Writings of Jane Jacobs - Kenneth Frampton, Robert Venturi - Christopher Alexander, Charles Jencks.

UNIT 2 WORKS OF THE MASTERS IN INDIA**7Hrs.**

Chandigarh and Bhubaneshwar experiments - Le Corbusier, Koenigsberger, Louis Khan, Nari Gandhi, Baker, B.V.Doshi, Achyut Kanvinde, Charles Correa, Anant Raje, Uttam Jain, Joseph Allen Stein, Raj Rewal, Hasmukh Patel, Bimal Patel, Nimish patel, Karan Grover, Laurie Baker.

UNIT 3 CONTEMPORARY TRENDS IN INDIAN CONTEXT**7Hrs.**

Works and ideas: CNT, Sen Kapadia, Gerard da Cunha, Mistry Architects, Sanjay Mohe, Rahul Mehrotra, Chitra Vishwanath, Yatin Pandya, Satprem Maini, Ashok B Lall, Aravind Krishnan, Dean d' Cruz, Manit Rastogi.

UNIT 4 SUSTAINABLE LOGICS AND DESIGN PROCESSES**10Hrs.**

Post modernism - Cesar Pelli, Mario Botta, sustainable logics, Eco aesthetics- Meaning of fold, birth of blob- Frank Gehry, Santiago Calatrava, Zaha Hadid, Peter Eisenman, Greg Lynn, Eco cultural- Hassan Fathy - Geoffrey Bawa, Eco technical - Kenneth Yeang, Renzo-piano, Norman Foster, Eco centric- Shigeru Ban, Jeanne Gang, Michael Reynolds, Eco social - Ralph Erskine, Eco medical- Christopher Day.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Understand the various critiquing of modernism.

CO2: Relate various theories & writing of the architecture around the world.

CO3: Criticize & appraise the works of the masters in India.

CO4: Interrelate various master planning experiments in India.

CO5: Interpret and analyze ways adopted the contemporary trends of Indian context by Indian contemporary architects.

CO6: To express importance of Post modernism, co aesthetics, Eco cultural, Eco centric in their design process.

TEXT / REFERENCE BOOKS

1. Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, London, 1994
2. Christopher Alexander, Sara Ishikawa and Murray Silverstein, A Pattern Language, Oxford University Press, 1977
3. Robert Venturi, Complexity and Contradiction to Architecture, Museum of Modern art, 1977
4. Charles Jencks, Architecture 2000 and Beyond, John Wiley & Sons, Newyork, 2000

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR4065	DESIGN STUDIO VII	L	T	P	Credits	Total Marks
		0	0	18	12	600
		Continuous assessment		Univ viva		Min pass marks
		450		150		300

COURSE OBJECTIVES

- To expose the students to issues, challenges in the design of Industrial buildings and large built forms involving alternative construction materials and technology.
- To orient the students on the need for creating sustainable urban environment through sound Green building Principles.
- To understand the various green rating systems and procedures involved in it

FOCUS

Exploration of architectural design and form using alternative materials / technologies and Green Building Techniques.

METHODOLOGY PROPOSED

- To conduct workshop on sustainable architecture.
- To organize site visits where Green Building Principles are consciously adopted.
- Visit to Industrial complexes.

DESIGN INTEGRATION

Experience gained through Practical Training

SUGGESTED TYPOLOGIES

- Industrial Complexes
- Sports Complex involving Stadium Buildings
- Cost effective Housing

Max. 270 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

CO1:Acquiring knowledge in designing of industrial buildings

CO2:Understanding alternative construction materials and technology

CO3:Identifying the various technology for long span structures

CO4:Insight of various green rating systems in today's context with respect to context and typology

CO5:Integrating sustainable urban environment with green principles

TEXT / REFERENCE BOOKS

- Joseph DeChiara, Time Saver Standard for building types, McGraw Hill, 2nd Edition, 1980
 Donald Watson and Crosbie, Time Saver Standards for Architectural Design, MGH, 2005
 Joseph DeChiara; Julius, Time-Saver Standards for Housing And Residential Development, MGH, 2005
 National Building Code of India, Bureau of Indian Standards, 2005
 Ernst and Peter, Neufert's Architect's Data, Blackwell publishing professional, 2005
 Peter Sturzebecher and Ulrich, Architecture for Sport, Wiley - Academy, 2002
 Franziska Nauck, edited by Van Uffelen, Chris, Stadiums, Page One, 2006
 James B., Fundamentals of Landscaping and Site Planning, the Avi Publications, 2005
 Joseph N. Sabatini, Building & Safety Codes for Industrial Facilities, Brikhauser, 2004
 Booqs, Green Living: Sustainable Houses, Booqs, 2009

NINTH SEMESTER

SAR 1501	PROFESSIONAL PRACTICE AND ETHICS I	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To expose of the important legal aspects and legislations practice and profession.
- To enable the students to understand the important laws and acts relevant to architecture.
- To construct knowledge on emerging trends in the practice of sustainable architecture, role of foreign architects.

UNIT 1 INTRODUCTION**8 Hrs**

Importance of Architectural Profession - Role of Architects in Society - Career options open for Architects- Prerequisites for Private Practice - Types of practices (Partnership/ Proprietary Concern /Associate - Architect's office and its management - Location, Infrastructure requirement - organizational structure, Basic accounts - Legal requirements, Registration of Firm, Tax Liabilities, Relationship with clients, contractors, Associate consultants and product Manufacturers.

UNIT 2 CODE OF CONDUCT AND ETHICS**8 Hrs**

Role of Professional Body (The Indian Institute of Architects) History, Objectives, its relevance - Architects Act 1972 (Background, intent, objectives)- Council of Architecture (role and function with regard to Architectural practice) - Registration of Architects - Importance of Ethics - guidelines prescribed for professional code of conduct -punitive action for professional misconduct.

UNIT 3 STATUTORY PROVISIONS GOVERNING ARCHITECTURAL PROVISIONS**8 Hrs**

Important Acts and Regulations governing the design of buildings- (Town & Country Planning Act, Consumer Protection Act, Copy Right Act, Persons with Disabilities Act, Coastal Regulation Zone Act, Heritage Act, Land Acquisition Act, Factories Act, Cinema Act)-Master Plan Provisions and Development regulations with reference to CMDA -Planning norms and Building Rules-Role of Planning Authority and local body - Building Approval process.

UNIT 4 EMERGING TRENDS**6 Hrs**

Meaning of GATS - Globalisation and its impact on architectural profession - Entry of Foreign Architects and their impact in Indian Architectural practice - Information Technology and its impact -specialisation in the field of architecture - Green Buildings and the governing laws.

Max. 30 Hours**COURSE OUTCOMES****On completion of the course the student will be able to****CO1:** Understand the role of architects in society.**CO2:** Holistic understanding of legal requirements for managing an office and type of practices.**CO3:** Acquire knowledge on various acts, development regulations, planning norms and building rules.**CO4:** Comprehend the building approval process.**CO5:** Figure out the role of foreign architects working in collaboration with local architects.**CO6:** Enable the young minds to adopt green building strategies in design**TEXT / REFERENCE BOOKS**

1. Handbook of Professional Practice, IIA Publications, India
2. Roshan Namavati, Professional practice, Lakhani Book Depot, Mumbai 1984
3. Apte V.S., Architectural Practice and Procedure, Mrs. Padmaja Bhide, 2008
4. CMDA, Second Master Plan, 2026, CMDA Publications, 2008
5. Architects Act 1972, Council of Architecture, 2011
6. Krishnamurthy K.G. and Rvindra S.V., Professional Practice, PHI Learning Pvt Ltd, Delhi, 2014
7. Handbook of professional Documents, Council of Architecture, 2011

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1502	ARCHITECTURAL CONSERVATION	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To develop a comprehensive knowledge about Conservation and its importance in today's context.
- To enhance the skills of the graduate to understand various principles and practices in the field of architectural conservation.
- To familiarize the students with an overview of best practices in conservation charters, various conservation processes, techniques and skills through case studies.

UNIT I INTRODUCTION TO CONSERVATION**6 HRS.**

Definitions of conservation, Need for Conservation, Approaches, Indian context - history and principles of conservation - Role of Conservation architect, ethics and values of Conservation.

UNIT 2 CONSERVATION LEGISLATION**8 HRS.**

Charters and Principles: Preserving Cities and Towns - International Charters, Venice to Mexico - Central and State Government Policies and legislations - Various Agencies and their role in conservation - Role of ASI, INTACH & IHCN - Problems of living cities in conservation practices.

UNIT 3 CONSERVATION OF HISTORIC BUILDINGS**8 HRS.**

Criteria for identifying historic buildings - guidelines for conservation - Documentation, analysis and investigation of existing condition [surveys, inventory and analysis] in terms of historical and architectural conservation - Concepts and techniques for building conservation - Structural survey reports analysis and synthesis for historical and architectural intervention in the structure listing of faults, repair and alterations - Material conservation

UNIT 4 CASE STUDIES**8 HRS.**

Indian Case studies - analysis, methodology and proposals, Tajmahal- Agra, Senate House, Chennai, Ruins of Hampi, Conservation methods adopted in Mamallapuram, Kanchipuram, Case studies in urban settings-Ahmedabad, Hyderabad, Champaner, Madurai, Puducherry. International Case studies - Conservation methods adopted for leaning tower of Pisa, World Heritage sites, UNESCO etc.

COURSE OUTCOMES:

On completion of the course the student will be able to

CO1: Classify and understand various processes involved in conservation practices and understand the cultural and technical background behind the same.

CO2: Understand and appreciate various documentation techniques and its importance in conservation process.

CO3: Compare and determine the limitation in preserving a building, settlement, part of a building with reference to its historical background and authenticity.

CO4: Demonstrate about different concepts and techniques adopted in different regions, with reference to identified case studies.

CO5: Examine architectural and historical intervention in conservation process.

CO6: Interrelate and communicate the analysis, methodology and proposal adopted in various buildings.

Max. 30 Hours**TEXT / REFERENCE BOOKS**

- Bernard Feilden, Guidelines for Conservation, a Technical Manual, INTACH, New Delhi, 1989
- Bath, A Study in Conservation, HMSO Publication, London, 1977
- Benny Kuriakose, Nupur Prothi Khanna and Malvika Baja Saini, Guidelines for Preparation of Heritage Management Plan INTACH, 2012
- Pamela Ward, Conservation and Development in Historic Towns and Cities, Ohrid Press Ltd., 1968
- Shyam Chainani, Heritage Conservation: Legislative & Organizational Policies for India, INTACH, 2012
- Worskett Roy, Character of towns an Approach to conservation, Architectural Press, London, 1979

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1503	URBAN AND REGIONAL PLANNING	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course Objectives:

- To give an introductory and over all understanding of the relationship between Architecture and urban and regional planning
- To construct knowledge on various aspects involved in the planning and development of cities and regions.
- To explore the holistic understanding of regional planning in Indian context.

UNIT I REGIONAL PLANNING**6 HRS.**

Types of Region - Regional Policies - Principles & Methodologies of Regional Planning - Constraints & factors for consideration for regional plans - Need for regional planning - delineation of planning regions by various techniques.

UNIT 2 REGIONAL PLANNING TECHNIQUES**10 HRS.**

Need and significance of Infrastructure as related to design of buildings - Design, Planning & Application of management systems for infrastructure development - Monitoring & Implementations - Regional analysis- Input output analysis - growth model, core periphery model, industrial location theory, agricultural land use model, Spatial structure of region - central place theory, growth pole and growth centres

UNIT 3 URBAN PLANNING**6 HRS.**

Types of Plans - Perspective Plan, Structure Plan, Master plan, Comprehensive Plan, Detailed Development Plan, City Corporate Plan, Business Plan - Its Scope & Contents -Data Collection - Future proposals & Policies - Land Use Maps - Development Regulations & Bye laws - Limitations- Case studies.

UNIT 4 REGIONAL PLANNING IN INDIA AND PLANNING NORMS**8 HRS.**

Regional planning in India - Multi level planning District planning, special area, Development Programme and schemes, Regional planning as a tool to integrate rural and urban areas - Planning norms and development norms for urban and Regional approaches techniques of development for existing areas, renewal schemes and development. Detailed survey and preparation of questionnaire for land use, socio economic, Transportation planning etc.

Max. 30 Hours**Course Outcomes:**

On completion of the course the student will be able to

- CO1:**Classifying the types of regions and factors to consider for their planning.
CO2:Understanding the models, techniques and theories required in regional planning.
CO3:Listing the various types of urban plans with their scope and contents.
CO4:Evaluating regulations and byelaws of development through case studies.
CO5:Outlining the Indian scenario of urban and regional planning.
CO6:Applying techniques learnt to surveying for various types of planning.

TEXT / REFERENCES

1. Anthony James Catanese and James C.Snyder, Urban Planning, Mc Graw Hill, Newyork, 1988
2. Chand Mahesh and Puri.U.K., Regional Planning in India, Allied Publishers, 1983
3. Isward Walter, Methods of Regional Analysis-An Introduction to Regional Science, MIT Press, Cambridge, 1960
4. Misra R.P., Sundaram, Regional Planning in India, Allied Publishers, 2010
5. Peter Hall, Urban & Regional Planning, Routledge, Taylor & Francis Group, London, 2002
6. Rame Gowde K.S., Urban & Regional Planning, Prasaraanga University of Mysore, 1972

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**PART A : 2 questions from each unit, each carrying 5 marks.****PART B : 2 questions from each unit with an internal choice, each carrying 15 marks****Exam Duration: 3 Hrs.****: 08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR4066	DESIGN STUDIO VIII	L	T	P	Credits	Total Marks
		0	0	18	12	600

COURSE OBJECTIVES

- To facilitate the students to explore issues, challenges in the design of Industrial buildings and large built forms involving alternative construction materials and technology.
- To orient the students on the need for creating sustainable urban environment through sound Green building Principles.

FOCUS

Urban Design factors which have an influencing effect on Architecture and the impact of construction technology on urban context will be the focus.

METHODOLOGY PROPOSED

- To conduct a joint studio with institutions willing to partner.
- Special lectures from Urban Designers/ Planners, Practitioners / Construction Technology Experts

DESIGN INTEGRATION

- All services for high rise building along with the structure shall be integrated with the design.
- All Urban planning principles shall be integrated with any selected urban context for renewal.

SUGGESTED TYPOLOGIES

- Design of High rise / High density buildings
- Detailed investigation of a part of an urban area

Max. 270 Hours

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Fostering the young minds to familiarize the construction techniques alternate construction materials.

CO2: Facilitating the students to gain knowledge on theories related to urban design constructively.

CO3: Holistic understanding of data collection, mapping and analysis of a part of an urban area.

CO4: Integration of structural system, parking, services and landscape in the identified / proposed typology in a specific context.

CO5: Identify and design a typology appropriate to the context.

TEXT / REFERENCE BOOKS

1. Joseph De Chiara, Time Saver Standard for building types, McGraw Hill, 2nd Edition, 1980
2. Donald Watson and Crosbie, Time Saver Standards for Architectural Design, MGH, 2005
3. Joseph De Chiara, Julius, Time-Saver Standards for Housing And Residential Development, MGH, 2005
4. National Building Code of India, Bureau of Indian Standards, 2005
5. Ernst and Peter, Neufert's Architect's Data, Blackwell publishing professional, 2005
6. Antony Wood, Best Tall Buildings, Elsevier, 2008
7. Viswanath H.R., Tolloczk J. and Clarke J.N., Multi Purpose Highrise Towers And Tall Buildings, E & FN Spon, London, 2005
8. Ken Yeang, Eco Skyscrapers, Images Publishing, 2007
9. Ken Yeang, Service Cores: Detail in Building, Wiley - Academy, 2005

S21 PROJ1	DISSERTATION AND PRE THESIS	L	T	P	Credits	Total Marks
		0	0	4	3	200

COURSE OBJECTIVES

- To do a Research and document different aspects of architectural program- Method of construction, advance technology (concrete and steel), advances building services, climatology, theory of structures studied till the previous semester.

METHODOLOGY PROPOSED

1. Dissertation on a topic (project) will be approved for each student and each student shall carry out dissertation considering the following aspect: Method of construction, advance technology (concrete and steel), advances in building services, climatology, theory of structures studied till the previous semester.
2. Students shall submit the choices of their topic (three topics to be given by the Student) for dissertation in consultation with the Coordinator
3. An internal guide to each student will be allotted for supervising His/ Her dissertation work. The students with the approval of the guide may commence their dissertation work during this semester. The Schedule / Mode of presentation of their work at Preliminary, Intermediate and Final stage with the split-up of Continuous assessment marks pertaining to each stage shall be published. The students under the guidance of their respective guides shall independently carry out their dissertation.
4. The Pre thesis study may also be in continuation of the Dissertation done or a new topic approved from the selected list of synopsis submitted by the student through the review panel.
5. The study shall be derived from a Book review, Special study, Literature Study, Case Study & Standards Study, Architect's interview, etc.
6. The students need to do detailed analysis and inference of different design approaches by various Architects in different contexts.
7. The final Design Program for the Thesis need to be finalized along with the Site Analysis. The concise report (A3 sheets - max of 25 sheets spiral bounded) need to be submitted. This would be reviewed and evaluated by examiners appointed by the University.
8. For detail split up of marks refer clause 12c (viii) in the regulations.

Max. 60 Hours

TENTH SEMESTER

SAR 1504	PROFESSIONAL PRACTICE AND ETHICS II	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To develop a comprehensive knowledge about architectural competitions.
- To construct knowledge on various practices related to easement and tender documents.
- To familiarize the students with an overview of new trends in project execution.

UNIT I ARCHITECTURAL COMPETITIONS**6 Hrs**

Importance of Architectural competitions - Types of competitions (open, limited, ideas competition) - Single and two stage competitions - Council of Architecture guidelines for conducting Architectural competitions -Code of Conduct for Assessors and Participants - Case studies.

UNIT 2 EASEMENTS & TENDER**8Hrs**

Easements - meaning, types of easements, bearing of easements in architectural design - acquisition, extinction and protection of easements. Tender - Definition - Types of Tenders - Open and closed tenders - Conditions of tender- Tender Notice - Tender documents - Concept of EMD - Submission of tender -Tender scrutiny - Tender analysis - Recommendations - Work order - E-tendering (Advantages, procedure, conditions).

UNIT 3 CONTRACT & CERTIFICATES**8 Hrs**

Definition - Necessity of contract - Contents of Contract Document (Articles of Agreement, Terms and Conditions, Bills of Quantities and specification, drawings, Appendix), types of contracts - Certification of Contractors' Bills - Various types of certificates and procedures to be adopted, importance of Final bill. Defects -Liability period - penalty Clauses.

UNIT 4 LIABILITY, ARBITRATION AND NEW TRENDS IN PROJECT EXECUTION**8 Hrs**

Types of Liability, Professional Duties and Conduct of architects as per Council of Architecture, Professional Negligence, Deficient service and Exceptions, Insurance, Examples of Cases, Arbitration (Definition, Advantages of arbitration, Sole and joint arbitrators, Role of umpires, Award, Conduct of arbitration proceedings) - Arbitration clause in contract agreement (role of architect, excepted matters).New trends in Project Execution - Understanding of BOT,BOLT,DBOT,BOOT - Role of project Managers -charging role of architect in large projects.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: To understand the importance of architectural competitions in the field of architecture profession.

CO2:To comprehend and appreciate the rights of easement in architectural design.

CO3:To be familiar with the tender documents.

CO4:Synthesize the need and necessity of contract document and types of contract in architecture profession.

CO5:To interpret and analyze the professional duties and conduct as per guidelines of COA

CO6:Acquiring skill relating to new trends and role of architects in large projects.

TEXT / REFERENCE BOOKS

1. Handbook of Professional Practice, IIA Publications, India
2. Roshan Namavati, Professional practice, Lakhani Book Depot, Mumbai 1984
3. Apte V.S., Architectural Practice and Procedure, Mrs. Padmaja Bhide, 2008
4. CMDA, Second Master Plan, 2026, CMDA Publications, 2008
5. Architects Act 1972, Council of Architecture, 2011
6. Krishnamurthy K.G. and Rvindra S.V., Professional Practice, PHI Learning Pvt Ltd, Delhi, 2014
7. Handbook of professional Documents, Council of Architecture, 2011

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

S21 PROJ2	THESIS	L	T	P	Credits	Total Marks
		0	0	26	17	800

COURSE OBJECTIVES:

To deal the design problem in a real life like situation.

METHODOLOGY PROPOSED

- Students will be encouraged to approach the design problem identified by him/her in a systematic way with guidance from a Supervisor on a one to one basis.
- There shall be five continuous assessments during the semester by the review committee comprising of The Internal thesis coordinator, internal guide and External guide. The stages are:

STAGE I: Concept and Site Zoning along with the previous semester Pre Thesis report and study sheets to be presented.

STAGE II: Conceptual sketches, models, plans, sections, elevations.

STAGE III: Scheme I of the Architectural Drawings

STAGE IV: Scheme II of the Architectural Drawings

STAGE V: Pre- Final stage

STAGE VI: Final University Viva Voce

- The review marks obtained in the five assessments shall be taken into account for the internal marks. A jury comprising of internal and external examiners shall conduct the final Viva-Voce examination of the Architectural Thesis/Project in the institution at the end of the Tenth semester as a University Viva Voice. The total marks scored shall be the sum of marks secured in the continuous assessments and the final university viva-voce examination. For detail split up of marks refer clause 12c (ix) in the regulations.
- Each student is required to submit two hard copies of the report along with a soft copy of the report and sheets. The report shall be based on the literature review, Case Study analysis and inferences, Standards, Site Analysis, Requirements and area statements along with the concepts, design processes and the final design.

LIST OF ELECTIVES DEPARTMENT ELECTIVES

SAR1601	ARCHITECTURAL JOURNALISM	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

- To introduce the fundamentals of journalism.
- To understand the role of technologies and presentation techniques in architectural journalism.
- To outline various works of architectural journalists, interpret the strategies adopted and develop new directions.

UNIT 1 INTRODUCTION**6 Hrs**

Introduction to journalism, Subfields within Journalism, Key concepts and objectives of Journalism - Introduction to architectural journalism, skills needed, reporting, writing, editing, photography, columnists, public relationships, criticism.

UNIT 2 TECHNOLOGIES IN JOURNALISM**8 HRS.**

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, theories of journalism, Introduction to architectural 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.

UNIT 3 PRESENTATION TECHNIQUES**8 HRS.**

Text preparations, Mode of presentation, Standards and Guidelines for documentation, Code of ethics, Basic knowledge on Press laws, Press Council of India, Public Debate, Navigating Information Networks for Mass Media with relevance to searches on Architectural topics, User generated contents for analysis of various issues on Architecture, creating an online forum and platform for exchange of ideas and information, to critically contrast outputs of selected individual pieces of journalism.

UNIT 4 IMPLICATIONS FOR ARCHITECTURAL DESIGN**8 HRS.**

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 critically appraise selected individual pieces of journalism.

Max. 30 Hours**Course Outcomes:****On completion of the course the student will be able to****CO1:**Understanding the objectives of journalism and skills required for the same.**CO2:**Analysing and critically thinking about the effects of architecture on society as well as the tools to enable recording of the same.**CO3:**Illustrating the fundamentals of writing and presentation, explain different strategies and their criticism**CO4:** Interpret the ideologies of the architects, interior designers and comprehend the various schools of thought.**CO5:**Analysing recent historical and contemporary examples of written and journalistic criticism of architecture.**CO4:**Analysing major critical themes, thematic categories in architectural writing over the past three centuries.**TEXT / REFERENCE BOOKS**

1. Somerset Maugham, Summing up, Penguin Books, 1992
2. Stephen Leacock, How to write, Dodd Newyork, 1943
3. Tony Horcup, Journalism: principles and practice, Sage Publications, 2004
4. Mohammad al-Asad w/ Majd Musa, Architectural Criticism and Journalism, Umberto Allemandi, 2007

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1602	ARCHITECTURAL PHOTOGRAPHY	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

- To give an insight to the fundamentals of general photography.
- To foster knowledge on the importance of lighting and associated psychological effects.
- To give an overview of the principles and laws involved in framing views.

UNIT 1 INTRODUCTION**6 HRS.**

Introduction to architectural photography, interpretation and creation, Recording mediums - film and digital, specialist hard ware for image capture, black and white, colour photography, basics of composition.

UNIT 2 FUNDAMENTAL OF PHOTOGRAPHY**8 HRS.**

Fundamentals- focal length, aperture, exposure, aperture, shutter speed, recording medium, exposure meters, automatic & Techniques, film speed, contrast, Characteristics of lenses-viewing angle, Types of lens, depth of field, resolution and distortion, multiple exposures..

UNIT 3 EXTERNAL LIGHTING**8 HRS.**

Understanding light and photography, External lighting- Direction of lighting - front, side, back, shadows, texture, and effects of clouds, light modification, psychological effects, and types of artificial lighting, combined daylight and flash.

UNIT 4 FRAMING VIEWS**8 HRS.**

Single point and two point perspective- examples, distortions, emphasizing architectural elements, effect of camera to subject distance, oblique angles, three point perspective- applications in interiors and exteriors -composition, symmetric composition, applying the law of thirds - examples, image capture to publication

Max. 30 Hours**Course Outcomes:****On completion of the course the student will be able to**

CO1: Studying the equipment, processes, and procedures necessary for the photography of building exteriors and interiors

CO2: Understanding the various photography techniques of the past.

CO3: Utilizing light, structure and colour to create various feelings for the viewer of the photograph

CO4: Analysing the contributions of photography in the architectural profession.

CO5: Interpreting the various principles of composition used in famous architecture photographs.

CO6: Learning post processing and developing proficiency in modern photography techniques.

TEXT / REFERENCE BOOKS

1. Schulz A., Architectural Photography: Composition, Capture, and Digital Image Processing, O'Reilly Media Inc., 2010
2. Michael Heinrich, Architectural photography, Birkhauser, 2009
3. Michael G. Harris, Professional Architectural Photography, Taylor & Francis, 2002
4. Kopelow A., Architectural Photography the Digital Way, Princeton Architectural Press, 2007

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR1603	FILM SET AND TEMPORARY STRUCTURES DESIGN	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

- To explore and synthesize the various elements involved in a set.
- To give an insight to approached to art direction.
- To understand the process of designing and creating a set.

UNIT 1 ELEMENTS OF A SET**6 Hrs.**

Elements of Image Making - stage craft, Accessories, Props, Design of Space - elements of Form, Colour, Light, Sound, Time, Graphic, Location, themes and materials, graphics design, reuse and set design.

UNIT 2 THEORY OF ART DIRECTION**8 Hrs**

Drawing and Design, Theory for Art Direction, Relations between Scene vs Characters, Scene vs Painting, Scene vs Script, Scene vs Drama, translation from 2D to 3D.

UNIT 3 PROCESS OF DESIGNING AND CREATING A SET**8 Hrs**

Analyze scripts to determine theme, concept, mood, location, style, period, special needs, Character, setting of the drama/ movie, initial sketches of the design, materials and construction of the set and execution.

UNIT 4 CASE STUDIES**8 Hrs.**

Diverse concepts, philosophies and set designs of known art directors, movie reviews, case studies of different film cities in different contexts.

Max. 30 Hours**Course Outcomes:****On completion of the course the student will be able to**

- CO1:** Exploring the various elements to be included while designing sets.
- CO2:** Comprehending the relationship between the various aspects involved in art direction.
- CO3:** Ability to understand and sequence the processes involved in the designing and creation of sets.
- CO4:** Constructing knowledge to review the sets created in movies.
- CO5:** Critically analyze the philosophies of know art directors in documenting cities, buildings etc.

TEXT / REFERENCE BOOKS

1. Neumann D., Film Architecture: Set Designs from "Metropolis" to "Blade Runner", Prestel, 1997
2. Fear B., Architecture + Film II, Architectural Design, Wiley Academy, 2000
3. Lamster M., Architecture and Film, Princeton Architectural Press, 2013
4. Nystorm H., Creativity and Innovation, John Wiley & Sons, 1979

**End semester examination question paper pattern
(To be distributed uniformly among all the units)**

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1604	BIOMIMICRY	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To explore, understand and recognize the relation between nature and human.
- To comprehend and appreciate the natural construction by the organisms in nature.
- To generate similar approaches from nature in the built forms.

UNIT 1 INTRODUCTION**6 Hrs.**

Introduction- what is biomimicry - bionics - biomimetics - origins of biomimicry - nature's laws, strategies, and principles - Nature as a model, measure and mentor, changing metaphor and approach organic architecture - animal architecture - complexity of natural organisms and systems - Relationship between nature and architecture.

UNIT 2 BIOMIMICRY CONCEPTS**8 Hrs.**

Nostos Erda: Returning Home To Earth - Natural materials manufacture principles - Inorganic materials - crystallized version of Earth derived materials - Natural construction - adaptation for human use (mud-dauber wasp compass termites, Eastern tent caterpillars, female bauble spiders and the extraordinary Namibian fog-basking beetle, beaver dam construction).

UNIT 3 BIOMIMICRY IN ARCHITECTURE**8 Hrs.**

Biomimicry in architecture - overlap between biology and architecture, living building, emerging biomimetics - technologies - biomimetics concepts in structural efficiency - material manufacture systems- zero-waste systems- energy generation - the thermal environment - nanotechnology in architecture - biomimetics products.

UNIT 4 CASE STUDIES**8 Hrs.**

Examples of Buildings case studies - works of Douglas Cardinal, Imre Makovecz, Daniel Liebermann, Eugene Tsui, Jacques Gillet, Petra Gruber - Biomimetic cities-Biomimetic future Approach - Nature model - New applications of biological life into Architecture - Biomimicry and sustainability

MAX. 30 Hours**COURSE OUTCOMES:**

On completion of the course the student will be able to

- CO1:** Understand the origins and principles of biomimicry and distinguish its application in architecture.
CO2: Synthesize the different ways of construction with earth in comparison with the construction in the animal kingdom.
CO3: Explore the principles, design approaches of biomimicry adopted in architecture.
CO4: Outline the technologies and design strategies adopted by pioneers in the built form.
CO5: Interpret philosophies adopted by architects in different contexts.
CO6: Construct knowledge on the role of nature as a model, measure and mentor in architecture.

TEXT / REFERENCE BOOKS

- Benyus J. M., Biomimicry: Innovation Inspired by Nature, Harper Perennial, New York, 2002
 Pawlyn M., Biomimicry in Architecture, RIBA Publishing, 2011
 Gruber P., Biomimetics in Architecture: Architecture of Life and Buildings, Springer, 2010
 Mazzoleni I., Architecture Follows Nature - Biomimetic Principles for Innovative Design (Biomimetics), CRC Press, 2013
 Hansell M., Animal Architecture, Oxford University Press, New York, 2005

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR1605	INTERIOR DESIGN	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

- To introduce the process of Interior Design, starting from client discussion to execution at site.
- To outline the various elements of interior spaces, their varied treatments and the impact of elements like color, light, furniture and accessories on the quality of space.
- To understand the elements of interior design and ways through which these can be incorporated in design.

UNIT 1 INTRODUCTION TO INTERIOR DESIGN**6 HRS.**

Interior Design - definition and process. Introduction to Interior Design in terms of typology, function, themes and concepts. Study of Color and color schemes and their psychological and physical impact on space.

UNIT 2 HISTORY OF INTERIOR DESIGN**8 HRS.**

Brief history of Interior Design through ages relating to historical and regional context. Design movements such as minimalism, post and late Modernism, De Constructivism etc. Documentation of any Art/Craft relevant to the context of Interior Design in terms of processes and material from anywhere in India.

UNIT 3 MATERIAL, CONSTRUCTION AND FINISHES**8 HRS.**

Introduction to various finishes of walls, floors, ceilings and openings. Paint - Enamels, distempers, plastic emulsions, cement based paint - properties, uses and applications. Painting on different surfaces - defects in paintings. Clear coatings and stains - properties, uses and applications. Wallpaper finishes and special purpose paints. Installation detail for false ceilings.

UNIT 4 ELEMENTS OF INTERIOR DESIGN**8 HRS.**

Study of Interior Lighting, their effects, types of lighting fixtures. Accessories used for enhancement of interiors - paintings, objects de art, etc. Interior Landscaping - elements like rocks, plants, water, flowers, fountains, paving, artefacts etc. Furniture Design - Study of relationship of furniture to spaces and human movements, human comfort, function, materials. Case studies and projects on Furniture design. Interior Service Elements - HVAC, Water Supply and Sanitation, Electricity and Acoustics.

Max. 30 Hours**Course Outcomes:****On completion of the course the student will be able to**

CO1: Develop the ability to analyse the design problem, synthesize the response and critically evaluate the design thereby define the cyclic design process.

CO2: Understand the vibrant forms of expression of culture and lifestyle in interior design over the past.

CO3: Overview the recent design movements, widening knowledge in minimalism, sustainability and innovations.

CO4: Understand the properties and uses of natural materials like wood and fabrics, synthetic materials like glass and plastics and their appropriate application techniques.

CO5: Interpret the principles of design using spatial elements and compositions in interior space.

CO6: Comprehend the relationship between form, dimensions of interior space and human dimensions and also between human factors and activity relationships.

TEXT / REFERENCE BOOKS

1. Francis D.K. Ching, Interior Design Illustrated, VNR Pub. New York 1987
2. Steport De VanKness, Logan and Szevely, Introduction to Interior Design Macmillan Publishing Co., New York 1980
3. Kathryn B. Hiesinger and Marcus H., Landmarks of twentieth Century Design; Abbey Ville Press, 1993
4. Slesin S. and Ceiff S., Indian Style, Clarkson N Potter, New York, 1990
5. Massey, World of Art, Interior Design of 20th century, 2005
6. Archi World, Interior Furniture and Lighting Style 1, 2005

**End semester examination question paper pattern
(To be distributed uniformly among all the units)**

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A : 2 questions from each unit, each carrying 5 marks.****: 08 x 05 = 40 Marks****PART B : 2 questions from each unit with an internal choice, each carrying 15 marks****: 04 x 15 = 60 Marks**

SAR1606	CRITICAL THINKING	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

1. To introduce the context for the rise of critical theories in architecture.
2. To give an insight to understand the relationship between the power and the built forms and environments.
3. To foster the analytical skills to address architecture from unique perspectives to unravel the intangible values.

UNIT 1 INTRODUCTION**6 HRS.**

Definition of theory - Architectural theory and its nature, purpose and its relation to practice -overview of some traditional architectural theories- context for the rise of more critical theories in Architecture - Introduction to Critical Theory- Architecture and Critical Theory-Qualities and challenges in critical theory.

UNIT 2 POWER AND BUILT ENVIRONMENT**8 HRS.**

Definition of power- Forms of power- Power in the built environment at various scales -ideas of power and society, power and knowledge - Colonialism in India as a form of dominance- Production of Indo-Saracenic Architecture - New Delhi as a part of imperial vision- Idea of Ghetto, segregation, surveillance and control in colonial towns and contemporary cities.

UNIT 3 PLACE AND ARCHITECTURE**8 HRS.**

Critical reactions to modernity/ modernism with reference to the concept of context/ place - Critical Regionalism and Architectures of resistance - Place and phenomenology in Architecture - Semiotics and Deconstruction as a critical tool.

UNIT 4 ISSUES IN ARCHITECTURE**8 HRS.**

Architecture, Gender and space- Domestic Architecture-Convent Architecture, heritage sites and monuments, museums, galleries as narratives of national identity, City as congested geography, Technology and Architecture.

Max. 30 Hours**Course Outcomes:****On completion of the course the student will be able to**

- CO1: Critically understanding the origin of architectural theories and the reasons for the rise of more theories.
- CO2: Constructing knowledge on the role of power in architecture and planning.
- CO3: Ability to explore the relation between place and architecture.
- CO4: Exploring the principles of critical regionalism, architecture of resistance with examples.
- CO5: Skills to address the architecture and settlements from diverse perspectives.

TEXT / REFERENCE BOOKS

1. Anthony D King, Colonial Urban Development, Routledge, 2007
2. Lawrence Vale, Architecture and Nationalism and identity, Yale University Press, 1992
3. Edited by Michael Hays, Architectural Theory since 1960, MIT Press, 2000
4. Edited by Nazzari Al Sayaad, Forms of Dominance, Avebury, 1992
5. Edited by Neil Leach, Rethinking Architecture, Routledge, 2000
6. Kent S., Domestic Architecture and the Use of Space: An Interdisciplinary Study, Cambridge UP: Cambridge, 1990

**End semester examination question paper pattern
(To be distributed uniformly among all the units)**

Max. Marks: 100**PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR1607	DIGITAL ARCHITECTURE	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To understand the role of digital technology as a design tool in architecture.
- To provide an overview of various contemporary design processes and its relation to computation.
- To explore the various principles and directions adopted by eminent architects with digital tools

UNIT 1 INTRODUCTION**6 Hrs.**

Investigation of contemporary theories of media and their influence on the perception of space and architecture.
Technology and Art - Technology and Architecture - Technology as Rhetoric - Digital Technology and Architecture.

UNIT 2 ASPECT OF DIGITAL ARCHITECTURE**8 HRS.**

Aspects of Digital Architecture - Design and Computation - Difference between Digital Process and Non-Digital Process
- Architecture and Cyber Space - Qualities of the new space - Issues of Aesthetics and Authorship of Design - Increased Automatism and its influence on Architectural Form and Space.

UNIT 3 CONTEMPORARY PROCESS**8 Hrs.**

Overview of various Contemporary design process and its relation to computation: Diagrams - Diagrammatic Reasoning
- Diagrams and Design Process - Animation and Design - Digital Hybrid Design Protocols - Concept of Emergence -
Introduction to Cellular Automata and Architectural applications - Genetic algorithms and Design Computation

UNIT 4 GEOMETRIES AND SURFACES**8 Hrs.**

Geometry and their properties - Architectural applications - Works of Zvi Hecker-- Shape Grammar - Shapes, rules and Label - Shape Grammar as analytical and synthetic tools- Combining Shape grammar and Genetic algorithm to optimize architectural solutions - Hyper Surface- Introduction to Hyper surface and concepts of Liquid Architecture.

Max. 30 Hours**COURSE OUTCOMES:****On completion of the course the student will be able to**

- CO1:** Comprehend the contemporary theories of media and their influence on the perception of space and architecture.
CO2: Knowledge on the role of computation in cyber space to generate ideas and concepts.
CO3: Understand the strategies and directions by architects who evolve ideas in cyber space.
CO4: Compare and analyze the different directions through case studies.
CO5: Explore the fundamentals of shape grammar, rules and ways through which they are used as tool to evolve ideas.
CO6: Acquire the ability to comprehend the expressions of hyper surface architecture in reality.

TEXT / REFERENCE BOOKS

1. Peter Eisenmann, Diagram: An Original Scene of Writing, Diagram Diaries MOVE, UN Studio
2. Grey Lynn, The Folded, The Pliant and The Supple, Animate form Contemporary Techniques in Architecture, Halsted Press, 2002
3. Ali Rahim, Contemporary Process in Architecture, John Wiley & Sons, 2000
4. Walter Benjamin, Practices of Art in the Age of Mechanical Reproduction Colin press, 1977
5. Work of Architecture in the Age of Mechanical Reproduction, Differences MITpress, 1997
6. William J. Mitchell, the Logic of Architecture: Design, Computation and Cognition. MIT Press, Cambridge, 1995

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR1608	FACILITIES PLANNING	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES:

- To stress the need for facilities management in the construction projects
- To explore the scope of facilities planning in construction phase.
- To derive an efficient facilities management plan in Handover and after close out phase

UNIT 1 FUNDAMENTALS OF FACILITIES PLANNING**8 HRS.**

Principle duties of a facility manager - Diverse responsibilities and decision-making processes from building infrastructure to fleet services - Architectural Programming - Difference between primary data & Secondary data, various stages involved in planning viz., goal/objective setting, surveys & Studies, analysis, findings & recommendations, implementation, monitoring & evaluation and feedback - Various sources of information - Project scheduling and phasing.

UNIT 2 FACILITIES DESIGN AND SPACE PLANNING**6 HRS.**

Applications of facilities design - Lifespan documentation of buildings - Understanding the Project Development process - Flexibility and facilities planning - Optimal space planning and cost minimization through facility layout - Study of design sources - Factors, affecting and influencing the site - Process of site analysis.

UNIT 3 FACILITY PLANNING FOR THE CONSTRUCTION PHASE**8 HRS**

Functionality of Building Automation systems - Wear & tear of Technical installations - Recording operating costs, safety concepts, energy supply & waste management - Knowledge based facility planning and decision support system - Artificial intelligence - Simulation in facility planning and efficiency analysis - Real estate values, Items of work/ items of development budget. Architect's budget overlay construction cost: site development, building material, labour, on-site work etc.

UNIT 4 FACILITY PLANNING FOR HANDOVER & FACILITY PLANNING OPTIONS**8 HRS.**

Delivery of the project - Data transfer, user satisfaction, Planning options - Owner management, Outsourced management, owner management with outsourced labour & purchase of separate management, labour services- Tendering & contracts, evaluating offers - Ensuring functionality & value appreciation - Preplanning & Proposal phase, programming phase, Schematic design Phase, Design development phase construction phase & handover with project scheduling and phasing.

Max. 30 Hours**Course Outcomes:****On completion of the course the student will be able to:**

- CO1:** Understanding the role and responsibilities of facility manager in a project.
- CO2:** Developing the optimal space planning for cost minimization.
- CO3:** Scheduling and executing the involved facilities in construction phase.
- CO4:** Property assessment, real estate evaluation, cost benefit analysis for rental / lease options for clients
- CO5:** Acquiring knowledge on procedures for handover and record maintenance for operations.

TEXT / REFERENCE BOOKS

1. Keith Alexander, Facilities Management: Theory and Practice Taylor & Francis, 2004
2. David G. Cotts, Kathy O. Roper, The Facility Management Handbook, 2009
3. Lewis B. and Payant P., Facility Manager's Maintenance Handbook, 2007
4. Alexander K., Atkin B., Brochner J., & Haugen T., Facilities Management: Innovation and Performance, 2004
5. Johann Eisele Ellen Kloft, High Rise Manual, Birkhauser Verlag AG, 2003
6. Teicholz E., Facility Design and Management Handbook, Mc Graw Hill Professional, 2001
7. Booty F., Facilities Management Handbook, Elsevier 2009
8. Atkin B. and Brooks A., Total Facilities Management, Wiley-Blackwell, 2009

End semester examination question paper pattern**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1609	ENERGY EFFICIENT ARCHITECTURE	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To enable the students understand the importance of energy efficiency in the built environment through the basic energy efficiency principles, building materials, technologies and policies.
- To understand role of embodied energy in achieving efficiency.
- To comprehend the overall structure of green rating systems.

UNIT 1 ENERGY EFFICIENCY IN BUILDINGS**6 Hrs.**

Introduction and need for energy efficiency - Historic buildings, preindustrial, post-industrial, and modern architecture - Basic Principles - land form, vegetation type, and pattern, water bodies, open spaces, and built form, colour, texture, openings, and design strategies - passive techniques.

UNIT 2 SUSTAINABILITY AND MATERIALS**8 Hrs.**

Various building materials and techniques used for energy efficiency. Building materials role in improving energy efficiency. Embodied energy of materials - Reduce, reuse, and recycling of materials - "e" labelling of materials like energy star etc.

UNIT 3**TECHNOLOGIES FOR ENERGY EFFICIENT BUILDINGS****8 Hrs.**

Renewable energy systems. - Solar active, thermal and photovoltaic systems, wind, tidal, biomass, biogas, Ventilation and day lighting techniques - cross ventilation, stack effect, courtyard effect and shading principles, HVAC technologies, building automation system.

UNIT 4 ENERGY POLICY AND BUILDING ENERGY STANDARDS**8 Hrs.**

Green buildings - before and after rating systems - LEED, BREEAM, BEPAC, LEED INDIA etc - Concepts of green buildings - sustainable site, water efficiency, materials and resources, energy and atmosphere, indoor environmental quality, and innovation in design - case studies and examples.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Understanding Energy Efficiency practiced from the history till the current scenario

CO2: Interpreting the role of building materials in Energy Efficiency

CO3: Exploring the concept of Reduce, Reuse and Recycling of Materials.

CO4: Application of the renewable resources in Energy Efficiency

CO5: Integration of passive and active techniques in the creation of Energy Efficient Architecture

CO6: Inferring the role played by green rating systems in the creation of energy efficient structures.

TEXT / REFERENCE BOOKS

Walter F. Wagner, Energy Efficient Building, MGH Publisher, 1980

Majumdar M., TERI Publications, Energy Efficient buildings in India, 2001

Gupta V., Energy and habitat, John Wiley & Sons, 1984

LEED GREEN BUILDING Rating System version 2.1, June 2001

Chaman L. Gupta, Renewable Energy - Basics and Technology, Auroville Foundation, 1998

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 2 questions from each unit, each carrying 5 marks

:08 x 05 = 40 Marks

PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.

: 04 x 15 = 60 Marks

SAR 1610	CONSTRUCTION SYSTEMS	L	T	P	Credits	Total Marks
		2	0	0	2	100

COURSE OBJECTIVES

- To appraise the importance of modular coordination
- To summarize the pre-fabricated systems
- To introduce new innovative and emerging materials for application

UNIT 1 DEVELOPMENT OF MODULAR ARCHITECTURE**8Hrs.**

Modular architecture - definition - Approach - Development of theories of modular architecture - Advantages, scope and limitations of modular architecture.

UNIT 2 INTRODUCTION TO MODULAR SYSTEMS**8 Hrs.**

Various elements of buildings - modular walls, roofs, doors and windows, partitions, etc., various materials used in modular architecture, Pre-stressed and post-tensioned modular systems.

UNIT 3 MODULAR ARCHITECTURE AND CO-ORDINATION**10 Hrs.**

Basic management policies in modular co-ordination. Prefabricated structures: their uses with examples and techniques of constructions. Equipment for materials handling, transportation and erection. Uses of the following: Tractors, bulldozers, shovels drag lings, cableways and belt conveyors, batching plants - Transit mixers and agitator trucks used for ready mix concrete pumps. Guniting equipment - Air compressors - welding equipment - cranes and other lifting devices Choice of construction equipment for different types of works.

UNIT 4 NEW EMERGING MATERIALS**6 Hrs.**

Properties, Application, specification and standards (Indian and International) Teflon, special glasses, aluminium composite panel etc - Nano technology applications in construction.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Recognizing the concept of modular architecture

CO2: Knowledge on modular system for building elements like wall, roof, floor and its installation techniques.

CO3: Categorising the various materials in making the systems.

CO4: Relevance of modular coordination and prefabricated structures.

CO5: Planning of Construction Equipment's in material handling, hoisting.

CO6: Briefing on Nano technology and new materials for imparting modern techniques

TEXT / REFERENCE BOOKS

1. Konz T., Manual of Precast concrete Construction, Vol, I, II, III Banverlag GMBH, 1971
2. Missen H., Industrialized Building and Modular Design, C&CA UK, 1972
3. Directory of Indian Building Materials Products, Building materials and Technology Promotion Council and Centre for Symbiosis of Technology, Environment Management, Bangalore, 2000-2001
4. William P. Spence, Construction Materials, Methods, and Techniques, 2006

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR 1611	PROJECT MANAGEMENT	L	T	P	Credits	Total Marks
		2	0	0	2	100

Course objectives:

- To understand the basic requisites of traditional management systems, management skills and project planning.
- To compare and analyze the traditional and modern network techniques and their relationship in project planning.
- To connect and evaluate the project planning with project costing and knowledge on software application in planning of simple projects.

UNIT 1 TRADITIONAL APPROACH AND NETWORK ANALYSIS**8 HRS.**

Traditional Management System - Gantt's approach - load, progress and bar charts - limitations & overcoming - Project programming - work breakdown structure. Introduction to PERT & CPM -Introduction to network concepts, network elements and inter-relationships-Network techniques -Network logic - activity interrelationships - development of CPM network - Identification of critical path - Different float computations - Early start, early finish, late start, and late finish- worked out examples-Network control (updating): Introduction, process of updating, data required for updating, when to update, method of updating, examples.

UNIT 2 PROBABILITY ANALYSIS**6 HRS**

PERT Network - Introduction to theory of probability and statistics - Probabilistic time estimates of activities - Analysis of PERT network.

UNIT 3 PROJECT COST & RESOURCE ALLOCATION**8 HRS.**

Introduction to two-dimensional network analysis - activity cost information - cost time relationship - crashed estimates for activities - compression potential-cost slope - Project direct cost and indirect cost- crashed program, Network compression - least cost, least time, optimum solutions. Resource allocation - Resource levelling and smoothing - Simple examples.

UNIT 4 SOFTWARE APPLICATIONS**8 HRS.**

Introduction to Project Management software's - Applications - Detailed planning of a simple project - Scheduling using M.S. project and Primavera.

Max. 30 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Understand the various management skills and techniques.

CO2: Estimate the duration for a construction project.

CO3: Experiment the calculation of project duration with CPM and PERT analysis and techniques.

CO4: Prioritize work activity in the project with the comparison of project scope and time with project costing.

CO5: Consider the allocation of required human resources for the project according to the project time and cost.

CO6: Create a project plan and schedule for a simple residential project with MS Project software.

TEXT / REFERENCE BOOKS

1. Jerome D. Wiest and Forinord K. Levy, A Management Guide to PERT/CPM, Prentice Hall of India Pub. Ltd., 2012
2. Mukhopadhyay, Project Management for Architects and Civil Engineers, IIT, Kharagpur, 1974
3. Chitkara K.K., Construction Project Management, Tata Mc Graw Hill Publishing Company, 2014
4. Burgess R.A. and White G., Building Production and Project Management, The Construction Press, London, 1979
5. Punmiya B.C. and Khandelwal K.K., Project Planning and Control with PERT/CPM, Laxmi Publications, New Delhi, 1989
6. Harris F.C. and McCaffer R., Modern Construction Management, Croshy Lockwood Staples, 2013.

**End semester examination question paper pattern
(To be distributed uniformly among all the units)**

Max. Marks: 100**Exam Duration: 3 Hrs.**

PART A : 2 questions from each unit, each carrying 5 marks.

: 08 x 05 = 40 Marks

PART B : 2 questions from each unit with an internal choice, each carrying 15 marks

: 04 x 15 = 60 Marks

SCI 1617	BASICS OF REMOTE SENSING & GIS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To apply principles of remote sensing and GIS to collect map and retrieve spatial information.
- To provide an exposure to remote sensing with GIS and its practical applications.
- To pursue research and develop capabilities to handle multi-disciplinary field projects.
- To work in teams and demonstrate leadership skills with professional ethics.

UNIT 1 REMOTE SENSING AND EMR INTERACTION**9Hrs.**

Definition OF Remote Sensing and its components - Active & Passive remote sensing - Electro Magnetic Radiation (EMR) - EMR spectrum -Black body Radiation - Planck's law - Stefan Boltzmann law - Atmospheric characteristics - Scattering of EMR - Raleigh, Mie, Non-selective & Raman Scattering - Atmospheric Windows and its significance - Energy interactions in the atmosphere - Energy interaction with earth surface features - Spectral reflectance of vegetation, soil and water - Ideal remote sensing systems - Characteristics of real remote sensing systems.

UNIT 2 PLATFORMS AND SENSORS**9Hrs.**

Platforms - Aerial & Space platforms - Passive and Active sensors - Orbit types, Sun synchronous and Geosynchronous - Across track and along track scanning systems - Types of sensor resolutions (Spatial, Spectral, Radiometric and Temporal resolution) - Multispectral and thermal scanners - Characteristics of Remote sensing satellites and sensors (IRS, Landsat, SPOT, IKONOS, QUICKBIRD - Radar, LIDAR, SAR, SLAR MODIS, AMSRE).

UNIT 3 IMAGE INTERPRETATION, ANALYSIS AND DIGITAL IMAGE PROCESSING**9Hrs.**

Types of Data Products - Types of image interpretation - Standard False Colour Composites - Basic elements of image interpretation - Visual interpretation strategies and interpretation keys. Digital Image Processing - Storage formats (BSQ, BIL, BIP) - Sources for Geometric and Radiometric distortions in images -Image enhancement - level slicing, contrast stretching, convolution filtering, Image classification - Supervised, Unsupervised and Hybrid classification.

UNIT 4 GEOGRAPHIC INFORMATION SYSTEMS**10Hrs.**

Introduction - Maps - Definitions - Map projections - Types of map projections - Map Analysis GIS - Definition, Spatial and attribute data, Components of GIS, GIS Data Models - Spatial data structure (Raster and Vector) - Merits and demerits of raster and vector structures - Sources of GIS data - Data input techniques and data editing - updating and query - Spatial data analysis (Extraction, Overlay, Neighbourhood, Spatial interpolation, Proximity, Network) - Data quality and errors in GIS.

UNIT 5 APPLICATIONS OF REMOTE SENSING AND GIS**8Hrs.**

Remote Sensing applications in natural resource mapping - Land use/ Land cover Mapping - Geologic and Soil Mapping. Application of Remote Sensing and GIS with specific reference to Hydrologic modelling and watershed management, Impact of mining activities on environment, Urban growth and transportation planning, Disaster management.

Max. 45 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Familiarizing the principles of remote sensing.

CO2: Exploring knowledge on the basic technical principles of satellites, sensors and ground segments in data collection and the properties of the available data from these systems.

CO3: Understanding the concepts and analyzing the visual (vector) and digital (raster) interpretation.

CO4: Identify specific data and methodologies for effective mapping and evaluation of various specified applications.

CO5: Pursue lifelong learning for professional advancement.

TEXT / REFERENCE BOOKS

1. Anji Reddy, Remote Sensing and Geographical Information Systems, 3rd Edition, BS Publications, 2009.
2. Srinivas M.G., Remote Sensing Applications, Narosa Publishing House, 2001.
3. Lillesand T.M. and Kiefer R.W., Remote Sensing & Image Interpretation, 4th Edition, John Wiley & Sons, New York, 2004.
4. Burrough P.A., Principles of GIS for Land Resource Assessment, Oxford University Press, 2000.
5. Basudeb Bhatta, Remote sensing and GIS, Oxford University Press, 2008.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SCI 1618	TALL BUILDINGS	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course objectives:

- Understanding of basic principles of tall building design
- Preliminary design and selection of structural systems,

UNIT 1 DESIGN CRITERIA**9 HRS.**

Design philosophy, loading, sequential loading, materials, high performance concrete - Fiber reinforced concrete - High strength concrete - Lightweight concrete - design mixes

UNIT 2 LOADING AND MOVEMENT**8 HRS**

Gravity Loading: Dead and Live load, Methods of Live load reduction - impact, Gravity loading, Construction loads. Wind Loading - Static and dynamic approach -Earth quake loading - Equivalent lateral force - Introduction to working stress design - limit state design, plastic design.

UNIT 3 BEHAVIOR OF VARIOUS STRUCTURAL SYSTEMS**10 HRS.**

Factors affecting growth, Height and structural form - High rise behavior, rigid frames - braced forms - infilled frames, shear walls, coupled shear walls, wall frames, tubular, cores, outrigger - braced and hybrid mega systems.

UNIT 4 ANALYSIS AND DESIGN**10 HRS.**

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of a building as total structural system considering overall integrity and major sub system interaction
Structural elements - Sectional shapes, properties and resisting capacities, design, deflection, cracking, prestressing,

UNIT 5 CONSTRUCTION TECHNOLOGY FOR TALL BUILDINGS**8 HRS.**

Assembly of buildings, Safety Policy, Stages of Site investigation, On site tests, Foundation, Basement construction and Water proofing, Materials, Selection & handling, Wall & Floor construction, Roof Construction.

Max. 45 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Various types of materials used in tall buildings with their characteristics

CO2: Wind and seismic effects on behaviour of tall structure.

CO3: Various structural systems of tall buildings constructed using Concrete, Steel and Steel/Concrete Composite material

CO4: Behaviour of various structural systems under gravity and lateral loading alongwith their advantages and limitations
Use of structural engineering software for analysis and design of high rise structures

CO5: Foundation system used for high rise buildings

CO6: Latest trend in Tall Buildings in India and abroad

TEXT / REFERENCE BOOKS

1. Taranath. B. S., Structural Analysis in tall buildings, McGraw Hill, 1988.
2. Bryan Stafford Smith, Alexcoull., Tall building structures, Analysis and Design, John Willey and Sons Inc, 1991.
3. Beedle. L. S., Advances in Tall Buildings, CBS Publishers & Distributors, Delhi 1986
4. Lin T. Y., Stotes Burry D., Structural Concepts and systems for Architects and Engineers, 1981
5. Chew Yit Lin, Micheal, Construction Technology for Tall Buildings, Singapore University Press, 2nd edition, 2006.

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR 1612	SUSTAINABLE ARCHITECTURE	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course objectives:

- To sensitize about the various aspects of sustainable and green building design in the context of global warming and climate change.
- To study the building materials for its impact on environment.

UNIT 1 CONCEPTS AND STRATEGIES OF SUSTAINABLE ARCHITECTURE**8 HRS.**

Definition of Sustainability, Types of Sustainability - Social, Economic, Political, Built environment. Sustainability in the built environment-ideas, concepts and current practices. Climate and built form, Sustainability in vernacular architecture of India.

UNIT 2 SUSTAINABLE CONSTRUCTION TECHNIQUES AND MATERIALS**13 HRS**

Passive design with respect to various climatic types including hot dry, warm humid, cold, temperate and composite. Modern sustainable construction techniques such as Pre-Fab, etc. Introduction to green materials - Local material and their significance, Recycled materials, Reused materials, salvaged materials, etc.

UNIT 3 GREEN CONSERVATION PRACTICES**12 HRS.**

Water use reduction, water conservation, Rainwater harvesting, waste water treatment and reuse - Solid waste management, organic waste management. Energy conservation - Direct and Indirect means - HVAC systems and Lighting systems

UNIT 4 EMERGING TRENDS IN SUSTAINABLE ARCHITECTURE**12 HRS.**

Introduction to various Renewable power systems, concepts of life cycle analysis, carbon footprint reduction. Emerging ideas of Green Buildings including Net Zero Energy, Net zero water, Earth ships, etc. Green Building rating systems such as LEED, GRIHA, IGBC. Case Studies of various Green Building Projects across India.

Max. 45 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: An understanding on sustainability.

CO2: Knowledge on renewable energy conservation through material usage.

CO3: A thorough understanding on designing green buildings.

TEXT / REFERENCE BOOKS

- Cooper, Ilay & Dawson, Barry, Traditional buildings of India, Thames & Hudson, 1998
- Majumdar, Mili (ed.), Energy Efficient Buildings in India, Tata Energy Research Institute and Ministry of Non Conventional energy Sources, 2001.
- Krishnan, A. (ed.), Baker, N., Yannas, S., Szokolay, S., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
- Joo-Hwa Bay and Boon Lay Ong, Tropical Sustainable Architecture, Social and Environmental Dimensions, Architectural Press, Elsevier Ltd, 2006.

WEBSITES

- http://www.rcac.org/assets/greenbuild/grn-bldg-guide_4-20-09.pdf
- <http://teamshunya.in/docs/nme-ict/4.font1journey%20of%20sustainability.pdf>

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1613	STEEL IN ARCHITECTURAL DESIGN	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course objectives:

- Ability to perform analysis and design of steel members
- Ability to design steel structural systems
- Familiarity with professional and contemporary issues

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Identify and compute the design loads on a typical steel building.

CO2: Identify the different failure modes of steel tension and compression members.

CO3: Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

CO4: Identify the different failure modes of bolted and welded connections, and determine their design strengths.

CO5: Design bolted and welded connections for tension and comp. members and beams.

UNIT 1 STEEL STRUCTURE**13 Hrs.**

Standard structural steel - thermal properties - Fireproofing Methods - Steel Sheeting - Types of Sheeting Light roofing materials (Recent trends in roofing materials like Corrugated GI Sheets, Pre-coated metal sheets, Polycarbonate sheeting, Teflon coated sheets, PTFE Steel alloys properties and uses) - Long span structures using steel - Steel Roofing namely cable structures - Cable suspended roof, Hyperbolic paraboloid roof, Catenary, Pneumatic & Membrane roof - mention their Concept, Development, Laws of formation, Merits and Demerits- Vertical, Horizontal & Hexagonal joints.

UNIT 2 COMPOSITE CONSTRUCTION USING STRUCTURAL STEEL**8 HRS**

Concept of Composite materials - structural engineering & Material properties - Flitch Beam - Lightweight construction Foam Concrete - Ferro Cement - Fibre Reinforced Concrete Other composite construction materials.

UNIT 3 DESIGN, APPLICATIONS AND CONSTRUCTION OF STEEL BUILDINGS**12 HRS.**

Steel buildings design -Study of innovations in steel industry - Design and construction parameters developed by INSDAG.-Concept of Recycled Steel - manufacture and assemble steel framed buildings - factories - multi-storey buildings and car parks - commercial buildings - Industrial and agricultural buildings - Bridges and multi-storey steel framed structures - The Case Studies include KCR Terminal at Hung Hom, Hong Kong, B3 Offices in Stockley Park, Renault Centre and Swindon By Normal Foster, Inmos Microchip Factory, Bridges and Public Bus Stop in St. Gallen, IBM Traveling Exhibition Pavilion

UNIT 4 DOCUMENTATIONS, SEMINARS, WORKSHOP ON INNOVATIVE TECHNOLOGIES**12 HRS.**

Documentation - Innovative Steel Buildings - International & Indian Context - Construction Methods & Techniques - Seminar to present a study of architectural form and structural expression through selected - case studies which will aid understanding of structural philosophy and analysis, building envelope and services and construction sequence - work shop on steel to be organized to give students hands on experience.

Max. 45 Hours**TEXT / REFERENCE BOOKS**

1. Stanley W. Crawley, Robert M. Dillon, Steel Buildings: Analysis and Design, John Wiley & Sons, Inc., 1993
2. Roger Brockenbrough, Frederick Merritt, Merritt Frederick, Structural Steel Designer's Handbook, McGraw Hill Companies, Inc. 1999
3. Michael Barnes, Michael Dickson, Widespan roof structures, Thomas Telford, 2000
4. Martorell, Bohigas & Mackay, Pavilion of the Future, Expo 92, Seville (MBM), 1992.
5. Prada Aoyama Tokyo Herzog and De Meuron. Milan, IT: Progetto Prada Arte Srl, 2003
6. Christopher Beokrem, Material Strategies in Digital Fabrication, Routledge, Taylor & Francis Group, 2012.

WEBSITE

www.steel-insdag.org

End semester examination question paper pattern**Max. Marks: 100****PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SAR 1614	ENVIRONMENTAL PLANNING AND DESIGN	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course objectives:

- Provide a description of the history of environmental planning and its origins.
- Provide a knowledge base for how environmental impact assessments may be made at a regional scale, larger than site planning scale.

UNIT 1 INTRODUCTION**12 HRS.**

Introduction to Ecology; Ecosystem, Ecological balance, Biospheres, renewable energy and non renewable energy, resource identification and its implications for development - soil, water, land, plants - Elements of environmental planning - Area of environmental planning assessment - Sustainable human development. Main spheres of environmental planning ie, bio physical environment, socio economic environment and built environment etc.

UNIT 2 ENVIRONMENTAL IMPACT ASSESSMENT AND LEGISLATION**12 HRS**

Environmental impact assessment Methodologies and Techniques, Issues in EIA - Evolution of planning legislation, National environmental policy, significance of law and its relationship to development - The wild life (protection) act - The air act - The Water act 1974 - The forest conservation act - The environmental protection act Notification on coastal regulation zone - Worlds summits to safeguard the environment and Different energy audits like RT2000, basix, leed, griha etc.

UNIT 3 PLANNING AND EVALUATION TECHNIQUE**12 HRS.**

Essence of good planning, integration of environmental assessment and planning options, priorities and strategies for development on urban, coastal and hilly ecosystem- Cost benefit analysis, planning balance sheet and goal achievement matrix.

UNIT 4 ENVIRONMENTAL QUALITY AND DESIGN**9 HRS.**

Parameters for indoor environmental design- indoor air quality, lighting for Residential spaces.- Evaluation of factors, planning measures and legal tools to control: Air pollution, Water pollution, land Pollution, Noise pollution, etc

Max. 45 Hours**COURSE OUTCOMES****On completion of the course the student will be able to**

CO1: Describe an environmental system along with an understanding of how an environmental impact assessment may be conducted.

CO2: Convey through written work an argument on how to assess environmental resources using scientific information and technology with an element of human interaction important to society at large.

CO3: Demonstrate, through test essay response, an understanding of the linkage among policy practices and environmental consequences using methods accepted by the scientific community.

TEXT / REFERENCE BOOKS

1. Earthscape, Manual of Environmental Planning and Design, John OrmsbeeSimond, Van Nostrand Reinhold Company, 1978.
2. Richard P Dober, Environmental Design, VNR company, Newyork, 1969.
3. Albert J Rutledge, Anatomy of park-McGraw Hill book co., USA 1971
4. Harvey M Rubenstein, A guide to site and environment planning, Vol. 3, John Wiley & Sons, New York, 1987.

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SAR 1615	BUILDING AUTOMATION SYSTEM	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course objectives:

- Gain knowledge on Building Management System (BMS) and Automation.
- Be familiarized with various transducers and sensors in BMS.
- Be exposed on Control panel and Communication.

UNIT 1 INTRODUCTION**12 HRS.**

Introduction and Origins of the Intelligent Buildings Concept - Definition and characteristics of Intelligent Buildings with brief history and contemporary concept. Automated buildings, Responsive buildings, Evaluation of natural ventilation in buildings and indoor wind speed.

UNIT 2 ENERGY MANAGEMENT AND SERVICES**13 HRS**

Demands on building and services, Control systems, Study of development of Computer Integrated Building from single function systems to integrated solutions. Use of building intelligence in energy management. Factors that affect energy use in buildings - functional factors, environmental factors, envelope factors, air-conditioning systems factors, energy source factors and electrical systems factors. Fenestration design for optimal day lighting.

UNIT 3 KEY ISSUES OF INTELLIGENT BUILDING**10 HRS.**

Multiple activity settings, Generic analysis of space utilization. Models for shared space use. The development of briefing process including design activity and building elements, life cycles, Coordination between life cycle, building technologies. Study of issues related to site, shell, skin, services and technology.

UNIT 4 INTELLIGENT DESIGN AND CONSTRUCTION**10 HRS.**

Effective Space utilisation, Energy conservation through site selection, siting & orientation. Energy conservation through integration of building and site, site planning & site design. Expectations of user, effective communication of architectural concepts to user, Locating people and information, Introduction to building efficiency with respect to life cycle costs.

Max. 45 Hours**COURSE OUTCOMES**

On completion of the course the student will be able to

CO1: Understand Building Management system and Automation.

CO2: Describe various Sensors and Transducers - Automation components in BMS

CO3: Explain control panel and communication such as HVAC.

TEXT / REFERENCE BOOKS

1. Henrik Missen, Industrialized Building and Modular Design, C & CA UK, 1972.
2. Konz T, Manual of Precast concrete Construction, Vol, I, II, III, Banverlag GMBH, 1971.
3. William P. Spence, Construction Materials, Methods, and Techniques, 2006.
4. Bansal, N.K., Hauser, G., & Minke, G., Passive Building Design, Elsevier, Amsterdam, 1994
5. Directory of Indian Building Materials Products Building materials and Technology Promotion Council and Centre for Symbiosis of Technology, Environment Management, Bangalore, 2000-2001.

End semester examination question paper pattern
(To be distributed uniformly among all the units)

Max. Marks: 100**Exam Duration: 3 Hrs.****PART A: 2 questions from each unit, each carrying 5 marks****:08 x 05 = 40 Marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****: 04 x 15 = 60 Marks**

SCI 1619	DISASTER MANAGEMENT	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course objectives:

- Capacity to integrate knowledge and to analyse, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
- Capacity to describe, analyse and evaluate the environmental, social, cultural, economic, legal and organisational aspects influencing vulnerabilities and capacities to face disasters.

UNIT 1 INTRODUCTION TO DISASTER**12 HRS.**

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.

UNIT 2 DISASTER PREPAREDNESS**8 HRS**

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.

UNIT 3 REHABILITATION, RECONSTRUCTION & RECOVERY**10 HRS.**

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.

UNIT 4 DISASTER RESPONSE AND DISASTER MANAGEMENT**8 HRS.**

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.

UNIT 5 RISK ASSESSMENT AND VULNERABILITY ANALYSIS**7 HRS.**

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.

Max. 45 Hours**COURSE OUTCOMES****On completion of the course the student will be able to**

CO1: Capacity to integrate knowledge and to analyse, evaluate and manage the different public health aspects of disaster events at local and global levels, even when limited information is available.

CO2: Capacity to describe, analyse and evaluate the environmental, social, cultural, economic, legal and organisational aspects influencing vulnerabilities and capacities to face disasters.

CO3: Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.

CO4: Capacity to manage the Public Health aspects of the disasters.

TEXT / 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.

End semester examination question paper pattern**(To be distributed uniformly among all the units)****Max. Marks: 100****PART A: 2 questions from each unit, each carrying 5 marks****PART B: 2 questions from each unit with an internal choice, each carrying 15 marks.****Exam Duration: 3 Hrs.****:08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**