

**SCHOOL OF ARCHITECTURE**

**K L deemed to be University, Vaddeswaram – 522 502**

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**BACHELOR OF ARCHITECTURE - CURRICULUM**

## I TO X SEMESTERS CURRICULUM AND SYLLABUS

### SEMESTER I

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 MT 1109	Mathematics	3	0	0	3
2	15 AR 1101	History of Architecture and Culture - I	3	0	0	3
3	15 AR 1102	Theory of Architecture	3	0	0	3
<b>STUDIO</b>						
4	15 EN 1101	Rudiments Of Communication Skills	0	0	4	4
5	15 AR 1151	Architectural Drawing - I	0	0	6	6
6	15 AR 1152	Art Studio	0	0	6	6
7	15 AR 1153	Basic Design	0	0	12	12
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>28</b>	<b>37</b>

### SEMESTER II

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 1204	Mechanics of Structures – I	4	0	0	4
2	15 AR 1205	History of Architecture and Culture - II	3	0	0	3
3	15 AR 1233	Theory of Design	3	0	0	3
<b>STUDIO</b>						
4	15 AR 1264	Model Making Workshop	0	0	4	4
5	15 AR 1254	Building Construction - I	0	0	6	6
6	15 AR 1255	Architectural Drawing - II	0	0	6	6
7	15 AR 1256	Architectural Design – I	0	0	10	10
<b>TOTAL</b>			<b>10</b>	<b>0</b>	<b>26</b>	<b>36</b>

**SEMESTER III**

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 2108	Mechanics of Structures - II	4	0	0	4
2	15 AR 2109	History of Architecture and Culture - III	3	0	0	3
3	15 AR 2110	Climate and Built Environment	3	0	0	3
4	15 AR 2134	Building Materials - I	3	0	0	3
<b>STUDIO</b>						
5	15 AR 2165	Computer Aided Visualization	0	0	5	5
6	15 AR 2157	Building Construction - II	0	0	6	6
7	15 AR 2158	Architectural Design - II	0	0	10	10
<b>TOTAL</b>			<b>13</b>	<b>0</b>	<b>21</b>	<b>34</b>

**SEMESTER IV**

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 2213	Design of Structures - I	4	0	0	4
2	15 AR 2235	Building Materials - II	3	0	0	3
3	15 AR 2215	Site Analysis and Planning	3	0	0	3
<b>STUDIO</b>						
4	15 AR 2267	Surveying and Leveling	0	0	4	4
5	15 AR 2259	Architectural Design - III	0	0	10	10
6	15 AR 2268	Building Construction III	0	0	6	6
7	15 AR 2266	Advanced Computer Aided Visualization	0	0	4	4
<b>TOTAL</b>			<b>10</b>	<b>0</b>	<b>24</b>	<b>34</b>

**SEMESTER V**

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 3118	Design of Structures - II	4	0	0	4
2	15 AR 3136	Building Bye-Laws & Codes of Practice	3	0	0	3
3	15 AR 3137	Introduction to Landscape Architecture	3	0	0	3
4		Elective – I	3	0	0	3
<b>THEORY CUM STUDIO</b>						
5	15 AR 3138	Building Services - I	2	0	2	4
<b>STUDIO</b>						
6	15 AR 3160	Architectural Design - IV	0	0	12	12
7	15 AR 3169	Building Construction IV	0	0	6	6
<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>20</b>	<b>35</b>

**SEMESTER VI**

SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 3222	Design of Structures - III	4	0	0	4
2	15 AR 3223	Human Settlement and Planning	3	0	0	3
3	15 AR 3239	Evolution of Modern Architecture	3	0	0	3
4		Elective - II	3	0	0	3
<b>THEORY CUM STUDIO</b>						
5	15 AR 3240	Building Services - II	2	0	2	4
<b>STUDIO</b>						
6	15 AR 3261	Architectural Design - V	0	0	12	12
7	15 AR 3270	Working Drawing	0	0	6	6
<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>20</b>	<b>35</b>

SEMESTER VII						
SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 4128	Urban Design	3	0	0	3
2	15 AR 4141	Advanced Building Services	3	0	0	3
3		Elective - III	3	0	0	3
4		Elective - IV	3	0	0	3
<b>THEORY CUM STUDIO</b>						
5	15 AR 4142	Advanced Building Construction and Materials	2	0	4	6
6	15 AR 4124	Estimation, Costing and Specification	3	0	3	6
<b>STUDIO</b>						
7	15 AR 4162	Architectural Design - VI	0	0	12	12
<b>TOTAL</b>			<b>17</b>	<b>0</b>	<b>19</b>	<b>36</b>

SEMESTER VIII						
SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 4229	Building Construction and Management	3	0	0	3
2	15 AR 4242	Behavioural Architecture	3	0	0	3
3	15 AR 4243	Advanced Structural Design and Systems	3	0	0	3
4		Elective - V	3	0	0	3
5		Elective - VI	3	0	0	3
<b>STUDIO</b>						
6	15 AR 4272	Pre Thesis Seminar (Dissertation)	0	0	6	6
7	15 AR 4263	Architectural Design - VII	0	0	14	14
<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>20</b>	<b>35</b>

SEMESTER IX						
SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	15 IE 5148	Practice School / Practical Training	0	0	30	30
2	15 AR 5171	Documentation	0	0	5	5
<b>TOTAL</b>			<b>0</b>	<b>0</b>	<b>35</b>	<b>35</b>

SEMESTER X						
SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	15 AR 5244	Professional Practice and Ethics	0	0	3	3
<b>STUDIO</b>						
2	15 IE 5250	Project / Thesis	0	0	33	33
<b>TOTAL</b>			<b>0</b>	<b>0</b>	<b>36</b>	<b>36</b>

**TOTAL NO OF CREDITS FOR COMPLETION OF DEGREE : 353**

**LIST OF ELECTIVES**

<b>SEMESTER V</b>						
<b>ELECTIVE - I</b>						
<b>SL. No</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15 AR 31A1	Set Design	3	0	0	3
2	15 AR 31A2	Vernacular Architecture	3	0	0	3

<b>SEMESTER VI</b>						
<b>ELECTIVE - II</b>						
<b>SL. No</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15 AR 32B1	Energy Efficient Architecture	3	0	0	3
2	15 AR 32B2	Architectural Journalism and Photography	3	0	0	3

<b>SEMESTER VII</b>						
<b>ELECTIVE - III</b>						
<b>SL. No</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15 AR 41C1	Green Building	3	0	0	3
2	15 AR 41C2	Sustainable Building Design	3	0	0	3

<b>ELECTIVE - IV</b>						
<b>SL. No</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15 AR 41C3	Furniture Design and Product Design	3	0	0	3
2	15 AR 41C4	Interior Design	3	0	0	3

<b>SEMESTER VIII</b>						
<b>ELECTIVE - V</b>						
<b>SL. No</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15 AR 42D1	Housing	3	0	0	3
2	15 AR 42D2	Architectural Conservation	3	0	0	3

ELECTIVE - VI						
SL. No	COURSE CODE	COURSE TITLE	L	T	P	C
1	15 AR 42D3	Industrial Building System	3	0	0	3
2	15 AR 42D4	Intelligent Buildings	3	0	0	3

L – Lecture period T- Tutorial Period P- Practical period C –Credits

**Note: Elective cannot be taken twice by a student.**

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**Consolidated statement of Total Credits in each Semester**

Semester	L	T	P	C
I	9	0	28	37
II	10	0	26	36
III	13	0	21	34
IV	10	0	24	34
V	15	0	20	35
VI	15	0	20	35
VII	17	0	19	36
VIII	15	0	20	35
IX	0	0	35	35
X	0	0	36	36
<b>Total</b>				<b>353</b>



**I - SEMESTER****15 MT 1109****MATHEMATICS****L T P C  
3 0 0 3**

<b>CO No</b>	<b>Course outcome (CO)</b>	<b>PO/PSO</b>	<b>BTL</b>
CO 1	Apply trigonometric and exponential functions to determine the area of planes and volumes of solids.	PO1,PO7, PO9	2
CO 2	Apply the properties of lines and planes in space, along with sphere and providing a tool to understand 3D material. Understand functions of more than one variable, along with differentiation under integral sign.	PO1,PO7, PO8	2
CO 3	Determine the solutions of first order differential equations, first order simulations equations.	PO1,PO9	2
CO 4	Determine the statistical measures for data analyses, estimation forecasting and measure the uncertainty in random experiments using probability.	PO1	2

**TRIGONOMETRY AND MENSURATION**

Trigonometric (sine, cosine and tan functions) and exponential functions, De-Moiver's theorem. Area of plane figures, computation of volume of solid figures.

**THREE-DIMENSIONAL ANALYTICAL GEOMETRY**

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

**INTEGRATION AND FUNCTIONS OF TWO VARIABLES**

Integration of rational, trigonometric and irrational functions, properties of definite integrals, Reductions formulae for trigonometric functions, Taylor's Theorem - Maxima and Minima (Simple Problems).

**ORDINARY DIFFERENTIAL EQUATIONS**

Linear equations of second order with constant coefficients – Simultaneous first order linear equations with constant coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form.

**BASIC STATISTICS AND PROBABILITY**

The arithmetic mean, median, mode, standard deviation and variance Regression and correlation- Elementary probability – Laws of addition and multiplication of probabilities – Conditional probability – Independent events.

**REQUIRED BOOK:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41<sup>st</sup> Edition, 2011.

**REFERENCES:**

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.) 7<sup>th</sup> Edition, New Delhi, 2009.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co.Ltd., New Delhi, 11<sup>th</sup> Reprint, 2010.
3. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, 2<sup>nd</sup> Edition, New Delhi, 5<sup>th</sup> Reprint, 2009.
4. Gupta S.C and Kapoor V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 9<sup>th</sup> Edition, New Delhi, 1996.

CO No:	Course outcome (CO)	SO	BTL
CO 1	Understanding of the evolution of dwellings in the pre-historic age	PO3,PO7, PSO2	2
CO 2	Study of various river valley civilizations - Egyptian Civilization and Architecture. Understanding Mesopotamian Civilization and its Architecture	PO3,PO4, PSO2	1
CO 3	Gaining knowledge about the ancient cultures of Greece, its monumental and urban Architecture	PO3,PO7, PSO2	1
CO 4	Knowledge about the classical Architecture of ancient Rome, its impact on western Architecture	PO3,PO5, PO10,PSO2	1

### PREHISTORIC AGE

Introducing concepts of culture and civilization – Paleolithic and Neolithic Culture – art forms and evolution of shelter – megaliths – agricultural revolution and its impact on culture and civilization.

### ANCIENT RIVER VALLEY CIVILIZATIONS: EGYPT

Landscape and culture of Ancient Egypt – history – religious and funerary beliefs and practices – monumentality – tomb architecture: evolution of the pyramid from the mastaba – temple architecture: mortuary temples and cult temples

Great Pyramid of Cheops, Gizeh – Temple of Ammon Ra, Karnak – Temple of Abu Simbel (Rock Cut)

### ANCIENT RIVER VALLEY CIVILIZATIONS: MESOPOTAMIA

Urbanization in the Fertile Crescent – Sumerian, Babylonian, Assyrian and Persian culture – evolution of city-states and their character – law and writing – theocracy and architecture – evolution of the ziggurat – palaces.

Ziggurat of Ur, Urnamu – Palace of Sargon, Khorsabad – Palace at Persepolis

### CLASSICAL PERIOD: GREECE

Landscape and culture of Greece – Minoan and Mycenaean cultures – Hellenic and Hellenistic cultures – Greek character – Greek polis and democracy – Greek city planning – architecture in the archaic and classic periods – Domestic architecture; Public Buildings: Agora, stoas, theaters, bouletrion and stadias – Greek temple: evolution and classification – Parthenon and Erektion – orders in architecture: Doric, Ionic, Corinthian – optical illusions in architecture.

### CLASSICAL PERIOD: ROME

Roman history: Republic and Empire – Roman religion and the Roman temple – Roman character – lifestyle – Roman urban planning – art and architecture as imperial propaganda: forums and basilicas – domestic architecture – structural forms, materials and techniques of construction – orders in architecture: Tuscan and Composite.

Rome: Forum Romanum and other Imperial Forums, Enclosure and manipulation of space: Pantheon – Public buildings: Colloseum, Circus Maximus, Thermae of Caraculla.

### REQUIRED READINGS

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

#### **REFERENCES**

1. Pier Luigi Nervi, General Editor, "History of World Architecture – Series", Harry N. Abrams, Inc. Pub., New York, 1972.
2. Lloyd S. and Muller H.W., "History of World Architecture – Series", Faber and Faber Ltd., London, 1986.
3. Gosta, E. Samdstrp, "Man the Builder", Mc.Graw Hill Book Company, New York, 1970.
4. Webb and Schaeffer; "Western Civilisation", Volume I; VNR: NY: 1962.
5. Vincent Scully, "Architecture – The Natural and the Manmade", Harper Collins Pub: 1991.

CO No	Course outcome (CO)	PO/PSO	BTL
CO 1	Understanding on architectural space and mass in terms of elements in architecture.	PO1,PO10	1
CO 2	Understanding on aesthetic components and circulation of design – basic principles and components of building circulation	PO1,PO10	1
CO 3	Learn the circulation and principles of composition in architecture	PO1,PO10	1
CO 4	Understand the function of design process and observe in architectural buildings through case studies.	PO1,PO10	2

### ARCHITECTURAL SPACE AND MASS

Definition of architecture- **elements of architecture** - Space defining elements, openings in space defining elements, spatial relationship, spatial organization Primary forms, properties of form, transformation of forms - dimensional transformation, subtractive, additive forms, organization of additive forms - Articulation of forms

### AESTHETIC COMPONENTS OF DESIGN

Exploration of the **basic principles of design** such as Proportion, scale, balance, rhythm, symmetry, hierarchy, axis with building examples.

### CIRCULATION

**Components of building circulation** - The building approach, The building entrance, Configuration of path, Path space relationship, Form of circulation space -Circulation diagram for residence and restaurant

### PRINCIPLES OF COMPOSITION

Involves the study of the basic principles that govern an **architectural composition** such as Unity, Harmony, Dominance, Fluidity, Emphasis, Contrast etc.

### DESIGN PROCESS AND ANALYSIS OF BUILDING

**Design process** –integration of aesthetics and function - Understanding of formative ideas, organization concepts, spatial characteristics, - Massing and circulation in design analysis of the following buildings: Falling water house& Guggenheim museum by F. L. Wright -Villa Savoye& Chapel of NotredameDuHaut by Le corbusier.

### TEXT BOOKS

1. Francis D. K. Ching, *Architecture - Form, Space and Order*, Van Nostrand Reinhold Company , 1979
2. Roger H. Clark, Michael Pause, *Precedents In Architecture*, Van Nostrand Reinhold Company , 1996

## **REFERENCE BOOKS**

1. K.W.Smithies, *Principles of Design in Architecture*, Van Nostrand Reinhold Company , 1981
2. Sam F. Miller, *Design Process - A Primer For Architectural & Interior Design*, Van Nostrand Reinhold Company , 1995
3. Ernest Burden, *Elements of Architectural Design – A Visual Resource*, Van Nostrand Reinhold Company , 1994
4. V.S.Pramar, *Design Fundamentals in Architecture*, Somaiya Publications, New Delhi, 1973.

CO No	Course outcome (CO)	PO/PSO	BTL
CO 1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills.	PO7	1
CO 2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar.	PO7	1
CO 3	Understand the types of texts and tone of the author.	PO7	1
CO 4	Understand the importance of interpersonal skills	PO7	1

**Syllabus:**

**Speaking & listening skills** - Vowels in English, Diphthongs, Consonants, Word stress, Intonation, Words in Groups - English Conversation Practice, Difference between British English and American English, Received Pronunciation and Dialects, American Spelling and American Grammar, American Pronunciation, Listen and respond, Speak and Listen, Listen and Speak.

**Speaking and listening exercises from Effective Speech** Richard W Clark- Speaking to persuade, listening to understand.

**General writing skills** - Paragraph Writing: Seven 'C's of writing, Identifying & writing Topic sentences, Linkers, Coordinates, Sequencing, Letter Writing: Formal & Informal formats- Full block, Semi block, Modified block- Types & tone of letters, content & brevity, Note Making & Note Taking.

**Reading skills** - Reading comprehension Practice exercises (TOEFL Level) - Reading for information, Reading for specifics - Theme, Attitude, Identifying tone.

**Soft skills** - Introduction to soft skills, Body Language, Postures, Gestures, Eye contact, Personality styles, Grooming, Dress code, Group discussion - Format, Do's and Don'ts, scoring method.

**Text book:**

1. Material produced by the Dept.

**References Book:**

1. Mark Hancock and Sylvie Donna, "English pronunciation in use: Intermediate", 2<sup>nd</sup> edition, Cambridge publication.
2. Krishna Mohan & N P Singh, "Speaking English Effective (English) 2nd Edition", Laxmi Publications-New Delhi, (2005).
3. Mr. Gopalaswamy Ramesh et al, "The Ace of Soft Skills", Pearson publishers, (2010).
4. Richard W.Clark, "Effective speech", Glencoe Pub. Co., (1988).

CO No	Course outcome (CO)	PO / PSO	BTL
CO 1	Understand the Fundamentals of Drawing and Drafting..	PO7,PO10	2
CO 2	Understand the Construction and Development of Surfaces for various Basic 3D Shapes	PO7,PO8	2
CO 3	Understand the Multi view Projections for various Basic Geometric Shapes.	PO7,PO8	2
CO 4	Understand the representation of an Object in Different Standard 3D Views...	PO7,PO10	2
CO 5	Understand the Preparation of Simple Measure Drawing	PO6,PSO2	2

### GEOMETRICAL DRAWING: INTRODUCTION

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

Construction of circles, tangents, curves and conic sections.

### GEOMETRICAL DRAWING: PLANE GEOMETRY

Construction and development of planar surface – square, rectangle, polygon etc  
Introduction of multi- view projection – projection of points, lines and planes.

### GEOMETRICAL DRAWING: SOLID GEOMETRY

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

### GEOMETRICAL DRAWING: AXONOMETRIC PROJECTION

Isometric, plan oblique and elevation oblique projection of planes, solids and combination of solid etc.

### MEASURED DRAWING

Introduction to fundamentals of measured drawing, line value, lettering, drawing representation, format for presentation methods and technique of measuring buildings and their details. Measured drawing of simple objects like furniture, detailing in terms of construction, ornamentation, measured drawing of building components like column, door, window, cornice, etc.

### REQUIRED READINGS

1. Morris IH., "Geometrical Drawing for Art Students", Orient Longman, Madras, 2004.
2. Francis D. K. Ching, "Architectural Graphics", John Wiley and Sons, 2009.
3. Fraser Reekie, Reekie's, "Architectural Drawing", Edward Arnold, 1995

### REFERENCES:

1. Leslie Martin C., "Architectural Graphics", The Macmillan Company, New York, 1978.



CO No	Course outcome (CO)	PO / PSO	BTL
CO 1	Understand the Principles of Drawing	PO1,PO10	2
CO 2	Understand the Types, Properties and Application of Colors	PO1,PO10	2
CO 3	Understand the Painting Variations	PO1,PO10	2
CO 4	Understand the Techniques of Sculpturing	PO1,PO10	2
CO 5	Understand the Principles of Graphic Representation	PO1,PO10	2

### DRAWING

Introduction to art – Elements and principles of drawing – Types of drawing – Visual effects of drawing – Scale drawing – Composition – Approach to sketching – Study of light, shade and shadow.

Exercise involving Indoor and out door sketching – Spot sketching - Drawing from imagination – Study of 3 D effects through light and shade from nature – Tools and materials – Illustration – Study of human being and mobiles.

### PAINTING I

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

### PAINTING II

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

### SCULPTURE

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

### APPLIED ART

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

### REQUIRED READINGS

1. Webb, Frank, "The Artist guide to Composition", David & Charles, U.K., 1994.
2. Ching Francis, "Drawing a Creative Process", Van Nostrand Reinhold, New York, 1990.
3. Alan Swann, "Graphic Design School", Harper Collins, 1991.

**REFERENCES:**

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

CO No	Course outcome (CO)	PO / PSO	BTL
CO 1	To understand the importance of Basic design Study and appreciation of design elements from natural and man-made environment	PO2,PO4,PSO1	2
CO 2	Introduction to design elements and apply them in composition	PO2,PO4,	3
CO 3	Understanding the principles of design using the application of elements and colour.	PO2,PO4	3
CO 4	Developing compositions using shapes and colours using principles .Application of compositions into 3D forms.	PO2,PO4	3
CO 5	To apply ornamentation skills for various components of a building .	PO2,PO4,PSO2	3

**Contents:**

Introduction to Architectural Design through Basic Design – Elements of Design: Properties, qualities and characteristics of point, line, direction shape, form, colour and texture – Principles of Design: Scale, Proportion, Balance, Harmony, Rhythm and Contrast.

The course shall be conducted by giving a number of exercises in the form of design studios, seminars and creative workshops that are aimed at teaching the following:

1. Elements and Principles of Visual Composition using point, line, shape.
2. Exploring colour schemes and their application in a visual composition and in Architectural forms and spaces.
3. Study of texture and schemes of texture both applied and stimulated and their application.
4. Study of linear and Planar forms using simple material like Mount Board, metal foil, box boards, wire string, thermocol etc.
5. Study of Solids and voids to evolve sculptural forms and spaces and explore the play of light and shade and application of color.
6. Study of fluid and plastic forms using easily mouldable materials like clay, plaster of paris etc.
7. Analytical appraisal of building form in terms of visual character, play of light and shade, solids and voids etc.
8. Application of Basic design in Architectural Design through the manipulation of line, plane, solid and voids and application of texture colour, proportion etc.

**REQUIRED READINGS:**

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

**REFERENCES:**

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

## II - SEMESTER

15 AR 1204

MECHANICS OF STRUCTURES - I

L T P C  
4 0 0 4

CO No	Course outcome (CO)	PO / PSO	BTL
CO 1	Understand the force system on a rigid body.	PO1, PO2	2
CO 2	Understand of trusses using method of joints.	PO3, PO4	3
CO 3	Understand sectional properties of the geometrical shapes.	PO5, PO6	3
CO 4	Understand the relation between elastic constants and their application.	PO8, PO10	2

### FORCES AND STRUCTURAL SYSTEMS

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

### ANALYSIS OF PLANE TRUSSES

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

### PROPERTIES OF SECTION

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

### ELASTIC PROPERTIES OF SOLIDS

Stress strain diagram for mild steel, High tensile steel and concrete - Concept of axial and volumetric stresses and strains. (excluding composite bar)

### ELASTIC CONSTANTS

Elastic constants - Relation between elastic constants - Application to problems.

### REQUIRED READINGS

1. Bansal R.K.– A text book on Engineering Mechanics, Laxmi Publications, Delhi, 2005.
2. Bansal R.K. – A textbook on Strength of Materials, Lakshmi Publications, Delhi 2007.

### REFERENCES:

1. Punmia P.C., "Strength of Materials and Theory of Structures"; Vol. I, Lakmi Publications, Delhi 1994.
2. Ramamrutham S., "Strength of Materials", Dhanpatrai& Sons, Delhi, 1990.
3. Nash W.A., "Strength of Materials" – Schaums Series, McGraw Hill Book Company, 1989.
4. Rajput R.K., "Strength of Materials", S. Chand & Company Ltd., New Delhi, 1996.

CO No	Course outcome (CO)	PO / PSO	BTL
CO1	To understand ancient cultures and civilizations of India.	PO1,PO3,PS02	2
CO2	To understand the evolution of Buddhism along with Buddhist and Rock-cut Architecture	PO1, PO5,PS02	2
CO3	To understand the evolution of Hindu Temple Architecture	PO3, PO4,PS02	2
CO4	To understand South Indian and North Indian temple Architecture	PO3,PO5,PS02	2
CO1	To understand ancient cultures and civilizations of India.	PO1,PO3,PS02	2

### ANCIENT INDIA

Indus Valley Civilization: culture and pattern of settlement. - Aryan civilization – theories and debates of origin- origins of early Hinduism - Vedic culture - Vedic village and rudimentary forms of bamboo and wooden construction - origins of Buddhism and Jainism.

### BUDDHIST ARCHITECTURE

Evolution of Buddhism, Buddhist thought, art and culture - Hinayana and Mahayana Buddhism - interaction of Hellenic & Indian Ideas in Northern India - evolution of building typologies- the stupa, vihara and the chaitya hall - symbolism of the stupa - architectural production during Ashoka's rule Ashokan Pillar, Sarnath - rock cut caves at Barabar - Sanchi Stupa- rock cut architecture in Ajanta and Ellora - Karli - viharas at Nasik - Rani gumpha, Udaigiri - Takti Bahai, Gandhara.

### EVOLUTION OF HINDU TEMPLE ARCHITECTURE

Hindu forms of worship – evolution of temple form - meaning, symbolism, ritual and social importance of temple - categories of temple - elements of temple architecture - early shrines of the Gupta and Chalukyan periods

Tigawa temple - Ladh Khan and Durga temple, Aihole - Papanatha, Virupaksha temples, Pattadakal - Kailasanatha temple, Ellora.

### TEMPLE ARCHITECTURE - SOUTHERN INDIA

Brief history of South India - relation between Bhakti period and temple architecture - of temple towns - Dravidian Order - evolution and form of gopuram

Rock cut productions under Pallavas: Shore temple, Mahabalipuram and Kailasanatha temple, Kanchipuram - Chola Architecture: Nartamalai, Brihadeeswara, GangaikondaCholapuram and Darasuram temples — temple gateways of Madurai and Chidambaram - temple towns: Madurai, Srirangam and Kanchipuram Hoysala architecture: Belur and Halebid.

### TEMPLE ARCHITECTURE -NORTHERN INDIA

Temple architecture of Gujarat, Orissa, Madhyapradesh and Rajasthan - their salient features Lingaraja Temple, Bhuvaneshwar - Sun temple, Konarak. - Somnatha temple, Gujarat, Surya kund, Modhera Khajuraho, Madhyapradesh - Dilwara temple, Mt. Abu

**REQUIRED READINGS:**

1. Percy Brown, "Indian Architecture (Buddhist and Hindu Period)", Taraporevala and Sons, Bombay, 1983.
2. Satish Grover, "The Architecture of India (Buddhist and Hindu Period)", Vikas Publishing Housing Pvt. Ltd., New Delhi, 2003.
3. Christopher Tadgell, "The History of Architecture in India from the Dawn of civilization to the End of the Raj", Longman Group U.K.Ltd., London, 1990.

**REFERENCES:**

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

CO No:	Course Outcome (CO)	PO / PSO	BTL
1.	To Understand the definition and the purpose of design, introduce the elements and components that contribute to the definition of design. to know about the context of the architectural design problems, ideas of design methodology.	PO1,PO3,PS02	2
2.	To know about problem definition, identification of problem, user needs and requirements, Skills pertaining to drafting Philosophies, concept formulation and theories for a design.	PO1, PO5,PS02	2
3.	To understand the imagination and creative thinking skills with aspects of aesthetics, flexibility.	PO3, PO4,PS02	2
4.	Apply Design methodology and strategies to a design problem.	PO3,PO5,PS02	3

**DESIGN**

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

**DESIGN PROCESS**

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

**DESIGN PROBLEMS AND SOLUTIONS**

Different approaches to design, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design.

**DESIGN THINKING**

Understanding the terms - creativity, imagination, etc. Theories on thinking, convergent and divergent thinking, lateral and vertical thinking, creative techniques like checklists, brainstorming, syntactic, etc. design puzzles and traps, blocks in creative thinking.

**DESIGN CONCEPTS, PHILOSOPHIES AND STRATEGIES**

Various approaches to generate ideas for architectural design - types of concepts, personal philosophies and strategies of individual designers, channels that foster creativity in architecture.

**TEXT BOOKS**

1. Geoffrey Broadbent - Design in Architecture - Architecture and the human sciences – John Wiley & Sons, New York, 1981
2. Nigel Cross - Developments in Design Methodology, John Wiley & Sons, 1984



## **REFERENCE BOOKS**

1. Bryan Lauson - How Designers Think, Architectural Press Ltd., London, 1980.
2. Tom Heath - Method in Architecture, John Wiley & Sons, New York, 1984

CO No:	Course Outcome (CO)	PO / PSO	BTL
CO1	To understand cutting and sticking for making a model	Po7	2
CO2	To understand representing hills, Plateau, water bodies, furniture's, Cars.	Po7,Po8	2
CO3	To understand components of a detailed model	Po7,Po8	2
CO4	To know different materials and making model with them	Po7	2
CO5	To apply the acquired knowledge and create a model Independently by choosing appropriate material and techniques.	Po7, Po8	3

### INTRODUCTION TO MODEL MAKING

Detail description of tools used in Model making, Basic surface development, introducing Techniques used for cutting and sticking Different materials (Paper, thermocol, Foam board ....). Making models of Cube, Cylinder & Sphere from Ivory and Thermocol. Making Block Models using thermocol with simple base.

### CONTOURS MODELLING; TREES, FURNITURES, CARS, AND MINIATURE MODELS

Model making of Site with different levels using echoplex or corrugated sheet, Different ways of representing trees, cars, street lights in architectural model, Blown up model along with furniture.

### DETAILED MODEL ALONG WITH SURFACE DEVELOPMENT

Advanced Surface development (half cuts, reverse cut, elevation and slabs...), Detailed model with doors, windows, balconies and other architectural elements, making of detailed base showing roads, pathways, greens, plinth and water bodies.

### EXPLORING MATERIALS

Making models using MDF, Acrylic, Bio foam. Workshop on Tensile material, bamboo, wood, Gateway, paper Folding.

### FINAL PROJECT

The knowledge acquired from the earlier projects is used to make architectural model of Existing Building.

### REQUIRED READINGS:

1. Nick Dunn, "Architectural Modelmaking", Laurence King Publishing, 2nd edition, 2014.
2. Graham D. Pattinson, "A Guide to Professional Architectural and Industrial Scale Model Building", Prentice Hall, 1st Edition, 1982.

**REFERENCES:**

1. Martha Sutherland, "Modelmaking - A Basic Guide (Norton Professional Books for Architects & Designers)", W. W. Norton & Company, First Edition, 1999.
2. Roark T. Congdon, "Architectural Model Building", Fairchild Books, First Edition, 2010.

CO No	Course Outcome (CO)	PO / PSO	BTL
CO1	It is required that students should understand materials used in the building, method of construction and application	PO6,PO7,PO8	2
CO2	To understand the components of building and nuances of drawing plan, Elevation and section along with relevant sketches and details showing method of construction.	PO6,PO7,PO9,	2
CO3	To understand , analyze the application and different arrangement styles of building materials	PO7,PO8,PSO1	4
CO4	Students will analyze the different construction methods and details of contemporary and traditional work methods	PO4,PO7,PO9,PSO1	4
CO5	To apply the knowledge and demonstrate the techniques through study models	PO4,PO7,PO9,PSO2	3

### STONES

Geological **Classification** of rocks – test for stones, uses of stones, deterioration of stone, preservation of stones, stones available for construction in India their **properties and uses**.  
Stones for finishes – cutting & polishing – granite and marble. Artificial stone and their uses.

### BRICKS & CLAY PRODUCTS

**Bricks:** Composition of good brick, properties and uses of bricks, classification of bricks, shape of bricks, fire bricks, and substitutes for bricks **Clay products:** Tiles, terra cotta, stoneware, earthenware, porcelain, and clay blocks their properties and uses.

### BASIC BUILDING COMPONENTS, FOUNDATION, WALLS& ROOFS

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

**Foundation:** typical types of foundation in stone, brick & RCC. **Walls:** Details of walls section across the opening (door & window) **Roofs:** simple configurations and details of various forms of roofs (flat, slope pyramidal & dome)

### BRICK MASONRY

Applications:Foundation, walling, types of brick walls, brick masonry (English, Flemish, rat trapbond) detailed brick layout at corners, junctions and brick piers, style of construction viz.,exposed brick work, Reinforced brick walls, piers etc.

### BRICK ROOFING

Types of brick roofs, Madras terrace roof, jack arch roof, brick arches and domes, reinforced brick roofs, Types of arches, vaults and domes, and construction of arches, vaults and domes.

**TEXT BOOKS**

1. W.B. Mickay – *Building construction Vol 1 and 3* – Longmans, UK 1981
2. S.C.Rangwals – *Engineering materials* – Charotar Publishing, Anand.

**REFERENCE BOOKS**

1. Harold B.Olin – *Construction principles, Materials and Methods* – IFE, Chicago, 1980.
2. Dr. B.C Punmia – *Building construction*
3. R.Chudley, *construction Technology*

CO No:	Course Outcome (CO)	PO / PSO	BTL
CO1	To Understand the Principles of Shade & Shadow and Construct Sciography of Architectural Structures.	PO7,PO10	2
CO2	To Understand the concepts and Scientific Methods of Perspective Drawing and apply Rendering Techniques	PO7,PO8	2
CO3	To Learn shortcut Perspective Method and Understand the application of various architectural Elements in drawings.	Po7,Po8	2
CO4	To Understand identification and measuring of specific Architectural Details of Historically significant Buildings	PO7,PO10	2
CO5	To Understand the Historical, Structural and Architectural details of Building in order to document the information..	PO6,PSO2	3

**CIOGRAPHY**

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

**PERSPECTIVE: SCIENTIFIC METHOD**

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

**PERSPECTIVE: SHORT OUT METHOD**

Introduction to short cut perspective method. Adding of figures, trees furniture etc., shade and shadows and applying rendering techniques.

**MEASURED DRAWING: HISTORIC DOCUMENT STUDY**

Combined study of historic document along with small building by using simple measuring tools like tapes, photograph etc.

**MEASURED DRAWING: DOCUMENTATION**

Documentation of a complete building of a special interest in terms of history, building construction, architectural excellence or technology.

**REQUIRED READINGS:**

1. John M.Holmes, Applied Perspective, Sir Isaac, Piotman and Sons Ltd., London 1954.
2. Robert W.Gill, Basic Perspective, Thames and Hudson, London, 1974.
3. Leslie Martin C., Architectural Graphics, The Macmillan Company, New York, 1964.
4. Francis Ching, Architectural Graphics, Van Nostrand and Reinhold Company, NY 1975.

**REFERENCES:****I. MEASURED DRAWING**

1. Claude Batley, Indian Architecture, D.B.Taraporevale Sons and Co., Ltd., Bombay
2. William Kirby Lockard, Drawing as a Means to Architecture, Van Nostrand, Reinhold Company, New York.
3. George A Dinsmore, Analytical Graphics – D.Van Nostrand, Company Inc., Canada.

**II.PERSPECTIVE**

1. Interiors: Perspective in Architectural Design Graphic - SMA Publishing Co. Ltd., Japan, 1967.

**III. SCIOGRAPHY**

1. Ernest Norling, Perspective drawing, Walter Fostor Art Books, California, 1986.
2. Bernard Alkins - 147, Architectural Rendering, Walter Foster Art Books, 1986.
3. RoberW.Gill, Advanced Perspective, Thames and Hudson, London, 1974.

CO No:	Course Outcome(CO)	PO / PSO	BTL
CO1	To make student to remember anthropometric data, conduct desk top/case study and understand collected data towards framing parameters for Bed room design.	PO2,PO4,PO10,PSO1	2
CO2	To make student to apply and analyze collected data, to derive concepts, evaluate schematic preliminary design options and final design presentation of a Bed room for a cine actor.	PO2,PSO2	6
CO3	To make student to derive concepts, schematic preliminary design and final design presentation of a Shop front for a given context.	PO2,PO10,PSO2	6
CO4	To make student to remember anthropometric data, conduct desk top/case study and understand collected data towards framing parameters for Coffee Shop design.	PO2,PO4,PO10,PSO1	2
CO5	To make student to apply and analyze collected data, to derive concepts, evaluate schematic preliminary design options and final design presentation of Coffee Shop design.	PO2,PSO2	6

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

**Areas of focus/ concern:**

architectural form and space aesthetic and psychological experience of form and space in terms of scale, colour, light, texture, etc., function and need: user requirements, anthropometrics, space standards, circulation image and symbolism Typology/ project: bedroom, bathroom, kitchen, shop, exhibition pavilion, children's environment, snack bar, residence, petrol bunk, fire station.

**REQUIRED READING:**

1. Joseph De Chiara, Michael J Crosbie, "Time Saver Standards for Building Types", McGraw Hill Professional 2001.
2. Julius Panero, Martin Zelnik, "Human Dimension and Interior Space", Whitney Library of Design, 1975
3. Joseph De Chiara, Julius Panero, Martin Zelnik, "Time Saver Standards for Interior Design and Space Planning", McGraw Hill 2001.
4. Ernst Neuferts, "Architects Data", Blackwell 2002



5. Ramsey et al, "Architectural Graphic Standards", Wiley 2000

**REFERENCES:**

1. Hideaki Hareguchi, "A Comparative analysis of 20<sup>th</sup> century houses", Academy Editions, 1988
2. Robert Powell, "Tropical Asian House", Select Books, 1996
3. Terence Conran, "The Essential House Book", Conran Octopus, 1994
4. Sam F. Miller, "Design Process: A Primer for Architectural and Interior Design", Van Nostrand Reinhold, 1995.

### III - SEMESTER

15 AR 2108

MECHANICS OF STRUCTURES - II

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CO No:	Course Outcome (CO)	PO/PSO	BTL
CO1	Understanding Shear force and Bending moment of beams	PO7,PO9	2
CO2	Understanding Bending ,Shear stress and Principal stresses of beams	PO6,PO9	2
CO3	Understanding Buckling of columns	PO8,PO9,PSO 2	2
CO4	Understanding the concept of Statically Indeterminate Beams and Frames	PO9,PSO2	2

#### **SHEAR FORCE AND BENDING MOMENT**

Basic concepts – shear force and bending moment diagrams for cantilever and simply supported beams subjected to various types of loadings (Point loads, uniformly distributed loads) – Over hanging simply supported beams – Point of contra flexure

#### **STRESSES IN BEAMS**

Theory of simple bending – Bending stress distribution – Strength of sections – Beams of composite sections (Flitched beams) – Shearing stress distribution in beam sections

#### **DEFLECTION OF BEAMS**

Slope and deflection at a point–Double Integration method and Macaulay’s method for simply supported and cantilever beams

#### **COLUMNS**

Short and long columns – Concept of Elastic stability – Euler’s theory – Assumptions and Load carrying capacity of Columns with different end conditions – Concept of Effective length – Slenderness ratio – Limitations of Euler’s theory – Rankine’s formula.

#### **STATICALLY INDETERMINATE BEAMS**

Introduction – Determination of degree of statically indeterminacy for beams and frames – Concept of Analysis (No Problems)

#### **REQUIRED READING:**

1. R.K. Bansal, “A Text Book on Strength of Materials”, Laxmi Publications, New Delhi, 2006.
2. B.C. Punmia, “SMTS-I, Strength of Materials”, Laxmi Publications, New Delhi, 1994.

**REFERENCES:**

1. M.M. Ratwani & V.N. Vazirani, "Analysis of Structures", Vol. 1, Khanna Publishers, Delhi, 2012.
2. Timoshenko, S.P. and D.H. Young, "Elements of Strength of Materials", Fifth edition, East West Press, 1993.
3. A.R. Jain and B.K. Jain, "Theory and analysis of structures", Vol. 1, Nemchand and Bros, Roorkee, 1987.
4. R.K. Rajput "Strength of Materials", S.Chand, 2006.

CO No:	Course Outcome (CO)	PO/PSO	BTL
CO1	Understanding the evolution of early Christian and Medieval periods, its Architecture and socio – political changes.	PO1,PO3, PS02	2
CO2	Renaissance and Mannerist Architectures and their practices in Europe, growth of nations and styles of Baroque and Roccoco.	PO1, PO5,PS02	2
CO3	Understanding the Islamic principles, philosophy, & its relevance to various built forms, and the influence of Islamic architecture on Indian subcontinent. Architecture of various provinces under sultanate rule .	PO3, PO4,PS02	2
CO4	Study of Architectural developments during Mughal Dynasty, Study of cross culture influence and evolution of secular architecture in princely states	PO3,PO5,PS02	2

### EARLY CHRISTIAN AND MEDIEVAL PERIODS

Birth and spread of Christianity – transformation of the Roman Empire – early Christian worship and burial.Church planning – basilican concept: S. Hagia Sophia, Constantinople; St. Marks, Venice.The Carolingian Renaissance – Feudalism and rural manorial life – Papacy – Monasticism – Craft and merchant guilds.Romanesque churches – Development of vaulting – Pisa Group – British Cathedrals.Political and social changes: Re-emergence of the city – Crusades - Scholasticism. Development of Gothic Architecture Church plan, structural developments in France and England – Notre Dame.

### RENAISSANCE, MANNERISM AND POST RENAISSANCE MOVEMENTS

Idea of Renaissance and Humanism – Development of thought – Renaissance architecture: Brunelleschi and rationally ordered space – ideal form and the centrally planned church: Alberti and Donato Bramante – Merchant Prince palaces: Palazzo Ricardi– Villas of Palladop : Villa Capra Vicenza – Mannerist architecture : The Renaissance in transition – Michaelangelo : Library at S. Lorenzo, Florence, Capitoline Hill. Protestantism – French Revolution – Monarchy and growth of nations.Roman Baroque churches: The central plan modified – St. Peters, Rome; French Baroque: Versailles – English baroque – Sir Christopher wren; St. Paul’s London – Rococo Architecture.

### INTRODUCTION TO ISLAMIC ARCHITECTURE IN INDIA

History of Islam: birth, spread and principles - evolution of building types in terms of forms and functions: mosque, tomb, minaret, madarasa, palace, caravanserai, market - character of

Islamic architecture: principles, structure, materials and methods of construction, elements of decoration, colour, geometry, light. Islamic architecture in India: sources and influences.

### **PROVINCIAL ISLAMIC ARCHITECTURE AND DELHI SULTANATE**

Shift of power to the provinces and evolution of regional architecture with their own unique influences: geographic, cultural, political, etc., - important examples for each region, Deccan (Gulbarga, Bidar, Golconda and Bijapur) .

Establishment of the Delhi Sultanate- evolution of architecture under the Slave, Khalji, Tughlaq, Sayyid and Lodhi Dynasties – tombs in Punjab- important examples for each period

### **MUGHAL ARCHITECTURE**

Mughals in India- political and cultural history- synthesis of Hindu-Muslim culture, Sufi movement - evolution of architecture and outline of Mughal cities and gardens under the Mughal rulers: Babur, Humayun, Akbar, Jahangir, Shahjahan, Aurangzeb- important

examples- decline of the Mughal empire.

Cross cultural influences across India and secular architecture of the princely states: Oudh, Rajput, Sikh, Vijayanagara, Mysore, Madurai- important examples

### **REQUIRED READING:**

1. Sir Banister Fletcher, "A History of Architecture", CBS Publishers, 1996.
2. Spiro Kostof, "A History of Architecture - Setting and Rituals", Oxford University Press, London, 1995.
3. Brown Percy, "Indian Architecture (Islamic Period)", Taraporevala and Sons, Bombay, 1983.
4. Satish Grover, "Islamic Architecture in India", CBS Pub, New Delhi, 2002

### **REFERENCES:**

1. George Mitchell, "Architecture of the Islamic World - Its History and Social meaning", Thames and Hudson, London 1978.
2. Robert Hillenbrand, "Islamic Architecture- Form, Function and Meaning", Edinburgh University Press 1994.
3. Christopher Tadgell, "The History of Architecture in India", Penguin Books (India) Ltd, New Delhi, 1990.
4. R.Nath, "History of Mughal Architecture", Vols I to III - Abhinav Publications, New Delhi, 1985.

CO No	Course outcome's	PO/PSO	BTL
CO 1	To understand the relation between climate and human comfort.	PO4	1
CO 2	To study of heat flow through building envelopes and design of solar shading devices.	PO1,PO4	1
CO 3	To study of airflow in natural and built forms	PO4,PO5	1
CO 4	To understand the capabilities in climate responsive building designs.	PO1,PO5,PSO2	1

### CLIMATE AND HUMAN COMFORT

Factors that determine climate of a place – Components of Climate – Climate classifications for building designers in tropics – Climate characteristics. Human body heat balance – Human body heat loss – Effects of climatic factors on human body heat loss – Effective temperature – Human thermal comfort – Use of C.Mahony's tables.

### DESIGN OF SOLAR SHADING DEVICES

Movement of sun – Locating the position of sun – Sun path diagram – Overhead period– Solar shading–Shadow angles – Design of appropriate shading devices

### HEAT FLOW THROUGH BUILDING ENVELOPE CONCEPTS

The transfer of heat through solids – Definitions – Conductivity, Resistivity, Specific heat, Conductance, Resistance and Thermal capacity – Surface resistance and air cavities – Air to air transmittance (U value) – Time lag and decrement – Types of envelopes with focus on glass.

### AIR MOVEMENT DUE TO NATURAL AND BUILT FORMS

The wind – The effects of topography on wind patterns – Air currents around the building – Air movement through the buildings – The use of fans – Thermally induced air currents – Stack effect, Venturi effect – Use of court yard.

### CLIMATE AND DESIGN OF BUILDINGS

Design strategies in warm humid climates, hot humid climates, hot and dry climates and cold climates – Climate responsive design exercises

### REQUIRED READINGS:

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

### REFERENCES:

1. Martin Evans, "Housing Climate and Comfort", Architectural Press, London, 1980
2. B. Givoni, "Man, Climate and Architecture", Architectural Sciences Series – Applied Science Publishers Ltd., London, 1981.
3. B. Givoni, "Passive and Low Energy Cooling of building", Van Nortrand Reinhold New York, USA, 1994.

4. Galloe, Salam and Sayigh A.M.M., "Architecture, Comfort and Energy", Elsevier Science Ltd., Oxford, U.K., 1998.

CO No	Course outcome's	PO/PSO	BTL
CO 1	Understanding of the building materials Soils and Lime	PO3,PO6	2
CO 2	Understanding of the building materials Bamboo.	PO6	2
CO 3	Understanding of the building materials Timber	PO8	2
CO 4	Understanding of the building materials Straw bales.	PO4,PO6,PO8	2

**SOILS**

Fundamentals of Soils, Principles of Soil Stabilization, Characteristics of core, Types of Stabilizers, Requirements and Types of mudwall building and surface protection.

**LIME**

Types of lime, Classification of lime, comparison between fat lime and hydraulic lime, Manufacturing process slaking, hardening – Testing and Storage, Lime putty, Precautions in handling and uses of lime.

**BAMBOO AND OTHER MATERIAL**

Bamboo – Bamboo as plant classification, species, geographical distribution, Anatomy of Bamboo, Properties, strength, processing, harvesting, working of Bamboo tools – Treatment and preservation of Bamboo and uses of Bamboo.

Cane, gate, coir, coconut - Growth, Form, Shape, Leaves, Flowering, Propagation Roofing materials – Thatch, grass, Bamboo, reeds

**STRAWBALES**

Straw as a building material-physical aspects - Basics, Fire, moisture, insects and pests proof. Plastering straw bale walls, straw bale roof.

**TIMBER**

Classification of trees, structure of trees, Defects in timber, Storage of timber, Uses of timber, characteristics, seasoning of timber, Defects and diseases, Decay of timber, Preservation, Fire resistance, Conservation of timber.

**REQUIRED READING**

1. Don A. Watson, "Construction Materials and Processes", McGraw Hill, 1972.
2. W.B. McKay, "Building Construction", Vol, 1 and 2, Longmans, UK, 1981.
3. S.C Rangwala "Building Construction", Charotar Publishing House, India, 2000.
4. S.K.Sharma, "A Text book of Building Construction", S.Chand& Co Ltd., New Delhi, 1998.

**REFERENCES**

1. American Institute of Timber Construction (AITC), "Timber Construction Manual", Wiley Publishers, 2004.
2. Francis D.K Ching "Building Construction" illustrated, John Willey & Sons, 2008.
3. Barry, "Construction of Buildings", Volume 1&2, Blackwell Publishing Ltd., Oxford, 2005.
4. Wills H Wagner, Howard Bud, "Modern Carpentry", Good Heart – Wilcox publishers, Portland, 2003



CO No	Course outcome's	PO/PSO	BTL
CO 1	To understand the basics of computer system and their supporting technologies.	PO7	1
CO 2	To create documentation reports, analysis reports; and audio visual presentations.	PO7,PO8,PSO1	3
CO 3	To reciprocate the tools of 2D visualization to create architectural drawings.	PO7,PO8,PSO2	3
CO 4	To create layouts, plot/print to scale drawings	PO7,PSO2	2
CO 5	To design and edit 2D graphic images	PO7,PSO2	3

### INTRODUCTION TO COMPUTER AND IMAGE EDITING

Technology of small computer system, computer terminology operation principles of P.C, introduction to application software, and graphic system, and use of printers, scanner, plotter, File management, etc. Understanding Bitmap images and Vector Graphics, Image size and Resolution. Basic Tools for Editing and Creating Graphics.

### PRESENTATION AND ANALYSIS TOOLS

Introduction to tools which help them create audio – visual presentations and architectural data analysis such as word processing package, spread sheets, multimedia presentations. Detail application of tools which enhance presentation and documentation skills – formatting text, inserting tables, pictures, creating charts, creating formulas, slide animations etc.

### THE BASICS OF BUILDING MODELLING

Understanding the drawing unit's settings, templates, coordinate system, limits, drawing tools, drawing objects, object editing, text, and dimensioning. Layers, transparent overlays, hatching utilities, line type, line weight and colour. Multiline, Polyline, etc. Styles, blocks and symbol library.

### VIEWING THE BUILDING MODEL AND PUBLISHING

Introduction to basics of 3D settings and its interface. Layout settings, scales, view ports, plot/print settings.

### EDITING TOOLS

Introduction to software's and system requirements, preferences, terminology, and editing tools. Selections, choosing foreground and background colour, visual editing of architectural plans, editing of images for presentations etc.

### REQUIRED READING:

1. Deke McClelland, "Photoshop 7 Bible Professional Edition", Wiley John & Son INC, New York, 2000.
2. Aouad, "Computer Aided Design guide for Architecture, Engineering and construction", Spon process, 2012.

3. Adobe Creative Team – Adobe Photoshop CS (Class Workbook).

**REFERENCES:**

1. Ralph Grabowski, “The Illustrated AutoCAD 2002 Quick Reference”, 1<sup>st</sup> edition, Cengage Learning, 2001.
2. Sham tikoo, “Autocad 2000: A Problem-Solving Approach”, .Delmar Cengage Learning, 1999.
3. Fiorello. J. A., “CAD for Interiors beyond the basics”, Wiley publications, 2011.

CO No:	Course Outcome (CO)	PO/PSO	BTL
CO1	To understand the construction of doors and windows in accordance with the type of usage.	PO1,PO3,PS02	2
CO2	To understand the uses of wooden trusses and staircases in construction industry/practice.	PO1, PO5,PS02	2
CO3	To understand the installation of paneling, soundproof and light weight partitions	PO3, PO4,PS02	2
CO4	To understand the techniques of bamboo constructions	PO3,PO5,PS02	2
CO5	To understand the construction techniques of wall and kitchen cabinets	PO3,PO5,PS02	2

#### **TIMBER -JOINERY AND WALLING**

Methods of construction using natural timber in joinery works including methods of fixing and options for finishing - Windows (panelled, louvered, glazed and sliding windows) - Doors (panelled, glazed, sliding, sliding/folding, louvered and pivoted) – Ventilators (top hung, bottom hung, pivoted, louvered, and glazed), structural components of the building such as walls,

#### **FLOORS TRUSSES AND STAIRCASES**

Methods of construction using natural timber in various structural components of the building such as floors, roof trusses - Exercises involving the above through case studies - Types of timber staircases. Methods of construction of timber staircases- basic principles and design details including detailing of handrail and baluster- Exercises involving the above through drawings.

#### **PARTITIONS AND PANELLING**

Methods of construction using man-made timber products such as ply woods, block boards, etc., in fixed partitions, sliding/folding partitions, wall paneling. - Exercises of the above through drawings and case studies.

#### **BAMBOO AND OTHER MATERIALS**

Design and Construction Techniques using bamboo for building components for small scale buildings like snack bar, tree house including detailing of doors and windows, arches, barrel walls, weave structures and understanding of the same through case studies

Cane, gate, coir, coconut - Growth, Form, Shape, Leaves, Flowering, Propagation Roofing materials – Thatch, grass, Bamboo, reeds – Basics – Case studies and applications.

#### **FURNITURE AND FITMENTS**

**Showcase and Shelf:** TV Shelf, showcase and room dividers, dressing wardrobe.

**Cupboard & cabinet:** kitchen cupboards and wall cabinets

#### **REQUIRED READING**

1. Don A. Watson, "Construction Materials and Processes", McGraw Hill, 1972.
2. W.B. McKay, "Building Construction", Vol, 1 and 2, Longmans, UK, 1981.
3. S.C Rangwala "Building Construction", Charotar Publishing House, India, 2000
4. S.K.Sharma, "A Text book of Building Construction", S.Chand& Co Ltd., New Delhi, 1998

#### **REFERENCES**

1. American Institute of Timber Construction (AITC), "Timber Construction Manual", Wiley Publishers, 2004
2. Francis D.K Ching "Building Construction" illustrated, John Willey & Sons, 2008.
3. Barry, "Construction of Buildings", Volume 1&2, Blackwell Publishing Ltd., Oxford, 2005.
4. Wills H Wagner, Howard Bud, "Modern Carpentry", Good Heart – Wilcox publishers, Portland, 2003.

CO No	Course outcome (CO)	PO/PSO	BTL
CO 1	To understand and analyze the use, the spaces and the concepts of different Bungalow	PO2,PO4,PO10,PSO1	2
CO 2	To design a Bungalow	PO2,PSO1	3
CO 3	To understand and analyze the spaces, connectivity and the standards of Institution buildings.	PO2,PO10,PSO2	2
CO 4	To design an institution oriented building Nursery School	PO2,PSO2	3
CO 5	Time Problem - To design an Salon	PO2,PO10,PSO2	3

**CONTENT:**

Scale and Complexity: Project involving organization of multiples of single unit space with predominantly horizontal movement as well as single use public buildings of small scale; passive energy

Areas of concern/ focus:

- form-space relationships
- spatial organization
- behavioral aspects especially those relating to children
- site planning aspects
- appropriate materials and construction

Suggestive Typologies/ projects: residential buildings, institutional buildings: nursery or primary schools, schools for children with specific disabilities, primary health center, banks, neighbourhood market, neighbourhood library, Gate complexes including security Kiosk and entry / exit gates.

**REQUIRED READING**

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

## REFERENCES

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

## IV SEMESTER

15 AR 2213

DESIGN OF STRUCTURES - I

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CO No	Course outcome's	PO/PSO	BTL
CO 1	Design the structural components timber and their general behavior with reference to code provisions, Madras roof terrace.	PO1,PO3	6
CO 2	Design of bolted and welded connections	PO1,PO3	6
CO 3	Design the tension members	PO1,PO3	6
CO 4	Design the compression members, Design of steel beams - laterally supported	PO1,PO3	6

### OBJECTIVES:

- To introduce the design of various timber components in a building.
- To enable the understanding of the types, efficiency and strength, advantages and disadvantages of Rivet and welded joints in steel.
- To enable the design of Tension (beams) and compression (columns) steel members in a building under various conditions.
- Case studies and models wherever applicable.

### TIMBER STRUCTURES - DESIGN OF BEAMS AND COLUMNS

Grading of Timber – Permissible Stresses – Design of timber beams – Madras terrace roof – Design of timber columns.

### STEEL STRUCTURES - BOLTED AND WELDED JOINTS

Assumptions – failure of Bolted joints – Strength and Efficiency of Bolted Joints – Types – Design of Bolted Joints for Axially Loaded Members (Excluding eccentric connections) Types of welded joints – Advantages and disadvantages – Design of Fillet welds (Excluding eccentric connections). (Exercises)

### TENSION MEMBERS

Introduction – Net sectional area – permissible stresses. Design of Axially Loaded Tension member – Lug angle – code provision – tension splice.

### COMPRESSION MEMBERS

Introduction – various sections – built up section – Design of columns (excluding Lacing, Battening and other connections.)

### STEEL BEAMS

Introduction – laterally supported and unsupported beams – Design of laterally supported beams.

**REQUIRED READING:**

1. M.R. Shiyekar, "Limit State Design in Structural Steel", PHI Learning Private Limited, 2010.
2. N. Subramanian, "Design of Steel Structures", Oxford Higher Education, 2008.

**REFERENCES:**

1. S.K. Duggal, "Limit State Design of Steel Structures", McGraw Hill Education, Private Limited, 2010.
2. Dr. V. L. Shah, Prof. Veena Gore, "Structures Publications", Pune, 2012.
3. S.S. Bhavikatti, "Design of Steel Structures" by Limit State Method as per IS800-2007, I.K. International Publishing House Pvt, Ltd, 2012.



CO No	Course Outcome(CO)	PO / PSO	BTL
CO1	Understanding of the building materials - Cement and RCC.	PO3, PO6	2
CO2	Understanding of the building material - Steel.	PO6	2
CO3	Understanding of the building material - Glass.	PO8	2
CO4	Understanding of the building material - Paints.	PO8, PSO2	2

**OBJECTIVES:**

- To have an understanding of the properties, characteristics, strength, manufacture, processing and application of materials such as cement, glass, paints and other finishing materials.
- To inform about the properties, characteristics and use of concrete in construction including its manufacture.
- To inform about the properties, characteristics and manufacture of various type of concrete using aggregates.

**CEMENT:** Manufacturing process, physical and chemical properties, classification of cast-in situ and precast systems. Foundation, column & beam structure, lintels, sunshades, floor and roofslabs in concrete, granolithic flooring, CC blocks (solid & hollow), fly ash bricks as a walling material, cement bonded particle boards. Different grades, composition, preparation and properties of cement mortar. Use and selection of mortar for different construction works.

**STEEL:** Steel - definition, properties, Manufacture, casting, heat treatment, mechanical treatment process of steel, market forms of steel, fire protection of steel - Corrosion of ferrous metals (Causes, factors of corrosion and prevention).

Steel alloys- properties and uses. Structural steel-definition and protection. Steel sheeting- types of sheeting. Stainless steel in building Industry as a structural entity by studying codes. Study of innovations in steel industry. Design and construction parameters developed by INSDAG.

**GLASS:** Composition of glass, brief study on manufacture, treatment, properties and uses of glass. Types of glass - float glass, cast glass, glass blocks, foamed glass. Decorative glass, solar control, toughened glass, wired glass, laminated glass, fire-resistant glass, glass blocks, structural glass - properties and application in building industry, glazing and energy conservation measures.

**RCC:** Definition, properties, specification, water cement ratio, preparation, placing, curing, casting and different equipments used, fine and coarse aggregates, types of concrete (aerated, polymer, ready mix, fibre reinforced) and grades of concrete, P.C.C, and R.C.C.

## **PAINTING AND VARNISHING**

**Paints:** characteristic of an ideal paint, types of paints, defects in painting, painting on different surfaces. **Varnishing:** characteristics of an ideal, varnish types of varnishes, process of varnishing. **Distemper:** properties of distempers, process of distempers. **Wall finishes:** wall paper, whitewashing and colour washing for walls.

### **REQUIRED READING:**

1. S.C.Rangwala, "Engineering Materials", Charotar Publishing House, India, 1997.
2. S.K Duggal, "Building Materials", Oxford and IBM Publishing Co, Pvt. Ltd., 1997.
3. P.C Varghese, "Building Materials", Prentice Hall of India Pvt. Ltd., New Delhi, 2005

### **REFERENCES:**

1. Arthur Lyons, "Materials for Architects and Builders", An introduction Arnold, London, 1997.
2. Don A.Watson, "Construction Materials and Processes", McGraw Hill Co., 1986.
3. S.N Sinha, "Reinforced Concrete Design", Tata-McGraw Hill, New Delhi, 2002
4. Howard Kent Preston, "Prestressed concrete for Architects and Engineers", McGraw Hill, New York, 1964

CO No:	Course Outcome (CO)	PO/PSO	BTL
CO1	To make students understand about the basics of site, it's measuring and drawing methodologies.	PO9	2
CO2	To explain the importance of analysis of a site required in architectural design and building construction.	PO3	2
CO3	To make students understand the context of the site with respective to the surrounding land use typology.	PO3	2
CO4	To discuss about the site planning techniques and layout principles to be followed prior to site designing.	PO4	2

**OBJECTIVES:**

- To teach the importance of site and its content in architectural creations.
- To orient the students towards several influencing factors which govern the siting of a building or group of buildings in a given site.
- To teach various techniques of site analysis through exercises and case studies.
- To teach the students the methodology of preparing a site analysis diagram. This will serve as a prelude to any architectural creation through exercises.

**INTRODUCTION**

Definition of plot, site, land and region, units of measurements. Introduction to survey, methods of surveying, where they are used, Surveying Instruments and their application. Need for surveying. Measuring and drawing out a site plan from the measurements

**SITE DRAWINGS**

Computation of area by geometrical figures and other methods. Drawing marking out plan, layout plan and centerline plan – Importance, procedure for making these drawings and dimensioning. Setting out the building plan on site – Procedure and Precautions. Exercises on the above.

**SITE ANALYSIS**

Importance of site analysis; Onsite and off-site factors; Analysis of natural, cultural and aesthetic factors – topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available - sources of water supply and means of disposal system, visual aspects; Preparation of site analysis diagram. Study of microclimate: - vegetation, landforms and water as modifiers of microclimate. Study of land form; - contours, slope analysis, grading process, grading criteria, functional and aesthetic considerations – Case studies and exercises on the above.

**SITE CONTEXT**

Context of the site. Introduction to existing master plans land use for cities, development control Rules. Preparation of maps of matrix analysis & composite analysis. Site selection criteria for housing development, commercial and institutional projects - Case studies.

## **SITE PLANNING AND SITE LAYOUT PRINCIPLES**

Organization of vehicular and pedestrian circulation, types of roads, hierarchy of roads, networks, road widths and parking, regulations. Turning radii & street intersections

### **REQUIRED READING:**

1. Kevin Lynch, "Site planning", MIT Press, Cambridge, MA, 1984.
2. Edward. T. Q., "Site Analysis", Architectural Media, 1983.

### **REFERENCES:**

1. B.C.Punmia, Ashok K. Jain, Ashok Kr. Jain, Arun Kr. Jain, "Surveying", Vol.I, Firewall Media, 2005.
2. P.B.Shahani, "Text of surveying", Vol. I, Oxford and IBH Publishing Co, 1980.
3. Joseph De.Chiarra and Lee Coppleman, "Urban Planning Design Criteria", Van Nostrand Reinhold Co., 1982
4. Storm Steven, "Site engineering for landscape Architects", John wiley& Sons Inc, 2004.
5. Second Master Plan – Development Regulations – CMDA, 2008.

CO No:	CO	PO/PSO	BTL
CO1	Understanding Surveying using Chain and Compass.	PO8	2
CO2	Understanding Surveying using Dumpy Level and Theodolite.	PO8	2
CO3	Understanding Surveying using Total Station and Alidade.	PO8	2
CO4	Applying survey practices in field	PO10	3

**Objectives:**

To equip students with the basic principles and theories which underlie the systematic study of topographic features, basic skills of landform analysis through map and field observation, need and role of Surveying and Levelling related to Architecture, preparation and interpretation of survey drawings, methods, tools and equipment necessary to carryout different survey procedures and recent advancements in the field of landforms survey and measurements.

**Introduction**

Reading of survey Maps, understanding of features and undulations of Ground. Scales used in Plotting. Study of land forms, topography and contours, slope analysis, grading process; graphic representations of landforms. Principles, definitions, units, scales, symbols and instruments used in Surveying, common errors in surveying and their corrections.

**Linear Measurements**

Measurements in horizontal plane, linear measurements with chain & tape, setting-out & survey stations, survey accessories, survey lines, open & closed traverse, chaining & offsetting, direct & indirect ranging, log-books, field boundaries, field area estimation. Compass survey, bearings & angles, local attractions, errors in compass survey.

**Contours in Landforms**

Characteristics, contour intervals, direct & indirect methods of contouring, block contour surveys, profile levelling, longitudinal & traverse cross sections, gradients, Contouring methods & equipment, plane-table, plotting contours & profiles, estimating areas & volumes.

**Sloping Landforms and Levelling**

Measurements along sloping landforms, principles, definitions, methods, instruments, & staff required for levelling, simple & differential levelling, dumpy level, adjustments, hand signals, reduced levels, rise & fall methods, errors in levelling, level tube & barometric levelling.

**Precision methods in Landforms Survey & Measurement**

Theodolite surveying, temporary adjustments, horizontal & vertical angles, closing errors and balancing traverse, automated & digital surveying, Total station, G.P.S, Aerial Photography, digital levels, auto-levels.

**References:**

1. Miller, V. C. and Westerback, M. E. (1989). *Interpretation of Topographic Maps*. Columbus: Merrill.
2. Lynch, K. and Hack. G. (1984). *Site Planning*. 3rd Ed. Cambridge: Maple-Vail Inc.

3. Easterbrook, D.J. (1999). *Surface Processes and Landforms*. 2nd Ed. New York: McMillan.
4. Carson, M. A. and Kirkby, M. J. (1972). *Hill slope Form and Process*. London and New York: Cambridge University Press.
5. Arora, K.R. (2004). *Surveying Vol. 1-3*. Delhi: Standard Book House.
6. Chandra, A. M. (2002). *Plane Surveying*. New Delhi: New Age International.
7. Duggal, S. K. (2004). *Surveying Vol. 1-2*. New Delhi: Tata McGraw Hill.
8. Punmia, B. C., Jain, A. K. and Jain, A. K. (2005). *Surveying Vol. I-III*. New Delhi: Laxmi Publications.
9. Shahani, P. B. (1980). *Text of Surveying Vol. I*. Oxford and IBH Publishing.
10. Subramanian, R. (2012). *Surveying and levelling*. New Delhi: Oxford University Press.

CO No:	Course Outcome	SO	BTL
CO1	To memorize anthropometry, circulation patterns, standards various facilities to be provided.	PO2,PO4, PO10,PSO 1	2
CO2	To create and design spatial planning, circulation and functionally good community oriented open spaces – <b>Project 1</b>	PO2,PO4, PO9	6
CO3	To Create and design functional and activity oriented community spaces- <b>Project 2</b>	PO2,PO4, PO9,PO10	6
CO4	To analyze the architecture, rural planning, infrastructure and settlement planning of a village (rural settlement)	PO2,PO4, PO9	2
CO5	To document the observations and compile the analysis for presentation – <b>Project 3</b>	PO2,PO4, PO9,PO10 ,PSO2	5

**OBJECTIVES:**

- To create a holistic understanding of the socio-cultural, geographic and economic aspects that shape the built environment as well as to expose the students towards the design of simple community oriented buildings.
- To make a comprehensive study of a rural settlement that is an exemplar of collective design evolved organically over a period of time.
- To expose the students on the methodology of conducting various surveys covering, physical, visual characteristics and demographic aspects.
- To understand the vernacular / traditional architecture involving local materials and construction techniques.
- To emphasis on the importance of designing built form and open spaces that meet the aspirations of the community.
- To enable the presentation of concepts through 2D and 3D presentation including sketches and model.

**CONTENT:**

Scale and Complexity: Projects involving public and community oriented buildings - multi room, single use, small span, multiple storied, horizontal and vertical movement; active cum passive energy; comprehensive analysis of rural settlement in a hierarchical manner.

Area of concern/ focus:

- Rural settlements and architecture
- Community oriented design
- Simple public buildings (not more than Ground+ 2 floors)

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

**REQUIRED READING**

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

**REFERENCES:**

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



CO No	Course outcome (CO)	PO/PSO	BTL
CO 1	It is important for students to understand the construction of doors and windows in accordance with the type of usage	PO1,PO3,PS02	2
CO 2	Students learn how to use R.C.C in Structural and non-structural building components in construction industry/practice.	PO1, PO5,PS02	2
CO 3	Clear understanding on paneling ,soundproof and light weight partitions	PO3, PO4,PS02	2
CO 4	Students should also understand the techniques of water proofing and damp proofing.	PO3,PO5,PS02	2

### GLASS IN BUILDINGS

**Glass:** - Classification of glass, types of glass, physical properties and uses of glass, special varieties of glass and Architectural glass.

Construction methods using glass for single storey glass structures like pavilions, green houses, staircases. Construction methods using glass for single/multi-storey buildings including curtain walling details – Exercises of the above through case studies and drawings.

### DOORS WINDOWS AND VENTILATORS

Types of doors based on the make (battened, ledged, braced, flush, panelled, framed and etc.) usage (pivoted, single leaf, double leaf, revolving, swing, rolling shutter, safety doors, collapsible, etc.), hardware fixtures, joinery, door-fixing details, and types of materials used in doors (wood, metal, glass, aluminium, & PVC).

Types of windows based on the make (sliding, pivot, casement, louvered, fixed, bay window, etc.) and material (wood, steel, glass and aluminium) hardware fixtures, joinery, windowfixing details.

### STEEL STRUCTURES

Introduction to Steel structures: Steel structural shapes, Introduction to IS 800; Rivets, Design of steel structural members, tension, compression and bending Members.

Concepts of connections, design of riveted and welded connections like beam end connections. Design of Steel Beams and Columns, Concepts of plate girders.

Design of laterally supported and unsupported beams. Beams subjected to bi-axial bending, built-up beams - design concepts with flanged plates.

Theory of columns, slenderness ratio, design of axially loaded steel columns, design of built-up lacing and battened columns.

## **PARTITIONS AND FALSE CEILING**

Introduction, requirement of partition, types of partitions (viz. Brick, clay, concrete, glass, timber, gypsum etc.) Various types of panelling (glazed, wooden etc.), details for panelling, sound proof and lightweight partitions.

## **WATER PROOFING AND DAMP PROOFING**

Causes and defects of dampness, methods adopted for waterproofing and damp proofing at different levels of a building, admixtures and different materials (rigid, flexible) used in the process.

**Damp proofing:** Hot applied and cold applied – Emulsified asphalt, Bentonite clay. Butyl rubber, silicones, Vinyls, Epoxy resins and metallic water proofing materials, their properties and uses.

**Waterproofing:** water proofing membranes such as rag, asbestos, glass felt, plastic and synthetic rubber-vinyl, butyl rubber, neoprene, polyvinyl chloride – prefabricated membranes sheet lead, asphalt their properties and uses.

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

## **REQUIRED READING**

1. Don A. Watson, "Construction Materials and Processes", McGraw Hill, 1972.
2. W.B. McKay, "Building Construction", Vol, 1 and 2, Longmans, UK, 1981.
3. S.C Rangwala "Building Construction", Charotar Publishing House, India, 2000.
4. S.K.Sharma, "A Text book of Building Construction", S.Chand & Co Ltd., New Delhi, 1998.

## **REFERENCES**

1. American Institute of Timber Construction (AITC), "Timber Construction Manual", Wiley Publishers, 2004.
2. Francis D.K Ching "Building Construction" illustrated, John Willey & Sons, 2008.
3. Wills H Wagner, Howard Bud, "Modern Carpentry", Good Heart – Wilcox Publishers, Portland, 2003.
4. Barry, "Construction of Buildings", Volume 1&2, Blackwell Publishing Ltd., Oxford 2005.

CO No	Course Outcome (CO)	PO / PSO	BTL
CO1	To understand interface, workspace and utilization of tools of 3D modeling software	PO7	2
CO2	To apply the required tools and components in building a 3D model	PO7, PO8	3
CO3	To understand, visualize the space and apply the tools of BIM software.	PO7	1
CO4	To understand, visualize the space and identify the need of tools of BIM software.	PO7, PO8	2
CO5	To create a detailed 3D model by working in collaboration by application of advanced tools	PO7	3

### INTRODUCTION

Explain the uses of BIM (building information Modeling), touching upon the Concepts used in 2D Drawing and extending to 3D Modeling, Basic awareness on Interface, Setting up workspace.

### BASIC MODELING

3D modeling using Walls – Windows – Doors– floors – Slabs – Staircase – Railing – Furniture. Basic editing of components.

### DOCUMENTATION

Using Cross Sections Tool. Exporting 3D Model to Architectural 2D- Drawings (Plans – Elevations – Sections – Details.).

### VISUALIZATION

Introduction – Applying materials – Creating and Editing materials – Setting up Camera – Rendering settings – Enhancing final output using Image editing software.

### ADVANCED MODELING

Curtain Walls – Columns – beams – Massing – working in collaboration – Adding Architectural Elements – Creating components – Rendering in Cloud.

### REQUIRED READING:

1. Ryan Duell, [Tobias Hathorn](#) , [Tessa ReistHathorn](#), “Autodesk Revit Architecture 2016 Essentials: Autodesk Official Press”, Sybex, First Edition, 2016.
2. Eric Wing, “Autodesk Revit 2017 for Architecture No Experience Required”, Sybex, First Edition, 2016.

**REFERENCES:**

1. Marcus Kim, Lance Kirby, Eddy Krygiel, "Mastering Autodesk Revit 2017 for Architecture", Wiley India, 2016.
2. [Prof Sham Tickoo Purdue Univ](#), "Exploring Autodesk Revit 2017 for Architecture", CADCIM Technologies, 13<sup>th</sup> Edition, 2016.

## V SEMESTER

15 AR 3118

DESIGN OF STRUCTURES II

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CO No	Course Outcome (CO)	PO / PSO	(BTL)
CO 1	Understanding Concept of Elastic method, Ultimate Load Method and Limit State Method, Analysis and Design of beams by WSM	PO7,PO9	2
CO 2	Analysis and design of beams – Design of Continuous beams by LSM	PO6,PO9	3
CO 3	Understanding Behavior and design of one way and two-way slabs by LSM	PO8,PO9	2
CO 4	Understanding Design of circular slabs, Design of staircase by limit state method (LSM)	PO9	2

### OBJECTIVES:

- To inform about the methods of design through working stress and limit state methods.
- To use the above two methods for the design of Concrete beams and slabs under various conditions.
- To use the limit state method for design of a concrete staircase. Case studies and models wherever applicable.

### DESIGN OF CONCRETE MEMBERS AND WORKING STRESS

#### DESIGN OF BEAMS

Concept of Elastic method, Ultimate Load Method and Limit State Method – Advantages of Limit State Method over other methods. Analysis and Design of Singly and Doubly reinforced rectangular and flanged beams for bending.

#### LIMIT STATE DESIGN OF BEAMS

Analysis and design of singly and doubly reinforced rectangular and flanged beams for Bending – Design of Continuous beams using IS code co-efficient.

#### LIMIT STATE DESIGN OF SLABS

Behavior of one way and two-way slabs – Design of one way and two-way slabs for various edge conditions - Corner effects.

#### DESIGN OF CIRCULAR SLABS

Design of Simply supported and fixed Circular slabs subjected to uniformly distributed loads.

#### DESIGN OF STAIRCASE BY LIMIT STATE METHOD

Types of Staircases – Design of Dog Legged Staircase.

#### REQUIRED READING

1. S.N. Sinha, "Reinforced Concrete Design", Tata McGraw Hill Publishing Co. Ltd, New Delhi, 1998.
2. Shah, "Reinforced Concrete", Vol. 1 and 2, Charotar Publishing House, Anand, 1998.

CO No	Course outcome's	PO/PSO	BTL
CO 1	To Understand the professional role and ethics and also get well versed with the relation between services and monetary agreements based on the norms.	PO1,PO8	2
CO 2	To Understand various building regulations and legislations applicable in practice and competitions	PO3, PO7	2
CO 3	To Understand in detail the regulations and norms for special mandatory services in a building	PO5, PO7	2
CO 4	To Understand the administrative processes that have to be dealt with in the professional practice.	PO3,PO5	2

**Objectives:**

To develop understanding of the duties and liabilities of an architect along with knowledge of bye-laws that relate to the building & the environment in the Indian context.

**THE PROFESSIONAL ROLE OF AN ARCHITECT & SERVICES RENDERED**

Architect's role in society, IIA code of conduct, salient features of **architect's act 1972**, the council of architecture – Management of an architect's office, elementary accountancy required for the same etc.

**Architectural services**- conditions of agreement- scope of work, comprehensive architectural services and architectural competitions, conditions of engagement, remuneration, professional fees and charges as per IIA norms.

**ARCHITECTURAL COMPETITIONS & LEGISLATIONS**

Regulations governing the **conduct of competitions**, open & closed competitions, appointment & duties of Assessors, instructions to participants, award of premium. Role of development authorities & urban commissions, AP Building bye-laws and regulations, factory rules, - Environmental acts & laws, special rules governing hill area development & coastal area management, heritage act of India etc.

**STUDY OF BUILDING REGULATIONS**

Overview of administrative process for obtaining building permits at various stages; General land use, building classifications and permissible uses; Norms for exterior and interior open spaces, setbacks and margins, norms for building projections in open spaces, consideration in FAR, guidelines for open green spaces.

**NORMS**

**Vehicular Access:** Means of access, norms for access widths for various types of buildings, requirements of parking spaces, standards for turning radius, access to service areas.

**Fire Protection:** Overview of fire protection norms for various building classifications, norms for fire exit ways and building materials, concept of fire zoning, doorways, stairways, passages and corridors, fire escapes etc.

**Building services:** Norms for lighting and ventilation, Introduction to basic terminologies, components of daylight factor, general principles of opening for good lighting, considerations

in artificial lighting; general principles for natural and mechanical ventilation, overview of norms for acoustical and electrical installations.

**Parts of buildings:** Plinth, Habitable rooms, kitchen, wet areas, mezzanine, store rooms, elevated parts like chimneys, parapets etc.

### **GOVERNING BODIES AND DEVELOPMENT AUTHORITIES**

Study the Role and functions of the administrative and Development authorities- Vijayawada Municipal Corporation, CRDA (Capital Region Development Authority) etc and the local regulations for building permissions, architectural control and provision of building services, regulations for super structures, building height regulations, regulations for multi storied buildings etc.

### **REQUIRED READING:**

1. G.O.Ms.No.119, Dt.28-03-2017 – The Andhra Pradesh Building Rules – 2017
2. CRDA Master plan
3. AP Reorganization Act
4. National Building Codes

### **REFERENCES:**

1. Second Master Plan – Development Regulations – CRDA,
2. Publications of Handbook on Professional practice by IIA.

CO No	Course Outcome (CO)	PO / PSO	BTL
CO1	To understand the need for Landscape architecture in a design project.	PO2	2
CO2	To understand various types of Landscape architectures prevailing in different countries	PO4	2
CO3	To understand techniques for climate based landscaping and examine the need for natural environment.	PO4,PO9	2
CO4	To understand the upcoming trends in landscaping to meet various needs of the present context.	PO4,PO9	2

**Objectives:**

Exposure to various concepts, ideas and techniques prevalent in landscape architecture To introduce the students to the discipline of Landscape architecture & its relevance to Architecture. To gain an insight into the changing relationship of human with nature, to develop the understanding of site and site planning. To develop the skill of integrated design of open and built spaces.

**Elements of Landscape architecture and Landscape Design**

Elements of landscape – land elements, land form plants and planting, water, lighting etc. characteristics and classification of plant materials, basic principles of landscape design; Factors to be considered, Use and application of plant materials in landscape design, and other components involved.

**History of landscape architecture**

Development of landscape design: Detailed study of selected examples from Eastern, Central and Western traditions; Ancient Heritage - Mesopotamia, Egypt, Greece, Rome; Western Civilization – Europe: Italy, France, and England; The middle-east - The Persian tradition and its far-reaching influence Eastern Civilization: China and Japan Ancient and medieval period in India; Mughal and Rajput Landscapes and study of contemporary landscape architecture.

**Urban Landscape**

Basic principles and elements of Urban landscape, Significance of landscape in urban areas, introduction to street furniture, road landscaping, waterfront development, landscaping of residential areas, Industrial Landscaping.

**Landscape Exercise**

Landscape design of a neighborhood open space (area of 2000 to 3000 sq. meters)

**REQUIRED READING:**

1. Michael Laurie, An Introduction to Landscape Architecture, Elsevier, 1986
2. Geoffrey And Susan Jellicoe, The Landscape of Man, Thames And Hudson, 1987



**REFERENCE:**

1. T S S for Landscape Architecture, Mc Graw Hill, Inc, 1995
2. Grant W Reid, From Concept to Form in Landscape Design, Van Nostrand Reinhold Company, 1993.
3. Brian Hackett, Planting Design
4. T.K. Bose and Chowdhury, Tropical Garden Plants in Colour, Horticulture and Allied Publishers, Calcutta, 1991
5. Motloch, J.L., "Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991.
6. Bring, M, "Japanese Gardens: "design & Meaning
7. Simonds, J.O., "Earthscape: A Manual of Environmental planning", McGraw Hill Book Co., New York, 1978.
8. Motloch, J.L., "Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991., McGraw Hill Book Co., New York, 1981.

CO No	Course outcome's	PO/PSO	BTL
CO 1	To know about the water treatment, distribution and waste water treatment methods & disposal.	PO7	1
CO 2	Understanding the building sanitation method and different types of plumbing systems	PO8,	2
CO 3	To understand the layouts and sanitary layouts of a residence.	PO8,	2
CO 4	To understand the use and installation of various plumbing fixtures and to know the sewerage systems for sanitary conveyance.	PO8, PSO2	2

### WATER SUPPLY AND SANITATION

#### OBJECTIVES:

- To Study Water supply, treatments, distribution and plumbing system for all type of buildings.
- To Study Waste water treatments, Sewer lines for all types of buildings.
- To Study Drainage system for a Small Campus and a Residential neighborhood.
- To understand Refuse collections, disposal, composting, Landfill, Bio gas for a Town and City. Applications of all the above systems to a Buildings, Small Campus and a Residential neighborhood.

#### WATER QUALITY, TREATMENTS AND DISTRIBUTION

Sources of water supply – Water Quality - Water requirements for all type of residential, commercial, Industrial buildings and for town – Water treatment methods – Screening, aeration, Sedimentation, Filtration, Disinfection, Softening, conveyance of water – Distribution of water – Choice of pipe materials - Types of fixtures and fittings – System of plumbing in all type of buildings.

#### WASTE WATER, TREATMENTS AND DISPOSAL

Waste water – Sewage disposal, primary treatment. Secondary treatment, Biological treatment and Modern types of Sewage Treatment Plants - Sewer line fixtures and traps, Manholes, Septic tank.

Basic principles of storm water drainage – drain pipes and type of pipe – storm water gutter – rain water harvesting principles – storage sumps.

#### Building Sanitation

Principles of sanitation, collection and disposal of various kinds of refuse from buildings. Methods of carrying refuse, systems of refuse disposal, their principles. Plumbing definitions and related terms, plumbing systems (one pipe, two pipe etc), House drainage system, Drainage of sub-soil water. Inspection chambers, Manholes, Sub-drains, culverts, ditches and gutters, drop inlets and catch basins, roads and pavements, storm overflow/regulators.

#### Plumbing and Sanitary Appliances

Basic principles of Plumbing, need, scope, terminology. Specifications and installation of

sanitary fittings like wash basins, water closets, urinals, bidets, sinks, etc in buildings. Uses of gate valve, float valve, flap valve, ball valve, flush valve, etc, different types of taps, faucets, stop cocks, bib cocks, 'P', 'Q', 'S', floor/bottle traps used in buildings.

Design considerations on drainage scheme. Planning of bathrooms, lavatory blocks and kitchen in domestic and multi-storeyed buildings. Preparation of plumbing drawings, symbols commonly used in these drawings.

### **Sewerage**

Indian standards and byelaws for sanitary conveyance. Disposal of sewage from isolated building, Gradients used in laying of drains and sewers for various sizes. Septic tank details & capacity calculation. Sewage treatment. Use of pumps in sanitation, biogas, soil disposal without water carriage, rural sanitation. Layout design and details of water supply distribution system in a Campus or Small residential neighbourhood - Layout design and details of sewage and drainage system for different types of buildings - water supply pipe lines, storm water drainage pipe lines and Rain Water Harvesting for small residential neighbourhood.

### **REQUIRED READING:**

1. S.C.Rangwala, "Water supply and sanitary engineering", Chartar publishing house, Anand, 1989. (N.A.)
2. Punmia B.C., "Waste Water Engineering", Laxmi Publications, 2009.
3. Arceivala S.J., "Waste Water Treatment for Pollution Control", Tata McGraw Hill, 2008.
4. Birdie, B. S. (1996). Water supply and Sanitary Engineering. Dhanpat Rai and Sons.

### **REFERENCE:**

1. Punmia, B. C., Jain, A. K. and Jain, A. K. (1995). Water Supply Engineering. New Delhi: Laxmi Publications.
2. P.N. Modi, Sewage Treatment Disposal and Waste Water Engineering, Standard Book House.
3. National Building Code - 2005.
4. A. Kamala & DL Kanth Rao, *Environmental Engineering*, Tata McGraw – Hill publishing company Limited.

CO No	Course outcome's	PO/PSO	BTL
CO 1	To understand and analyze the use, the spaces and the concepts of different homes for the disabled	PO2,PO4,PO10,PSO1	2
CO 2	To design a Social oriented building –A Home for physically and mentally challenged	PO2,PSO1	3
CO 3	To understand and analyze the spaces, connectivity and the standards of Institution buildings.	PO2,PO10,PSO2	2
CO 4	To design an institution oriented building – School of Architecture	PO2,PSO2	3
CO 5	Time Problem - To design an Art center / Museum	PO2,PO10,PSO2	3

**OBJECTIVES:**

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

**CONTENT**

Scale and Complexity: Buildings and small complexes that address the social and cultural needs of contemporary urban life (residential. Commercial, institutional) with a thrust on experiential qualities; multi bayed, multiple storied and circulation intensive; passive and active energy Areas of concern/ focus behavioral aspects and user satisfaction socio-cultural aspects designing for the differently abled Building byelaws and rules. Appropriate materials and construction techniques Climatic Design Typology/ project: Housing Projects- detached, semi-detached, row housing, cluster housing, apartment; housing and facilities for other user groups- Old age Home, orphanage, working women's hostel, home for physically and mentally challenged; Museum/ Art centre, Educational campus, R & D centre, shopping complex.

### **REQUIRED READING**

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

### **REFERENCES**

1. Richard P. Dober, "Campus Planning" - Society for College and University Planning, 1996.
2. Kanvinde, "Campus design in India", American year Book, 1969
3. Kevin Lynch, "Site planning", Literary Licensing, LLC, 2012
4. Sam F. Miller, "Design Process: A Primer for Architectural and Interior Design", Van Nostrand Reinhold, 1995

CO No	Course outcome (CO)	PO/PSO	BTL
CO 1	Understanding of Cement and Concrete properties.	PO6,PO7,PO8	2
CO 2	Understanding of Special concrete and Concreting methods.	PO6,PO7,PO9	2
CO 3	Understanding of the Reinforced Cement Concrete Construction.	PO7,PO8	2
CO 4	Understanding of Advanced Reinforced Cement Concrete Construction.	PO4,PO7,PO9	2
CO 5	Understanding the applications of Reinforced Concrete in Construction.	PO6,PO7,PO8	2

**RCC****OBJECTIVES:**

To expose the students the preparation of concrete mix placing and curing. Concrete construction methods and special concrete and concreting methods. To expose to students to appropriate material Construction method.

**CEMENT & CONCRETE**

**Cement:** Composition of cement, properties of cement, various of cement and their uses.

**Concrete:** proportioning concrete, grading of aggregates, water cement ratio, workability of concrete Estimating yield concreting.

**Concreting:** form work for concreting, mixing, transporting and placing, consolidating and curing of concrete. various types of cement concrete, the properties and uses.

**SPECIAL CONCRETE AND CONCRETING METHOD**

High density, fiber Reinforced, polymer concrete – properties & uses. Ready mixed concrete – grouting – cold weather & underwater concreting – Lightweight concrete construction – Composition of lightweight concrete & its advantages – its application in building walls, roof, foundations & ornamental works.

**CONCRETE CONSTRUCTION**

Introduction to RCC framed structures

**concrete in foundation:** types of footing – Isolated, combined, continuous, strip raft & piles.

**Concrete slabs:** one-way two way continuous & cantilever.

**Concrete beams:** singly reinforced, doubly reinforced, cantilever & continuous beams.

Concrete columns, floors, walls, partitions, lintels, arches, sunshades.

**APPLICATION**

RCC in building components (foundation, columns, beams, slabs and walls) Typical details for RCC footing, pile foundation - precast pile, cast in situ piles, types of piles, method of driving piles, walls, column, beams, lintels, sunshades, floor and roof slabs (1 & 2 way slabs) cantilever. Concepts and Design of different types of staircases.

**REQUIRED READING**

1. M.S.Shetty, "Concrete Technology", S.Chand&Co.ltd, New Delhi, 1986.
2. Dr. B.C.Punmia, "A Text book of Building Construction", Laxmi Publications Pvt. Ltd., New Delhi, 2005.
3. T.D Ahuja and G.S. Birdie, "Fundamentals of Building Construction", Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1996.
4. S.P Arora and S.PBindra, "A Text Book of Building Construction", Dhanpat RaiPublishing Company Pvt. Ltd., New Delhi, 1990
5. Alan Blanc, "Stairs, Steps and Ramps", Butterworth, Heinemann Ltd., 1999

**REFERENCES:**

1. Francis D.K. Ching, "Building Construction illustrated", John Wiley & Sons, 2000
2. W.B. McKay, "Building Construction", Vol 1 and 2, Longmans, UK, 1981.
3. Barry, "Construction of Buildings", Volume 1&2, Blackwell Publishing Ltd., Oxford, 2005
4. Pamphlet and Manuals supplied or published by SERC, BMPTC, HUDCO and Other research organization.

## VI SEMESTER

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DESIGN OF STRUCTURES III

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CO No:	COURSE OUTCOMES (CO)	PO / PSO	BTL
CO-1	Design of Columns- Uniaxial & Axially Loaded	PO1, PO5	5
CO-2	Design of Rectangular Footing – Pad & Sloped, Design of Combined Footing	PO1,PO5	5
CO-3	Design of Flat Slabs	PO1,PO5	5
CO-4	Design of Masonry Walls & Introduction to Prestressed Concrete	PO1,PO5	5

### OBJECTIVES:

- To use limit state design for the analysis and design of columns.
- To enable the learning of design of structural elements like footings, retaining walls and masonry walls.
- To understand the principle, methods, advantages and disadvantages of pre stressed concrete.
- Case studies and models applicable.

### LIMIT STATE DESIGN OF COLUMNS

Types of columns – Analysis and Design of Short Columns for Axial, Uniaxial and biaxial bending – Use of Design aids.

### DESIGN OF FOOTINGS

Types of footings – Design of wall footings – Design of Axially loaded rectangular footing (Pad and sloped footing). Design of Combined Rectangular footings.

### FLAT SLABS

Design Principles of flat slabs – Code Provision – Simple Design Problems.

### DESIGN OF MASONRY WALLS

Analysis and Design of masonry walls – use of Nomograms - code requirements.

### INTRODUCTION TO PRESTRESSED CONCRETE

Principle of Prestressing – Methods of Prestressing, advantages and disadvantages.

### REQUIRED READING:

- 1 B.C. Punmia, "Reinforced Concrete Structures", Vol. 1 & 2, Laxmi Publications, Delhi, 2004.
- 2 IS 456, "Indian Standard, Plain and Reinforced Concrete", Code of Practice, Bureau of Indian Standards, 2000.
- 3 SP – 16, Design Aids for Reinforced Concrete to IS 456 National Building Code of India, 1983



- 4 IS 1905, Code of Practice for Structural Safety of Buildings, 1987.
- 5 Ashok K.Jain, "Reinforced Concrete:Limit State Design", Nemchand, Bros Roorkee 1983.

**REFERENCES:**

1. P. Dayaratnam, "Design of Reinforced Concrete Structures", Oxford and IBH Publishing CO., 1983.
2. N.C.Sinha and S.K.Roy, "Fundamentals of Reinforced Concrete", S.Chand and Co., New Delhi, 1983.
3. Krishna Raj, "Prestressed Concrete Structures", 3rd Edition, Tata McGraw Hill, 2005.

CO No:	CO	PO/PSO	BTL
CO1	To understand the various elements of Human Settlements and the classification of Human Settlements.	PO2	1
CO2	To familiarize the students with Planning concepts and process in Urban and Regional Planning.	PO4	1
CO3	To explore the students about the dynamics of Urban Form and its planning	PO4,PO9	1
CO4	To understand the interrelationship between Human Settlements structure and Social Dynamics	PO4,PO9	1

### OBJECTIVES

- To have an overview on the vocabulary of Human settlements.
- To understand the various elements of Human Settlements and the classification of Human Settlements.
- To familiarize the students with Planning concepts and process in Urban and Regional Planning.

### INTRODUCTION

Elements of Human Settlements – human beings and settlements – nature shells&Network – their functions and Linkages – Anatomy & classification of Human settlements – Locational, Resource based, Population size & Occupational structure.

### FORMS OF HUMAN SETTLEMENTS

Structure and form of Human settlements – Linear, non-linear and circular – Combinations – reasons for development – advantages and disadvantages – case studies – factors influencing the growth and decay of human settlements.

### PLANNING CONCEPTS

Planning concepts and their relevance to Indian Planning practice in respect of Ebenezer Howard – Garden city concepts and contents – Patrick Geddes – Conservative surgery – case study – C.A. Perry – Neighborhood concept Le Corbusier – concept and case studies.

### URBAN PLANNING AND URBAN RENEWAL

Scope and Content of Master plan – planning area, land use plan and Zoning regulations – zonal plan – need, linkage to master plan and land use plan – planned unit development (PUD) – need, applicability and development regulations - Urban Renewal Plan – Meaning, Redevelopment, Rehabilitation and Conservation – JNNURM – case studies.

### ISSUES IN CONTEMPORARY URBAN PLANNING IN INDIA

Globalization and its impact on cities – Urbanization, emergence of new forms of developments – self sustained communities – SEZ – transit development – integrated townships – case studies.

### REQUIRED READING:

1. C.L.Doxiadis, Ekistics, “An Introduction to the Science of Human Settlements”,

- Hutchinson, London, 1968.
2. Andrew D.Thomas, "Housing and Urban Renewal", George Allen and Unwin, Sydney, 1986.
  3. "Ministry of Urban Affairs and Employment", Government of India, New Delhi,1999 '
  4. "Urban Development Plans: Formulation & Implementation" , Guidelines, 1996.
  5. Madras Metropolitan Development Authority, 'Master Plan for Madras Metropolitan Area, Second Master Plan, 2007.

**REFERENCES:**

1. Government of India, "Report of the National Commission on Urbanisation", 1988.
2. Hansen N., "Regional Policy and Regional Integration", Edward Elgar, UK, 1996.
3. Sandhu. R. S., "Sustainable Human Settlements", Asian Experience, Rawat publications, 2001.
4. Gastek.P.,"LivingPlans:New concepts for advanced housing", Brikhauser publications, 2005.

CO No	Course outcome's	PO / PSO	BTL
CO 1	To Understand Cubism & Constructivism along with various Building styles of Early Modern Architects.	PO1,PO3	2
CO 2	To Understand Post Modernism, International Style and CriticalRegionalism along with Ideas and Works of Various Architects ofthat time.	PO1, PO5	2
CO 3	To Understand Deconstructivism along with Forms, Ideas andConcepts followed by Various Architects in their works.	PO3, PO4	2
CO 4	To Understand Post Independence City Planning and its influenceon Architects.	PO3,PO5	2

### EARLY MODERN ARCHITECTURE

Cubism, Constructivism, works of architects Philip Johnson –**Glass house, Connecticut, Seagram** Building, New York, **Mies Vander Rohe** - Barcelona Pavilion, *Illinois Institute of Technology*, Chicago, **F.L.Wright**- Falling water, Pennsylvania, Guggenheim Museum, New York , **Richard neutra** -Kaufmann Desert House, California, **Oscar Niemeyer** - Cathedral of Brasília, *Museu Oscar Niemeyer*,Brazil **Alvar Alto** - Finlandia Hall, Finland , **Lecorbusier** – Villa Savoye , France , Notre dameRonchamp , Paris, **Louis khan** - The National Assembly Building, Bangladesh, Kimbell ArtMuseum,Texas.

### LATER MODERN ARCHITECTURE

Post modernism and international style .Ideas and works of – Paul Rudolph- Arts and architecturebuilding, Yale university, Orange County Government Center, New York, I.M.Pei - Grand Louvre, Paris,Everson Museum of Art, Kenzo Tange –Olympic arena, Tokyo, Fuji, Broadcasting center, Tokyo, MinoruYamasaki – Dahran International airport, McGregor Memorial Conference Community Center, Detroit, KishoKurokawa - The Museum of Modern Art, Wakayama , Capsule tower , Tokyo, Richard Meier –Jubilee church ,Los Angeles , Smith house, Connecticut , Toyo Ito - U House,Tokyo , Serpentine Pavilion, London.

### ALTERNATIVE PRACTICES AND IDEAS

Critical regionalism, works and ideas of Hassan Fathy, Geoffrey Bawa ,Tado Ando, Laurie baker andPaulo soleri.

### 21ST CENTURY ARCHITECTURE

Deconstructivism – Works of Zaha Hadid- London aquatic complex , 2012 Olympics ,Zaragoza bridgepavilion, Spain , Daniel libeskind – Jewish museum, Berlin, World trade center, New York, Frank o gehry -Guggenheim museum, Bilbao, Spain , Peter Eisenman - Cardinal stadium, Arizona ,City of Culture ofGalicia, Santiago Calatrola and his structural concepts- Lyon-satolas station, France, Milwaukee artmuseum ,U.S.A , News forms and ideas of Norman Foster - American Air Museum, Cambridge, UK,Standsted Airport, London , Greg Lynn – Embryological house, U.S.A.

## **POST INDEPENDENT ARCHITECTURE IN INDIA**

Architectural debates associated with nation formation– early modernist architecture- post independence city planning: Chandigarh and Bhuvanesar- influences on post-independence architects- Architecture of Kanvinde, Raje, Doshi, Correa, Nari Gandhi, Raj Rewal- PWD architecture – new directions after 1960s- post- independent architecture of Chennai

### **REQUIRED READING:**

1. Kenneth Frampton, "Modern Architecture: A Critical History", Thames & Hudson, London, 1994.
2. Diane Ghirardo , "Architecture after Modernism", Thames & Hudson, London, 1990.
3. Miki Desai et. al., "Architecture and independence", Oxford University Press, 2000.
4. Christopher Alexander, "Pattern Language", Oxford University Press, Oxford, 1977.
5. Robert Venturi , "Complexity and Contradiction in Architecture", 1977.

### **REFERENCES:**

1. Michael Hays ed., "Architecture Theory" since 1968, CBA, 1999.
2. Jane Jacobs, "Deaths and Life of Great American Cities", Vintage, 2003.
3. James Steele, "Hassan Fathy", Academy Editions, 1985.
4. Kenneth Frampton ed, "Charles Correa", The Perennial Press, 1998.
5. William Jr. Curtis, "Balkrishna Doshi, An Architecture for India", Rizzoli, 1988.

CO No	Course Outcome (CO)	PO / PSO	BTL
CO1	Study of electricity, installations, wiring and principles of distribution and safety	PO1, PO4	2
CO2	Know the application artificial illumination, and lighting design for various spaces	PO6, PO10	2
CO3	Knowledge of air conditioning and ventilation principles evaluate electrical layouts	PO3, PO9	2
CO4	Understanding properties of sound and Architectural acoustics, and analyzing acoustic concepts and design	PO3, PO9	2
CO5	Learning how to create acoustic and lighting designs to different building types – Studio work	PO3, PO9	2

### LIGHTING VENTILATION AND ACOUSTICS

#### Objective:

This course will give basic understanding about the science behind Lighting, ventilation and building acoustics. It will help students for applying prediction methods to assess the functional requirements of buildings. By learning this course students can provide optimum lighting, ventilation and acoustical solutions through simulations and design models. Further this course will expose students to perform basic room acoustics, wind and lighting measurements.

### ELECTRICAL SERVICES

**Electrical systems** – Basic of electricity– single/Three phase supply – protective devices in electrical installation – Earthing for safety – Types of earthing – ISI Specifications. Electrical installations in buildings – Types of wires, Wiring systems and their choice – planning electrical wiring for building – Main and distribution boards – Principles of illumination.

### ILLUMINATION AND LIGHTING DESIGN

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candle – solid angle illumination – utilization factor – Depreciation factor – MSCP – MHCP – Laws of illumination. Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

### ELECTRICAL LAYOUT OF SIMPLE BUILDINGS

Electrical layout of a simple residential, school and commercial building.

## **HEAT VENTILATION AND AIR CONDITIONING (HVAC)**

Behaviour of heat propagation, thermal insulating materials and their co-efficient of thermal conductivity.

**General methods of thermal insulation:** Thermal insulation of roofs, exposed walls.

**Ventilation:** Definition and necessity, system of ventilation. Principles of air conditioning  
Air cooling, Different systems of ducting and distribution, Essentials of air-conditioning system.

## **Fundamentals of architectural acoustics**

Fundamentals: Sound waves, frequency, amplitude, decibels, logarithms, measurement versus perception, addition and subtraction of decibels. NC curves. Material property: Absorption, reflection, scattering, diffusion, transmission, absorption co-efficient, NRC, sound transmission class (STC), impact insulation class (IIC).

## **Acoustics of Architectural Spaces**

Reverberation time, sound in enclosed space, basic room acoustics concepts and design, design of auditorium, conference hall, recording studio and class rooms. Environmental noise and its control.

## **References:**

1. Barron, M. (2009). *Auditorium acoustics and architectural design*. 2nd Ed. Taylor & Francis.
2. Conceptnine, R. (2008). *The Architecture of Light: Architectural Lighting Design Concepts and Techniques*. Sage Publications.
3. Cox, T. J. and D'Antonio, P. (2009). *Acoustic Absorbers and Diffusers*. 2nd Ed. Taylor & Francis
4. Cuttle, C. *Lighting by Design*. 2<sup>nd</sup>Ed. Architectural Press.
5. Eagan, D. M. (2002). *Architectural Lighting*, 2<sup>nd</sup>Ed. McGraw-Hill.
6. Eagan, D. M. (2002). *Concepts in Architectural Acoustics*.
7. Guzowski, M. (1999). *Day lighting for Sustainable Design*. McGraw Hill.
8. Harold, B. M. and Goodfriend, L. *Acoustics for Architects*. Reinhold.
9. Hescong, L. (1976). *Thermal Delight in Architecture*. Cambridge: MIT Press.
10. Hopkins, C. (2008). *Sound Insulation: Theory into Practice*. 1<sup>st</sup>Ed. Butterworth Heinemann.
11. Randall, W. (2008). *Residential Lighting: A Practical Guide to Beautiful and Sustainable Design*. 2<sup>nd</sup>Ed. Wiley.
12. Rea, M. (2000). *The Lighting Handbook*. 9th Ed. Illuminating Engineering Society of North America.
13. Reinhart, C. (2014). *Day lighting Handbook*.
14. Smith, B. J., Peters, R. J. and Owen, S. (1982). *Acoustics and Noise Control*. New York: Longman.
15. Steffy, G. (2000). *Time-Saver Standards for Architectural Lighting*. McGraw-Hill.
16. Szokolay, S. V. (2008). *Introduction to architectural science*. Taylor & Francis.
17. Vigran, T. E. (2008). *Building Acoustics*. 1<sup>st</sup>Ed. Taylor & Francis.

CO No:	Course Outcome	PO/PSO	BTL
1.	To memorize anthropometry, circulation patterns, importance of services and building techniques	PO2,PO4,PO10,PSO1	2
2.	To understand and apply the integration of services into intelligent sustainable building case study	PO2,PO4,PO9	3
3.	To Create and design spatial planning and functionality in high rise and multi use building issues.- <b>Project 1</b>	PO2,PO4,PO9,PO10	4
4.	To analyze the spaces, connectivity and the standards of sustainable and service intensive building. Case study	PO2,PO4,PO9	5
5.	To create design of a sustainable service integrated intelligent green building.- <b>Project 2</b>	PO2,PO4,PO9,PO10,PSO2	6

**OBJECTIVES:**

- To understand the design and form of building typologies that are the result of pressure on urban lands with a thrust on issues like urban land economics, technology and ecology.
- To create an awareness with regard to the design of green buildings and sustainable architecture.
- To inculcate the importance of services integration and construction in spatial planning in the context of design of High-rise buildings and service intensive buildings.
- To highlight on the importance of High rise buildings as elements of identity in urban areas and urban design principles that govern their design.
- To explore computer aided presentation techniques involving 2D and 3D drawings, walk through and models as required.

**CONTENT:**

Scale and Complexity: Advanced and complex problems involving large scale Multi-storeyed buildings and complexes for Residential/ Commercial/ Institutional/ Mixed-Use in an urban context with focus on visual characteristics, service integration and sustainable practices.

Areas of focus/ issues:

- sustainable building practices, green issues, alternative energy
- intelligent building techniques and service integration
- Architectural Detailing
- Advanced building practices

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



**REQUIRED READING:**

1. Joseph De Chiara, Michael J. Crosbie, "Time Savers Standards for Building Types", McGraw Hill Professional 2001.
2. Ernst Neuferts, "Architects Data", Blackwell, 2002.
3. National Building Code of India, Vol 1-5, 2005.
4. Daniel Williams, "Sustainable Design: Ecology, Architecture & Planning", John Wiley & sons Inc, NJ, 2007.
5. Richard P. Dober, "Campus Architecture: Building in the Groves of Academe", McGraw-Hill, 1996.

**REFERENCES:**

1. Kevin Lynch, "Site Planning", MIT Press, Cambridge, 1984.
2. Mili Mazumdar, "Energy Efficient Buildings in India", TERI, New Delhi, 2012
3. Diane Tsang, "SPACE Shopping Mall", Pace Publishing, 2011
4. Lara Menzel, "Office Architecture and Design", Braua Publishers 2009.
5. Sheri Koonos, "Prefabulous and Sustainable: Building and Customizing an affordable, Energy efficient home", ABRAMS, 2010.

CO No:	CO	PO/PSO	BTL
C	Make students understand general practices followed in construction industry, with respect to Working Drawing for executing a project.	PO6, PO7, PO8.	2
CO2	Make students apply procedures and techniques of marking plan, column layout, measured drawing for a given single bed room house using various terminology practiced in industry.	PO6, PO7, PO9.	3
CO3	To make students able to apply procedures for working elevations and working sections generally practiced in the construction industry.	PO7, PO8.	3
CO4	To make students to implement procedures on a given proto type plan, for preparing electrical layouts and plumbing layouts adopted in construction industry.	PO4, PO7, PO9.	3
CO5	To make students to execute and document working details of doors, windows, joinery and other service related drawings as practices.	PO7, PO9	3

**Objective:**

To introduce working drawings and their significance in the construction of buildings. To teach students the essential components of working drawings, notations, drawing standards, strengthen the students' knowledge about preparing working drawings for various building elements.

1. Introduction to working drawings: shop drawings / vendor drawings.
2. An exercise in fundamental elements in a "Working Drawing-Plan" an assignment on a typical standard "Working Plan".
3. Various formats for working drawing preparation, various types of vendor drawings, such as aluminium composite panels, steel doors, fire rated doors, curtain wall systems, aluminium windows, etc.
4. Working drawing details:
  - a. Developing Key plans, General Arrangement Plans, Part plans, Roof Plan / Terrace Plan and the like.
  - b. Excavation drawings, Foundation drawings, Center-line drawings, Floor Plans, Sections, Elevations.
  - c. Basic internal electrical and plumbing drawings.
4. Preparation of Working drawing details:
  - a. an overview of site marking procedure, "techniques/thumb rules" to ensure effective translation from "working drawings" to actual site execution, and developing SitePlan, Site Marking Plan, Site Grading / Levelling Plan.

- b. integration with schedule of joinery, schedule of hardware, finishing materials, method of dimensioning, appropriate section line markings.
- c. developing elevations, sections, part sections, wall sections integrated with finishing materials, etc.,
- d. Construction details for lifts, dumb waiters, escalators, travelators.
- e. External Plumbing Layout and details.
- f. Details of Septic tank.

An overview of “all service systems integrated drawings” and the effectiveness of “Building Information modelling – BIM” to achieve the same.

“Working drawing titles”, drawing documentation/record keeping, drawing transmittals, revision updation / superceeded drawings, and “as built drawings”.

**References:**

1. Building and Construction Authority. (2005). CONQUAS-21. Singapore: The BCA Construction Quality Assessment System. Ed. New York: Thomson Delmar Learning.
2. Jefferis, A. and Madsen, D.A. (2005). *Architectural Drafting and Design*. 5
3. Jeong, K-Y. (2010) *Architecture Annual*. Seoul:Archiworld Co.
4. Joe, B. (Ed). (2002). *Details in Architecture: Vol. I-V*. Victoria: The Images Publishing group.
5. Osamu, A. W., Linde, R. M. and Bakhoun, N. R. (2011). *The professional practice of architectural working drawings*. 4<sup>th</sup>Ed. Hoboken: John Wiley & Sons.

## VII SEMESTER

15 AR 4128

URBAN DESIGN

L T P C  
3 0 0 3

### OBJECTIVES:

- To understand the scope and nature of urban design as a discipline.
- To introduce the components of a city and their interdependent roles.
- To understand the evolution of historic urban form.
- To learn to interpret the city in different ways and layers.
- To create awareness of contemporary urban issues as well as learn about possible ways to address them.

### INTRODUCTION TO URBAN DESIGN

Components of urban space and their interdependencies- outline of issues/ aspects of urban space and articulation of need for urban design- scope and objectives of urban design as a discipline

### HISTORIC URBAN FORM

Western: morphology of early cities - Greek agora - Roman forum - Medieval towns- Renaissance place making - ideal cities – Industrialization and city growth - the eighteenth century city builders Garnier's industrial city - the American grid planning- anti urbanism and the picturesque- cite industrielle- cite nuovo-radiant city.

Indian: evolution of urbanism in India- Temple towns - Mughal city form- medieval cities - colonial urbanism- urban spaces in modernist cities: Chandigarh, Bhuvaneshwar and Gandhi Nagar-subsequent directions – case studies.

### THEORISING AND READING URBAN SPACE

Ideas of Imageability and townscape: Cullen, Lynch- place and genius loci- collective memory- historic reading of the city and its artefacts: Rossi- social aspects of urban space: life on streets and between buildings, gender and class, Jane Jacobs, William Whyte

### ISSUES OF URBAN SPACE

Understanding and interpreting of urban problems/ issues- place-making and identity, morphology: sprawl, generic form, incoherence, privatized public realm- effects/ role of real estate, transportation, zoning, globalisation - ideas of sustainability, heritage, conservation and renewal-contemporary approaches: idea of urban catalyst, transit metropolis, community participation – studio exercise involving the above.

### BEST PRACTICE IN URBAN DESIGN

Contemporary case studies from developing and developed economies that offer design guidelines and solutions to address various issues/ aspects of urban space – case studies.

### REQUIRED READING:

1. A.E.J. Morris, "History of Urban Form before the Industrial Revolution", Prentice Hall, 1996
2. Edmund Bacon, "Design of Cities", Penguin, 1976
3. Gordon Cullen, "The Concise Townscape", The Architectural Press, 1978

4. Michelle Provoost et al., *Dutchtown*, NAI Publishers, Rotterdam, 1999
5. "Time Saver Standards for Urban Design", Donald natson, McGraw Hill, 2003.
6. Kevin Lynch, *"The Image of the City"*, MIT Press, 1960.
7. Rithchie. A, *"Sustainable Urban Design: An Environmental Approach"*, Taylor & Francis, 2000.

**REFERENCES:**

1. Jonathan Barnett, *"An Introduction to Urban Design"*, Harper Row, 1982.
2. Lawrence Halprin, *"Cities"*, Reinhold Publishing Corporation, New York, 1964.
3. Gosling and Maitland, *"Urban Design"*, St. Martin's Press, 1984.
4. Molcolm Moor, *"Urban Design Futures"*, Routledge, 2006.
5. Geoffrey Broadbent, *"Emerging Concepts in Urban Space Design"*, Taylor & Francis, 2003.

CO No	Course Outcome (CO)	PO/PSO	BTL
CO1	Understanding various air conditioning systems for small and large-scale buildings knowing typical choices for cooling systems, sizing of mechanical equipment & design.	PO2	2
CO2	Dealing with Fire safety systems and planning considerations for various types of buildings. Familiarizing with NBC guidelines.	PO3, PO4	2
CO3	Study of the mechanism and design of Lifts, Escalators and other conveyance systems in buildings.	PO3, PO5	2
CO4	Application of Building automation and management systems and the current trends.	PSO1	3

**Objective:**

To develop the understanding of important Services in buildings, definitions and terms used, functioning and their applications in building.

**AIR CONDITIONING: BASIC REFRIGERATION PRINCIPLES**

Thermodynamics – Heat – Temperature – Latent heat of fusion – evaporation, saturation temperature, pressure temperature relationship for liquid refrigerants – condensate cycle, air cycle, chilled water cycle and cooling water cycle – vapor compression cycle – compressors– evaporators – Refrigerant control devices – electric motors – Air handling Units – cooling towers

**AIR CONDITIONING: SYSTEMS AND APPLICATIONS**

Air conditioning system for small buildings – window types, evaporative cooler, packaged terminal units and through the wall units split system. Case for Central Plant – DX system – Chilled Water System – Air Cooled and Water Cooled condensers – Air Distribution system – VAV & VRV Systems – Low temperature applications - Configuring/ sizing of mechanical equipment, equipment spaces and sizes for chiller plant, cooling tower, Fan room, Circulation Pumps, Pipes, ducts – case studies.

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

Design criteria for selecting the Air conditioning system for large building and energy conservation measures - Typical choices for cooling systems for small and large buildings - Horizontal distribution of services for large buildings - Grouped horizontal distribution over central corridors, above ceiling, In floor, Raised access floor, Horizontal distribution of mechanical services – case studies.

**FIRE SAFETY: DESIGN AND GENERAL GUIDELINES OF EGRESS DESIGN – FIRE DETECTION AND FIRE FIGHTING AND INSTALLATION**

Principles of fire behavior, Fire safety design principles \_ NBC Planning considerations in buildings – Non- Combustible materials, egress systems, Exit Access – Distance between exits, exterior corridors – Maximum travel distance, Doors, Smoke proof enclosures General guidelines for egress design for Auditoriums, concert halls, theatres, other building types, window egress, accessibility for disabled- NBC guidelines – lifts lobbies, stairways, ramp design, fire escapes and A/C, electrical systems – case studies Fire Detection and Fire

Fighting: Heat smoke detectors – sprinkler systems -Firefighting pump and water requirements, storage – wet risers, Dry rises -Fire extinguishers & cabinets -Fire protection system – CO2 & Halon system - Fire alarm system, snorkel ladder -Configuring, sizing and space requirements for firefighting equipment.

### **Fire Safety in Buildings**

Fire, causes of fire and spread of fire, firefighting, protection & fire resistance, equipment & methods of fighting fire, Code of fire safety, fire regulations, fire insurance, combustibility of materials. Structural elements and fire resistance, planning and design of Fire escape routes and elements, wet risers, dry risers, sprinklers, smoke detectors, fire dampers, fire doors, water curtains.

### **Building Automation**

Concept and application of Automation Systems in buildings. Design issues related to building automation and its effect on functional efficiency. Components of building automation system integrating HVAC, electrical, lighting, security, fire-fighting, communication etc. Current trend and innovation in building automation systems; Knowledge base and decision support systems and building automation and management system; Application of expert system in building automation.

### **LIFTS, ESCALATORS & CONVEYORS**

**Elevator:** Study of elevators – size, capacity, speed, and Mechanical safety methods, positioning in core under planning grid. Types like passenger and freight lifts, dumbwaiters, details of lift cage, lift shaft & other mechanism. **Escalator:** Parallel and criss cross escalators, **Conveyors:** horizontal belt conveyors, horizontal moving walk way – Mechanical safety systems and automatic control.

### **References:**

1. Abnwo, F. and Others. *Electrical Engineering Hand Book*.
2. Bovay, H. E. (1981). *Handbook of Mechanical & Electrical systems for Buildings*. McGraw Hill Higher Education.
3. Bureau of Indian Standards. (2005). *Code of Practice for Electrical Wiring Installations IS/732*.
4. *Electrical Wiring & Contracting (Vol.1 to Vol.4)*.
5. Sawhney, G. S. (2006). *Fundamentals of Mechanical Engineering: Thermodynamics, Mechanics and Strength of Materials*. New Delhi: Prentice Hall of India.
6. Taylor, E. O. and Rao, V. V. L. (1971). *Utilisation of Electric Energy in SI units*. Bombay: Orient Longman.
7. Willim, J. McG. (1971). *Mechanical & Electrical Equipment for Buildings*.

CO.No	Course outcome's	PO/PSO	BTL
CO 1	Understand the Terminology associated with Prefabrication and Industrialized Building.	PO6,PO7,PO8	2
CO 2	Understand Policies and Five Year Plans incorporating thrust on Housing	PO6,PO7,PO9	2
CO 3	Understand the applications of Industrialized Building Systems and Materials.	PO6,PO7,PSO1	2
CO 4	Understand different Construction Methods and details of Modular Industrial Building Systems	PO6,PO7,PO9,PSO1	2

### OBJECTIVES

To create awareness about the various types of pre-fabricated housing systems and to recognize the importance of modular coordination in industrialized building systems.

### INTRODUCTION

Five year plans and thrust in housing – Issues in Urban Housing – use of modern building materials –application of modern technology – meaning of industrial building system.

### APPLICATION OF INDUSTRIAL BUILDING SYSTEM

Feasibility of using industrial building system in Residential and Non-Residential buildings – manufacturing of building components – Technology requirements for industrial building system – use of Industrial building system as an option for disaster mitigation.

### MODULAR CO-ORDINATION AND INDUSTRIALISED SYSTEM

Concept and definition of Modular dimensional discipline – Advantages and Limitations of modular principle – Components of residential buildings – precast elements.

### PRE-FABRICATION SYSTEM

Objective and necessity – Off site on site prefabrication elements and construction joints – architectural and technical limitations.

### PROCEDURES AND ORGANISATION

Equipment used – manufacturing processes – transportation of components – assembly and finishing –Structural, social and economic issues related to industrial building system.

### REFERENCES:

1. Industrial Building and Modular Design Henrik Missen – C & CK, UK 1972.
2. Albert G.H.Dietz, Laurence Secotter – “Industrialized Building Systems for Housing “MIT, special summer session, 1970 USA.
3. “Industrialized Building Construction” – Proceedings of National Seminar, Nov-17-18, 2000, Indian Concrete Institute, Mumbai.
4. “Innovative Construction Materials” – Proceedings of Seminar, Jan 20-21,2001, VeermataJeejabai Technical Institute, Mumbai.



**OBJECTIVES:**

- To inform to students the need and importance of specification, how to write specification – important aspects of the design of a specification.
- To inform to students the need for estimation the concept of abstract and detailed estimates based on measurement of materials and works.
- To inform to students about cost control and about valuation and depreciation
- To inform students on writing feasibility report of a project.

**SPECIFICATION**

Necessity of specification, importance of specification, - How to write specification, - Types of Specification, -Principles of Specification writing, - Important aspects of the design of specification– sources of information – Classification of Specification.

**SPECIFICATION WRITING**

Brief Specification for 1<sup>st</sup> class, 2<sup>nd</sup> class, 3<sup>rd</sup> 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 dadoo, woodwork for doors, windows frames and shutters, cement plastering, painting & weathering course in terrace.

**ESTIMATION**

Types & purpose, Approximate estimate of buildings – Bill of quality, factors to be considered, - principles of measurement and billing, contingencies, measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work – abstract of an estimate.

**DETAILED ESTIMATE**

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

**CURRENT TRENDS**

Methods of contracting and its link to specification drafting - the Business Environment and the structure in practice. Valuation, depreciation and its implications – case studies.

**REQUIRED READING**

1. S.C. Rangwala, "Estimating, Costing and Valuation(Professional practice)", 1984.
2. B.W. Dutta, "Estimating & Costing" (Revised by S. Dutta), UBS Publishers Distribution P.Ltd. India, 1983.
3. M. Chakraborti, "Estimating Costing and Specification", 1984
4. Gurcharansingh & Jagdish singh, "Estimating Costing and Valuation", Standard Publishers Distributors, 2012.

**REFERENCES**

1. T.N. Building practice, Vol:1 Civil Govt Publication.
2. PWD Standard Specifications. Govt Publication, 2012.

CO No:	Course Outcome	SO	BTL
CO 1	Understanding of public spaces, physical infrastructure, socio-cultural aspects, circulation patterns, standards of various facilities to be provided in Urban Context.	PO2,PO4,PO10,PSO1	2
CO 2	To create and design spatial planning, circulation and functionally good Transportation Node	PO2,PO4,PO9	6
CO 3	To Create and design, functional and activity oriented Multi use Urban Complex	PO2,PO4,PO9,PO10	6
CO 4	To analyze the architecture and infrastructure requirements of High Rise Office Building	PO2,PO4,PO9	2
CO 5	To create and design spatial planning, circulation and functionally good High-rise Office Building	PO2,PO4,PO9,PO10,PSO2	5

**OBJECTIVES:**

- To understand the continuity and dynamics of urban form with a thrust on the interrelationships between the disciplines of architecture, urban design and town planning.
- To understand the various components and aspects of the urban environment as well as their interrelationships.
- To understand in specific components/issues such as public spaces, physical infrastructure, socio-cultural aspects- heritage, gender, class, dynamics of urban growth.
- To understand people as users of the urban environment in various scales.
- To explore techniques of mapping and diagramming to understand the dynamic urban environment.
- To take design decisions in a comprehensive manner understanding their implications in the larger context.

**CONTENT:**

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

Areas of focus/ issues: exploration of relationship between building and larger context contemporary processes in design appropriate architecture addressing issues in urban areas – transportation, sustainability, heritage, sprawl, place making, identity, collective memory Mixed use programming Typology/ project: those involving large scale urban interventions as well as large scale projects which have impact on the urban context- revitalization and renewal of urban fragments, evolving guidelines for heritage areas, adaptive reuse, urban waterfront development, transportation nodes, new communities, multi-use urban complexes.

**REQUIRED READING:**

1. Jonathan Barnett, "An Introduction to Urban Design", Harper & Row, 1982
2. Michelle Provoost et al., Dutchtown, NAI Publishers, Rotterdam, 1999.
3. I. Jawgeih, "Life between Buildings", Using Public Space, ArkitektensForleg 1987.
4. Donald Watson, "Time Savers Standard for Urban Design", McGraw Hill, 2005.
5. Malcolm Moor, "Urban design Futures", Routledge, 2006.

**REFERENCES:**

1. Edmund Bacon, "Design of Cities", Penguin, 1976.
2. Gordon Cullen, "The Concise Townscape", The Architectural Press, 1978.
3. Lawrence Halprin, "Cities", Revised Edition, MIT Press 1972.
4. Gosling and Maitland, "Urban Design", St. Martin's Press, 1984.
5. Kevin Lynch, "Site Planning", MIT Press, Cambridge 1967.

## VIII SEMESTER

15 AR 4229

BUILDING COSTRUCTION AND MANAGEMENT

L T P C  
3 0 0 3

### OBJECTIVES:

- To understand different management techniques suitable for planning and constructional projects.
- To understand the management system for accomplishing the task efficiently in terms of both time and cost.

### INTRODUCTION TO PROJECT MANAGEMENT

Project management concepts-objectives, planning, scheduling Controlling and role of decision in project management. Traditional management system, Gantt's approach, Load chart. Progress Chart, Development of bar chat, Merits and Demerits.

### PROJECT PROGRAMMING AND CRITICAL PATH METHOD

Project Network-Events Activity, Dummy, Network Rules, Graphical Guidelines for Network, Umbering the events, Cycles, Development of Network-planning for Network Construction, Models of Network construction, steps in development of Network. Work Break Down Structure, hierarchies. Concepts: critical path method-process, activity time estimate, Earliest Event time, Lastest allowable Occurrence time, start and finish time of activity, float, critical activity and critical path-problems.

### ANALYSIS

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

### PROGRAMMING EVALUATION REVIEW TECHNIQUE

PERT network, introduction to the theory of probablity and statistics. Probabilistic time estimation for the activities for the activities of PERT Network.

### COMPUTERIZED PROJECT MANAGEMENT

Introduction: Creating a New project, building task. Creating resources and assessing costs, Refining your project. Project Tracking-Understanding tracking, recording actual. Reporting on progress. Analyzing financial progress.

### REQUIRED READING:

1. Dr. B.C. Punmia and K.K. Khandelwal-Project planning and control with PERT/CPM, Laxmi publications, New Delhi, 1987.
2. Elaine Marmel, Microsoft office Project 2003 Bible, Wiley Dreamtect (P) Ltd., New Delhi, 2004.
3. Sam Kubba, "Green Construction Project Management and Cost Oversight", Elsevier, 2010.

**REFERENCES:**

1. S.P. Mukhopadyay, "Project Management for architects and Civil Engineers", IIT, Kharagpur 1974.
2. Jerome D. Wiest and Ferdinand K. Levy, "A Managementuide to PERT/CPM", prentice hall of Indian pub. Ltd. New Delhi 1982.
3. SR.A. Burgess and G. White, "Building production and project management", the construction press, London 1979.

**Objective:**

To impart knowledge about this relatively new field, born out of the synthesis between architecture and behavioral psychology. Understanding of the multiplicity of living patterns, activities, geometric patterns in space and designing for the same. Knowledge about the behavioral design process, techniques and design contexts.

**Introduction to Behavioral Architecture**

Designing for pattern and activities, Archetypal activities/Archetypal spaces: planning of public spaces with reference to age groups and activities.

**Building Systems**

Room use, geometry & meaning, hidden behavioral assumptions, adjacencies, vertical bypass & horizontal bypass, various stages in the design of building subsystems.

**Building – Behavioral Interface**

Geometry of spaces, their meaning & connotations, Social organization of buildings, Behavioral assumptions in the planning of new towns and neighborhoods, borrowed space.

**Behavioral Design**

Process organization chart, affinity matrices, pictograms: behavioral design process model, design context, activity/adjacency relationship, evaluation chart, Area use frequency program, simultaneous use, community utilization map, occupancy load profile, defensible space, EDRA etc.,

**Urban Environment**

Patterns of activity in time and space, the ecology of a neighborhood park and playground, cross-cultural issues, social & psychological issues in the planning of new towns, environmental perceptions and migration, awareness and sensitivity to open spaces, environmental cognition.

**References:**

1. Burnette, C. (1971). Architecture for human behaviour Philadelphia Chapter: AIA.
2. Canter, D. and Lee, T. (1974). Psychology and the built environment. New York: Halstead Press.
3. Christopher, A. et al. (1977). A pattern language. New York: Oxford University Press.
4. Clovis, H. (1977). Behavioural architecture. McGraw Hill.
5. Lynch, K. (1973). The image of a city. Cambridge: MIT.
6. Sanoff, H. (1991). Visual research methods in design. New York: John Wiley & Sons.
7. Zeisel, J. (1984). Enquiry by design: Tools for environment – behavior research. Cambridge: Cambridge University Press.

**Objective:**

- To inculcate the basic concepts of pre-stressing.
- To familiarize the students with the tall building structural system and various types of shells and folded plates.
- To introduce the basic concepts of Space Frames, Shells and folded plates and Tensile structures

**INSTRUCTIONAL OBJECTIVES**

By the end of the course the student shall be capable of designing Shells and Space Frames. He shall be in a position to appreciate the difference between RCC and pre-stressed concrete. Further he shall have sufficient knowledge to design pile foundations and suggest appropriate tall structural systems, shells and folded plates and tensile structure for the space coverage.

**DEEP FOUNDATIONS**

Soil Exploration Studies - **Pile foundations** – Types of pile foundation – Construction techniques – Design of end bearing piles – Design of under reamed pile foundation for apartment buildings as per National building code – Pile caps – Design as per hand books.

**PRE-STRESSED CONCRETE**

Introduction to pre-stressed concrete – Pre-stressed concrete materials – Methods of pre stressing - Analysis and approximate design of determinate beams - losses of prestressing - Comparison between RCC and pre stressed concrete.

**TALL BUILDINGS**

Tall buildings structural systems – Rigid frames – Braced frames – Shear wall – Buildings – Wall frame buildings – Tubular buildings – Tube-in tube buildings – Outrigger braced system – Brief outline of their behaviour and their applicability for various heights of buildings.

**SHELLS AND FOLDED PLATES**

Shells – Types – Classification as per BIS – Stress resultants – Relative merits and applicability. Folded plates – Types – Comparison with shells – Applicability. Arches – Basic concepts – Analysis of three hinged arches.

**SPECIAL STRUCTURES**

Definitions, Types – single, double & multilayered grids – two way & three way space grids, connectors, Grids – Domes - various forms - Geodesic domes, Suspended cable structures – types of cable network systems, shapes of cable suspended systems, examples of tensile membrane structures – types of pneumatic structures.

**REQUIRED READING:**

1. Sinha. N.C and Roy. S. K, *Fundamentals of Reinforced Concrete*, S.Chand & Co. Ltd., New Delhi, 2001.
2. Ramamrutham. S and Narayanan. R, *Reinforced Concrete Structures*, Dhanpat Rai Publications, New Delhi, 1997.



3. Bryan Stafford and Alex Coull, *Tall Building Structures, Analysis and Design* John Wiley & Sons, NewYork, 1991.

#### **REFERENCE BOOKS**

1. Bandyopadhyay. J.N, *Thin Shell Structures Classical and Modern Analysis*, New Age International Publishers, New Delhi, 1998
2. Ramaswamy. G.S, *Design of Construction of Concrete Shell Roofs*, McGraw Hill Publishing Company, New York, 1986
3. Krishna Raju. N, *Pre-Stressed Concrete*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1988
4. Taranath. B.S, *Structural Analysis and Design of Tall Buildings*, McGraw Hill, New York, 1988.
5. Purushothaman. P, *Reinforced Concrete Structural Elements*, Tata McGraw Hill Publishing Co Ltd.,

Independent study and documentation of architectural and allied subjects, pertaining to the envisioned thesis topic by individual student. Submission of report along with oral and visual presentation.

Students may choose a topic related to theory / philosophy / current issues related to architecture and allied subjects pertaining to the thesis topic. The topics must be vetted by the subject teacher/s. The emphasis must be on critical understanding, logical reasoning, structured argument /discussion about the topic chosen. The student is expected to draw inferences based on a structured study as above.

By the end of the semester, students are expected to submit a written paper of approximately 2000 words. Students must adhere to Standard referencing conventions and technical writing norms.

Final assessment of the students' work may be based on oral communication as well as written communication. However, greater weightage may be given for oral communication of the students.

**Creation of new Paradigms in architectural design** – This Design studio addresses predominantly urban issues such as Housing, Urban design and Conservation. Though emphasis is on the study of existing problems in our cities, scholars will be encouraged to strive for innovative architectural solutions for the same. Team work will be required to undertake such projects & hence the ability of the student as a team player will be critical.

- **Housing** – The various types of housing projects in a typical urban scenario can be taken with suitable design parameters that get established after conducting a rigorous study. Analysis of existing design trends & user preferences need to be ascertained. Awareness about special building byelaws applicable for Group housing schemes is essential. In addition to design issues such as security, accessibility, identity, social interaction, comfort, economy etc that would be investigated, the application of Fractals in design can also be explored. Ex. Housing for the poor / Slum dwellers, Multi-storeyed apartments for Govt. / corporate employees, Multi-storeyed condominiums for the rich etc.

- **Urban design or Conservation** – Urban design projects could deal with redevelopment of problem areas such as riverfronts, beach fronts, market areas, bazaars or commercial & residential districts that have reached dead end situation. It could also deal with emerging nodes of transportation with its surrounding areas, the design of city level open spaces such as parks, plazas etc.

Alternatively, conservation strategies for heritage areas along with revitalization techniques can also be attempted. The projects thus undertaken as group work will have to ultimately contribute ideas for the improvement of the quality of the urban environment.

#### REFERENCE BOOKS

1. *Time saver standards for building types*, DeChiara and Callender, Mc Graw hill company.
2. *Neufert Architect's data*, BousmahaBaiche & Nicholas Walliman, Blackwell science ltd.
3. National Building Code – ISI.
4. *New Metric Handbook* – Patricia Tutt and David Adler – The Architectural Press.
5. *Time saver standards for landscape architecture* – Charles W.Harris – McGraw Hill.

## IX SEMESTER

15 AR 5148

PRACTICAL TRAINING

L T P C  
0 0 30 30

### OBJECTIVES:

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

### CONTENT:

The Practical Training -I would be done in offices / firms in India empanelled by the Institution in which the principal architect is registered under the Council of Architecture. The progress of practical training shall be assessed internally through submission of log books supported by visual documents maintained by students every month along with the progress report from the employer/s of trainees.

The students would be evaluated based on the following criteria:

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

At the end of the Practical Training, a portfolio of work done during the period of Practical Training along with certification from the offices are to be submitted for evaluation by a viva voce examination. This will evaluate the understanding of the students about the drawings, detailing, materials, construction method and service integration and the knowledge gained during client meetings, consultant meetings and site visits.

Documentation of at least 25 innovative details from personal observations, office records or field studies. This may include historical as well as contemporary details. Critical observations of performance, usefulness etc. The selection of details should be based on their special nature due to practical field situation and must be presented in a folder.

Students are also expected to develop skills of academic portfolio preparation for higher education and placements.

## X SEMESTER

15 AR 5244

PROFESSIONAL PRACTICE AND ETHICS

L T P C  
0 0 3 3

**Objective:** To equip students about the procedures of tendering, valuation, easement, arbitration, and expose the students to the impact of WTO and GATS on professional practice, and equip them for international architectural practice.

### **Architecture profession**

Importance of Architecture Profession, role of Architects in the society, Architects' Act 1972, Amendments & Provisions, registration of architects, relations with clients, contractors, consultants, public authorities. Ways of getting works; types of works, works partly executed by other architect; precautions to take before taking up the work; conditions of engagement between the architect and client. Role of Council of Architecture and Indian Institute of Architects, functions, constitution, and rules & regulations. Code of professional conduct & Ethics, Social responsibility, Publications.

### **Practicing Architecture**

Scope of work of an architect, Schedule of services, drawings to prepare, Terms & conditions of engagement, letter of appointment. Private practice, types of offices/firms, responsibilities & liabilities. Salaried appointment in public & private sector jobs, Architectural Competitions procedure. Scale of charges, applicable building byelaws, municipal approvals, development controls, zoning regulations, National Building Code, Master plan, Zonal plan.

### **Architect's Office**

Architect's office management, organization structure, responsibility towards employees, consultants & associates, maintenance of accounts, filing of records, balance sheet, Income tax, Service tax, Professional tax. Copy rights and patenting, correspondence, documentation, drawings, conducting meetings, Clerk of works, inspection, works measurement, certificate of payment to contractors, applicable legislations, registration of properties, stamp duty; insurance for new work and additions; insurable value of property, claim for damages.

### **Arbitration, Valuation and Easements**

Need/Scope of Arbitration, Indian Arbitration act, arbitrators, umpires, appointment, conduct, powers, duties, Sole/Joint arbitrators, Arbitration procedure, awards & impeachment. Techniques/elements of valuation, factors affecting valuation of land/building, compensation on acquisition, lease renewal/extension, standard rent, Cost of sale, Purchase & Mortgage. Easements, types, rights & features; acquisition/extinction/protection; Interim/permanent/mandatory injunctions. dilapidation, insurance, estate development. Consumer protection act.

### **TENDER & CONTRACT**

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). Contract – Definition - Contract agreement - its necessity – Contents (Articles of Agreement, Terms and Conditions, Bills of Quantities and specifications, Appendix) – Certification of Contractors Bills at various stages. New trends in project formulation and different types of execution (BOT, DBOT, BOLT, BOO, etc.) - Execution of projects – The process (Expression of interest, Request for Proposal, Mode of Evaluation of Bids, Award of work)

**References:**

1. Apte, V. S. (2008). *Architectural Practice and Procedure*. Pune: Padmaja Bhide.
2. Chappell, D. M. And Willis, A. (2005). *The architect in practice*. 4<sup>th</sup> Ed. Oxford: Blackwell Publications.
3. Charles, E. (1996). *TQM and ISO 9000 for architects and designers*. New York: McGraw-Hill.
4. COA. (1989). *Architects (Professional conduct) Regulations, Architectural Competition guidelines*. Council of Architecture Publications.
5. COA. (2005). *Handbook of Professional Documents*. Council of Architecture.
6. Eldred, G. W. (2008). *The Beginner's Guide to Real Estate Investing*. John Wiley & Sons.
7. Lewis, R. K. (1985). *Architect: a candid guide to the profession*. Cambridge: MIT Press.
8. Namavati, R. (1984). *Professional practice*. Mumbai: Lakhani Book Depot.
9. Piotrowski, A. and Williams, J. (2001). *The Discipline of Architecture*. University of Minnesota Press.
10. Rangwala, S. C. *Valuation of Real Properties*. Charotar Publications.
11. Scott, J. J. (1985). *Architect's Practice*. London: Butterworth. & WTO and GATT guidelines.

**OBJECTIVES:**

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

**TOPICS OF STUDY**

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

**METHOD OF SUBMISSION**

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

**REQUIRED READING:**

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

**REFERENCES:**

1. Donald Appleyard, "The Conservation of European Cities", M.I.T. Press, Massachusetts, 1979.
2. Richard Kintermann and Robert, "Small Site Planning for Cluster Housing", Van Nastrand Reinhold Company, Jondon/New York 1977.
3. Miller T.G. Jr., "Environmental Sciences", Wadsworth Publishing Co., 1994
4. Geoffrey And Susan Jellicoe, "The Landscape of Man", Thames And Hudson, 1987.
5. Arvind Krishnan & Others, "Climate Responsive Architecture", A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2007.



**ELECTIVES**

**SEMESTER V**

**ELECTIVE I**

**15 AR 31A1**

**SET DESIGN**

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

<b>CO No</b>	<b>Course Outcome (CO)</b>	<b>PO/PSO</b>	<b>Blooms Taxonomy Level (BTL)</b>
CO1	Understanding the evolution of theatre and motion picture along with human cultural evolutions and its debatable relation with the society.		2
CO2	Ability to create layouts, typography and signage for different time periods.		3
CO3	Concept understanding and creation abilities for different sets for fine arts and entertainment media.		3
CO4	Concept understanding and creation abilities for stage design.		3

**FILM AND SOCIETY**

Examination of the twentieth-century culture and society through film. Critical analysis of cultural and social conflicts is portrayed and worked out in popular films, and examination of how motion pictures create a window into modern society. Film as cultural texts to better understand history and culture manifestations.

**HISTORY AND THEATER FILM SET DESIGN**

Investigation the production methods, dramatic theory and conventions, and scene design of various performance media since the popularization of the motion picture, and how it has influenced all entertainment design in the 20th and 21st centuries.

**GRAPHIC DESIGN AND TYPOGRAPHY FOR EXHIBIT DESIGN**

Principles of layout for creating effective visual signage and explore the unique problems, technique, theory, and approaches of signage in film, theatre, and other forms of mediated exhibition. Introduction to the design applications for building signage.

**SET DESIGN AND CONCEPT WRAP**

Introduction to the basic concepts, through theory and practice, of scene design in theatre, film, and other fine arts and entertainment media. Students will learn how to analyze scripts for proper scenery, how to conceptualize designs that will translate into actual sets, and develop visual thinking within the creative process.

## **STAGE DESIGN**

Stage design process from inception to performance, script analysis, visual arts analysis, research skills, and the application of principles and elements of design. Understanding stage setting through language, colour, and architectural analysis.

## **REFERENCE BOOKS**

1. *Time saver standards for building types*, DeChiara and Callender, Mc Graw hill company
2. *Neufert Architect's data*, BousmahaBaiche & Nicholas Walliman, Blackwell science ltd

CO No	Course outcome's	PO/PSO	BTL
CO 1	To introduce the study of Vernacular architecture and to understand the overview of various approaches and concepts of vernacular architecture	PO2	2
CO 2	Study various vernacular architectural forms of various region (North India)	PO7	2
CO 3	Study various vernacular architectural forms of various region (South India)	PO7	2
CO 4	Understand the impact of Colonial rule on the Vernacular Architecture of India	PO7	2

### INTRODUCTION

Definition and classification of Vernacular architecture – Vernacular architecture as a process – Survey and study of vernacular architecture: methodology- Cultural and contextual responsiveness of vernacular architecture: an overview

### APPROACHES AND CONCEPTS

Different approaches and concepts to the study of vernacular architecture: an over view – Aesthetic, Architectural and anthropological studies in detail

### VERNACULAR ARCHITECTURE OF THE WESTERN AND NORTHERN REGIONS OF INDIA 12

Forms spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of the following:

- Deserts of Kutch and Rajasthan; Havelis of Rajasthan
- Rural and urban Gujarat; wooden mansions (havelis); Havelis of the Bohra Muslims
- Geographical regions of Kashmir; house boats

### VERNACULAR ARCHITECTURE OF SOUTH INDIA

Forms, spatial planning, cultural aspects, symbolism, art, colour, materials of construction and construction technique, proportioning systems, religious beliefs and practices in the vernacular architecture of the following:

- Kerala: Houses of the Nair & Namboothri community; Koothambalam, Padmanabhapuram palace.
- Tamil Nadu: Houses and palaces of the Chettinad region; Agraharams.

### WESTERN INFLUENCES ON VERNACULAR ARCHITECTURE OF INDIA

Colonial influences on the Tradition Goan house - Evolution of the Bungalow from the traditional bangla, Victoria Villas – Planning principles and materials and methods of construction. Settlement pattern and house typologies in Pondicherry and Cochin.

**REQUIRED READINGS:**

1. Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997.
2. Amos Rapoport, House, Form & Culture, Prentice Hall Inc. 1969.
3. R W Brunskill: Illustrated Handbook on Vernacular Architecture, 1987.

**REFERENCES:**

1. V.S. Pramar, Haveli – Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad, 1989.
2. Kulbushanshan Jain and Minakshi Jain – Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad 1992.
3. G.H.R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Changesince 1850, Oxford University Press, Delhi, 1989.
4. Carmen Kagal, VISTARA – The Architecture of India, Pub: The Festival of India, 1986.
5. S. Muthiah and others: The Chettiar Heritage; Chettiar Heritage 2000.

**SEMESTER VI**

## ELECTIVE II

15 AR 32B1

ENERGY EFFICIENT ARCHITECTURE

L T P C  
3 0 0 3

CO No	Course Outcome (CO)	PO / PSO	(BTL)
CO1	To understand the need for architectural solutions for energy consumption	PO2	2
CO2	To classify various techniques for passive heating	PO7	2
CO3	To classify techniques for passive cooling and the exemplify the need for natural ventilation	PO2,PO7	2
CO4	To interpret the upcoming trends in solving the energy problem through architecture	PO2,PO7	2

### OBJECTIVES:

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

### PASSIVE DESIGN

Significance of Energy Efficiency in the contemporary context, Simple passive design considerations involving Site Conditions, Building Orientation, Plan form and Building Envelope - Heat transfer and Thermal Performance of Walls and Roofs.

### ADVANCED PASSIVE ARCHITECTURE- PASSIVE HEATING

Direct Gain Thermal Storage of Wall and Roof - Roof Radiation Trap - Solarium - Isolated Gain.

### PASSIVE COOLING

Evaporative Cooling - Nocturnal Radiation cooling - Passive Desiccant Cooling – Induced Ventilation - Earth Sheltering - Wind Tower - Earth Air Tunnels

### DAY LIGHTING AND NATURAL VENTILATION

Daylight Factor - Daylight Analysis - Daylight and Shading Devices - Types of Ventilation - Ventilation and Building Design.

### CONTEMPORARY AND FUTURE TRENDS

Areas for innovation in improving energy efficiency such as Photo Voltaic Cells, Battery Technology, Thermal Energy Storage, Recycled and Reusable Building materials, Nanotechnology, smart materials and the future of built environment, Energy Conservation Building code.

**REQUIRED READING:**

1. Manual on Solar Passive Architecture, IIT Mumbai and Mines New Delhi, 1999
2. Arvind Krishnan & Others, "Climate Responsive Architecture", A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2001.
3. Majumdar M, "Energy-efficient Building in India", TERI Press, 2000.
4. Givoni. B, "Passive and Low Energy Cooling of Buildings", Van Nostrand Reinhold, New York, 1994.

**REFERENCES:**

1. Fuller Moore, "Environmental Control Systems", McGraw Hill INC, New Delhi – 1993.
2. Sophia and Stefan Behling, Solpower, "The Evolution of Solar Architecture", Prestel, New York, 1996.
3. Patrick Waterfield, "The Energy Efficient Home: A Complete Guide", Crowood press ltd, 2011.
4. Dean Hawkes, "Energy Efficient Buildings: Architecture, Engineering and Environment", W.W. Norton & Company, 2002.
5. David Johnson, Scott Gibson, "Green from the Ground Up: Sustainable, Healthy and Energy efficient home construction", Taunton Press, 2008.

CO No	Course Outcome (CO)	PO / PSO	BTL
CO1	Demonstrate the photography history and changes in technology.	PO5	1
CO2	Determine different Journalism aspect to Photography	PO5	2
CO3	Identify the Contemporary Architectural Journalism through Photography.	PO5	1
CO4	Applying basic methods of photography for Architecture.	PO5	2

**OBJECTIVES:**

To provide basic introduction to the skills relevant to the practice of professional journalism. It introduces students to the fundamentals of writing, explaining of various strategies and their criticism. Introduction to Photojournalism and the contributions of photography to the professional practice of architecture and develop proficiency in this art using modern photography techniques.

**INTRODUCTION**

Introduction to journalism, key concepts and objectives of Journalism – Specialized journalism: with emphasis on architectural journalism - Journalism skills: research, reporting, writing, editing, photography, columnists, public relationships, criticism.

Issues such as copyright, public art policy, the arts and urban redevelopment. Introduction to local culture scene.

**TECHNOLOGIES IN JOURNALS**

Environment, Social Change, Persuasion- Interviewing techniques, Argument and debate as a technique in the investigation of social problems; evidence, proof, refutation, persuasion; training in argumentative speaking.

Introduction to software needed in journalism and photography, video coverage, walk-through of buildings, production of contemporary architectural journalism. Understanding the individual demands in the context of newspapers, radio, film, and television.

**CONTEMPORARY ARCHITECTURAL JOURNALISM**

Role of the Editor - Editing of Articles, Features and other stories - Editing for online newspaper and magazines - Text preparation, Mode of presentation, Standards and Guidelines for documentation, Code of ethics, Basic knowledge on Press laws, Press Council of India, Multimedia/online journalism and digital developments.

**DISCUSSIONS AND ISSUES**

Regional, National and International discussion forums, Changes in contemporary and

historical design practices. Discussions on topics needed in an architectural journal and current issues - types of journals, works of key architectural journalists, Public Discourse on the Internet, Mass Media and Public Opinion – critique on selected pieces of journalism.

### **ARCHITECTURAL PHOTOGRAPHY**

Introduction to architectural photography and role of the photographic image in the global world– basic instruction in Photojournalism

Equipment: cameras and lenses – techniques: film speed, exposure measurement, gray scale– photo- finishing and editing digital images.

Perspectives: Single Point, Two- Point, Three- Point and methods of correcting distortions –

Lighting: External and Interior.

### **REQUIRED READING:**

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

### **REFERENCES:**

1. Huckerby, Martin., The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
2. Ward, S. J. A. “Philosophical Foundations of Global Journalism Ethics.” Journal of Mass Media Ethics., Vol. 20, No. 1, 3-21, 2005.
3. M. Heinrich, “Basics Architectural photography”, Birkhauser Verlag AG, 2008.
4. Gerry Kopelow, “Architectural Photography: the professional way”, 2007.



## SEMESTER VII

### ELECTIVE III

15 AR 41C1

GREEN BUILDINGS

L T P C  
3 0 0 3

#### OBJECTIVES:

The objectives include creating awareness of the need for green buildings and imparting knowledge of designing green buildings, advocating of the application of passive and active use of renewable energy system and the promotion of efficient use of water, materials and waste through the sustainable concept of Reduce, Recycle and Reuse.

#### BIO CLIMATIC DESIGN CONCEPTS

Green buildings- salient features- LEED rating systems by IGBC - origin from USGBC – **Concept of Sustainable sites** – Orientation to sun and Wind - Land form & orientation – Vegetation & Pattern – Waterbodies – Open Space & Built form - Plan form & Elements – Roof form – Fenestration pattern & Configuration .

#### PASSIVE AND ACTIVE HEATING TECHNIQUES

**Passive Heating techniques:** General principles – Direct gain systems - Glazed walls, Bay windows, Attached sun spaces etc. Indirect gain systems – Trombe wall, Water wall, Solar Chimney, Transwall, Roof pond, etc - Isolated gain systems – Natural convective loop etc.

**Active Heating Systems:** Solar water heating systems

Case studies on buildings designed with passive and heating techniques.

#### PASSIVE AND ACTIVE COOLING CONCEPTS

**Passive Cooling techniques: General principles** – Evaporative cooling, Nocturnal radiation cooling, Passive Desiccant cooling, induced ventilation, earth sheltering, Berming, Wind Towers, earth – Air tunnels, Curved Roofs & Air Vents, Insulation, etc.

**Active Cooling techniques:** Air coolers.

Case studies on buildings designed with passive cooling techniques.

#### REDUCE, RECYCLE AND REUSE

Water conservation by Rainwater Harvesting systems – Treatment of waste water: Physical, Chemical and Biological methods – Root Zone treatment - Use of recycled water. Use of Environment friendly materials, Embodied Energy of materials, Bio degradable materials. Recycling and Reuse of steel, Aluminium and Glass.

#### INNOVATIVE GREEN TECHNOLOGIES AND CASE STUDIES

Innovative uses of solar energy: BIPV, Solar Forest, Solar powered street elements, - Innovativematerials: Phase changing materials, Light sensitive glass, Self-cleansing glass- Integrated Use of Landscape : Vertical Landscape, Green Wall, Green Roof. Case studies on Green buildings : CII building, Hyderabad, Gurgaon Development Centre-Wipro Ltd. Gurgaon; Technopolis, Kolkata; Grundfos Pumps India Pvt Ltd, Chennai; Olympia Technology Park, Chennai.

**REQUIRED READING:**

1. Sustainable *design manual*, Vols 1& 2, The energy and resource institute, New Delhi.

**REFERENCES:**

1. Arvind Krishnan & Others – *Climate Responsive Architecture*, Tata Mcgraw –Hill New Delhi 2001.
2. Ralph M. Lebens – *Passive Solar Architecture in Europe – 2*, Architecture Press, London 1983.
3. Sandra Mendler, William Odell, *The Guide Book of Sustainable Design*, John Wiley & Sons, 2000.
4. Lawson.B ,*Bulding Materials, Energy And The Environment; Towards Ecologically Sustainable Development Raia, Act, 1996.*

CO No	Course Outcome(CO)	PO /PSO	BTL
CO1	Understanding of the Sustainable Design strategies and approaches considering Environment and Social impact.	PO3, PO5	2
CO2	Understanding of optimizing energy performance and water conservation	PO3, PO7	2
CO3	Understanding of the biomimetics and mimicking mechanisms found in the nature.	PO6, PSO2	2
CO4	Understanding of the green building rating system and familiarize with the sustainable building designed in the past decade.	PO3, PSO2	2

**OBJECTIVES:**

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

**SUSTAINABLE DESIGN METHODS & MATERIAL OPTIMIZATION**

Sustainable design strategies and approaches, Sustainable design innovation, Systems design, Transdisciplinary collaboration in design, Life cycle design and life cycle assessment (LCA), Design for disassembly, Design for re-use, Design for sustainable manufacturing and construction, Design for remanufacturing.

**ENVIRONMENTAL & SOCIAL CONSIDERATIONS**

Design for environment, Land use planning; smart growth and urban design; transportation policy and design; environmental site design; site assessment and selection; Brownfield redevelopment strategies and infill development, Eco-design. Socially responsible design, User-centered design, Design education and sustainability, Design ethics and sustainability.

**ENERGY & WATER USAGE OPTIMIZATION**

Optimizing Energy performance & Designing with renewable and alternative energy systems including solar power, wind, geothermal, low-impact hydroelectric, photovoltaic, biomass & biogas with a view to achieving energy efficiency. Understanding water use/ demand, water conservation, water quality and biological methods of wastewater treatment, use of recycled water and storm water drainage as they relate to the planning and design of urban communities and project sites. Planning and design for natural and impacted on-site water features. Fundamental water resources policy issues and hydrologic processes, as they apply to community planning and design situations.

**BIOMIMETICS**

Definition, replicating natural manufacturing methods as in the production of chemical compounds by plants and animals; Mimicking mechanisms found in nature, Imitating organizational principles from social behavior of organisms; Examples: Spider-silk as a substitute for steel, Lotus effect in self-cleansing glass, Dinosaur spine in bridge design, Lily pad structure, termite mound cooling system, swarm theory, aerodynamic structures etc.

### **CASE STUDIES OF SUSTAINABLE BUILDINGS**

Introduction to the role of green building rating systems- Eg: LEED. Study the architectural design of the

following buildings in order to explore the use of green building materials, energy and water conservation, and creating safe, healthy indoor environments **indian:** Gurgaon Development Centre-Wipro Ltd. Gurgaon; Technopolis, Kolkata; Grundfos Pumps India Pvt Ltd, Chennai; Olympia Technology Park, Chennai; WorldBank Chennai Building Chennai; Bpo Park At Chennai. **others:** the Chicago Center for Green Technology Chicago, USA; Green Operations Building White Rock, Canada. U.S. Courthouse, Orlando, USA.

### **TEXTBOOK**

1. Sustainable *design manual*, Vols 1 & 2, The energy and resource institute, New Delhi.

### **REFERENCE BOOKS**

1. Charles. J. Kibert, 'Sustainable Construction' John Wiley and son's Inc, USA.
2. N.D. Kaushika, *Energy, Ecology and Environment*, Capital Publishing Company, New Delhi.
3. John Fernandez, *Material Architecture*, Architectural Press, UK.
4. Rodney Howes, *Infrastructure for the built environment*, Butterworth Heineman.
5. G.Tyler Miller JR, *Living in the Environment*, Wardsworth Publishing Company, USA

## ELECTIVE IV

15 AR 41C3

FURNITURE AND PRODUCT DESIGNING

L T P C  
3 0 0 3

### OBJECTIVES:

Understanding the methods and techniques involved in furniture and product design.

### INTRODUCTION

A brief introduction to Product Designing – Various elements – History of Product Design – Definition of Product Design, understanding of Product Design - Purpose of Product Design – Role of Product Designers.

### HUMAN FACTORS

Definition of human factors, Application of human factors data. Human activities, their nature and effects. Man-machine system and physical environment. Human performance and system reliability. Information input and processing. Human control systems. Applied anthropometry – Human response to climate.

### ASPECTS OF PRODUCT DESIGN

Visual, Auditory, Tactile, Olfactory human mechanisms, Physical space and arrangement. Visual display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays, Visual codes and symbols.

### PRODUCT DESIGN

Form, Colour, Symbols, User specific criteria, Material, Technology and recyclability, Packaging. Multiple Utility oriented approach to Product Design.

### DESIGN EXERCISES

Design of Household elements, tools and devices – Spoon/Cutlery.

Design of furniture – Chairs/Computer table, Kitchen racks, Cabinets etc.

Design of Industrial Product – Watch Dial, Gear Wheels, Automobile Headlights etc.

Element design for the physically and mentally different people.

### REFERENCE BOOKS

1. *Time Saver Standards for Interior Design*
2. Andrew Alpern, *Handbook of Speciality Elements in Architecture*, McGrawhill Co., USA, 1982.
3. Francis D.K.Ching, *Interior Design Illustrated*, VNR Publications, New York, 1987.
4. *An invitation to Design*, Helen Marie Evans.

CO No	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand the need and role of Interior Design. Understand Interior design Principles and Elements.	PO2	2
CO2	Study and analyze historical back ground of Interior Design. Study and Understand various concepts of Interior Design adopted historically through ages.	PO7	2
CO3	Study and Understand concepts and ideas to Interior space planning and design, understand how to handle components of Interior space, like walls, ceiling, etc., in achieving the required interior design theme.	PO7	2
CO4	Study and understand concepts and ideas to Interior space planning and design, understand how to handle components of Interior space, like lighting, colour etc., in achieving the required interior design theme. Understand role of furniture design, type and various styles of furniture in Interior design.	PO7	2

**OBJECTIVES:**

- To introduce the vocabulary of interior design.
- To familiarize the students with an overview of interior and furniture design and design movements through history.
- To inform the various components of interior space and treatment and finishes for the same.
- To familiarize the students with the various components of interior design like lighting, landscaping and furniture.

**INTRODUCTION TO INTERIOR DESIGN**

Definition and process of interior design - vocabulary of interior design in terms of principles and elements - introduction to the design of interior spaces as related to typology and function, themes and concepts

**HISTORY OF INTERIOR AND FURNITURE DESIGN**

Overview of interior and furniture design in the Western context through the ages relating to historical context, design movements and ideas -overview of folk arts and crafts of India with reference to their role in interior decoration.

**COMPONENTS OF INTERIOR SPACE- INTERIOR TREATMENT AND FINISHES**

Treatment of components such as floors, ceilings, walls, partitions, window treatments, accessories, etc., in terms of their choice and design related to materials, methods of construction, colour, texture, etc., based on functional, aesthetic and psychological criteria

### **COMPONENTS OF INTERIOR SPACE- LIGHTING AND LANDSCAPING**

Interior lighting - different types of lighting - types of lighting fixtures- their effects and suitability in different contexts Interior landscaping elements: rocks, plants, water, flowers, fountains, paving, artifacts, etc., their physical properties and effects on spaces

### **COMPONENTS OF INTERIOR SPACE- FURNITURE**

Furniture design as related to human comfort and function, materials and methods of construction, changing trends and lifestyles, innovations and design ideas - furniture for specific types of interiors: office furniture, children's furniture, residential furniture, display systems, etc.

### **REQUIRED READING:**

1. Francis D.K.Ching, "Interior Design Illustrated", V.N.R. Pub. NY 1987.
2. Joseph DeChiara, Julius Panero, Martin Zelnik, "Time Saver's Standards for Interior Design", McGraw-Hill Professional 2001.
3. John F.Pile, "Interior Design", John Wiley and Sons 2004.
4. Dr.Saranya Doshi, Editor, "The Impulse to adorn - Studies in traditional Indian Architecture", Marg Publications 1982.
5. Steport - De - Van Kness, Logan and Szebely, "Introduction to Interior Design", Macmillan Publishing Co NY 1980.

### **REFERENCES:**

1. Helen Marie Evans, "An Invitation to design", Macmillan Pub Co 1982.
2. Julius Penero and Martin Zelnik, "Human Dimensions and Interior space", Whitney Library of Design NY 1979.
3. "Inca-Interior Design Register", Inca Publications, Chennai 1989.
4. Kathryn B.Hiesinger and George H.Marcus, Landmarks of twentieth Century Design; Abbey Ville Press 1993.
5. Susanne Slesin and Stafford Cliff, Indian Style, Clarkson N. Potter, New york 1990.

## SEMESTER VIII

### ELECTIVE V

15 AR 42D1

HOUSING

L T P C  
3 0 0 3

#### OBJECTIVES:

Understanding of the various issues involved in urban and rural housing and knowledge about the planning and design solutions for low income groups.

#### INTRODUCTION TO HOUSING AND HOUSING ISSUES

Housing demand and need. Calculation of future need. National housing policy of 2007, Housing agencies, housing resources, Role of banks in housing finance.

#### SOCIO ECONOMIC ASPECTS

Social factors influencing Housing Design – identity, safety, convenience, access, amenities etc , economic factors - affordability and its relationship to house income , incremental housing concept , Slum upgrading and sites and services schemes.

#### Housing standards

Different types of housing standards – spatial standards, safety standards, standards for amenities, Methodology of formulating standards, UD PFI – guide lines, standard and regulations – DCR – performance standards for housing, TCPO, New norms and amenities

#### Modern Techniques in housing construction

Prefabrication techniques – modular house, panelized and precast homes, sustainable practices – zero energy home, eco-friendly home, green homes - Teri – Griha and its rating system.

#### Housing design and process

Traditional housing, row housing, cluster housing – apartments and high-rise housing, gated community, Government housing – HUDCO financed project for economically weaker section. Their Advantages and disadvantages. Methods and approaches to housing design. Various stages and tasks in project development – feasibility study, detailed study.

#### REFERENCE BOOKS

1. Babur Mumtaz and Patweikly, *Urban Housing Strategies*, Pitman Publishing, London, 1976.
2. Geoffrey K. Payne, *Low Income Housing in the Development World*, John Wiley and Sons, Chichester, 1984.
3. John F.C. Turner, *Housing by people*, Marison Boyars, London, 1976.
4. Martin Evans, *Housing, Climate and Ocmfort*, Architectural Press, London, 1980.
5. *Forbes Davidson and Geoff Payne*, Urban Projects Manual, Liverpool University Press, Liverpool, 1983.



**OBJECTIVES:**

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

**INTRODUCTION TO CONSERVATION**

Understanding Heritage. Types of Heritage. Heritage conservation- Need, Debate and purpose. Defining Conservation, Preservation and Adaptive reuse. Distinction between Architectural and Urban Conservation. International agencies like ICCROM, UNESCO and their role in Conservation.

**CONSERVATION IN INDIA**

Museum conservation – monument conservation and the role of Archeological Survey of India – role of INTACH – Central and state government policies and legislations – inventories and projects- select case studies of sites such as Hampi, Golconda, Mahabalipuram - craft Issues of conservation.

**CONSERVATION PRACTICE**

Listing of monuments- documentation of historic structures- assessing architectural character – historic structure report- guidelines for preservation, rehabilitation and adaptive re-use of historic structures- Case studies of Palaces in Rajasthan, Chettinad and Swamimalai dwellings, seismic retrofit and disabled access/ services additions to historic buildings- heritage site management.

**URBAN CONSERVATION**

Over view of urban history of India and Tamil Nadu- understanding the character and issues of historic cities – select case studies of towns like Srirangaram, Kumbakonam and Kanchipuram-historic districts and heritage precincts.

**CONSERVATION PLANNING**

Conservation as a planning tool- financial incentives and planning tools such as Transferable Development Right(TDR)-urban conservation and heritage tourism-case studies of sites like for Cochin, Pondichery French town. - conservation project management.

**REQUIRED READING:**

1. Donald Appleyard, "The Conservation of European Cities", M.I.T. Press, Massachusetts, 1979.
2. James M. Fitch, "Historic Preservation: Curatorial Management of the Built World" University Press of Virginia; Reprint edition, 1990.

3. Robert E. Stipe, *A Richer Heritage: Historic Preservation in the Twenty-First Century*, Univ. of North Carolina press, 2003.
4. *Conservation Manual*, Bernard Fielden; INTACH Publication, 1989.

**REFERENCES:**

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Seminar Issue on Urban Conservation

## ELECTIVE VI

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INDUSTRIAL BUILDING SYSTEMS

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### OBJECTIVES:

To create awareness about the various types of pre-fabricated housing systems and to recognize the importance of modular coordination in industrialized building systems.

### INTRODUCTION

Five year plans and thrust in housing – Issues in Urban Housing – use of modern building materials – application of modern technology – meaning of industrial building system.

### APPLICATION OF INDUSTRIAL BUILDING SYSTEM

Feasibility of using industrial building system in Residential and Non-Residential buildings – manufacturing of building components – Technology requirements for industrial building system – use of Industrial building system as an option for disaster mitigation.

### MODULAR CO-ORDINATION AND INDUSTRIALISED SYSTEM

Concept and definition of Modular dimensional discipline – Advantages and Limitations of modular principle – Components of residential buildings – precast elements.

### PRE-FABRICATION SYSTEM

Objective and necessity – Off site on site prefabrication elements and construction joints – architectural and technical limitations.

### PROCEDURES AND ORGANISATION

Equipment used – manufacturing processes – transportation of components – assembly and finishing – Structural, social and economic issues related to industrial building system.

### REFERENCES:

1. Industrial Building and Modular Design Henrik Missen – C & CK, UK 1972.
2. Albert G.H.Dietz, Laurence Secotter – “Industrialized Building Systems for Housing” MIT, special summer session, 1970 USA.
3. “Industrialized Building Construction” – Proceedings of National Seminar, Nov-17-18, 2000, Indian Concrete Institute, Mumbai.
4. “Innovative Construction Materials” – Proceedings of Seminar, Jan 20-21, 2001, VeermataJeejabai Technical Institute, Mumbai.

**OBJECTIVES:**

- To provide practicing engineers and managers with enhanced knowledge of advanced intelligent building technologies, system operation and control.
- Evaluate the characteristics and limitation of various automation system in buildings.
- Apply the underlying principles and theory to the operation and maintenance of each system.

**INTELLIGENT BUILDINGS**

Concept, Definition, intelligent Architecture and structure, evolution of intelligent buildings, IB assessment criteria – intelligent homes.

**ENERGY MANAGEMENT IN DESIGN**

Natural building design consideration – Energy efficient strategies – Contextual factors – Longevity and process Assessment – Renewable energy sources and design- Advanced building Technologies- Smart buildings.

**ENERGY MANAGEMENT IN SERVICES**

Energy in building design – Energy efficient and environment friendly building – Thermal phenomena – thermal comfort – indoor air quality – passive heating and cooling systems – Energy Analysis – Active HVAC systems- Preliminary Investigation – energy audit – types of energy audit – Energy flow diagram – Energy consumption/unit production – identification of wastage – priority of conservative measures – Maintenance of management program.

**BUILDING ENERGY CONSERVATION TECHNOLOGIES**

Standards of energy efficiency in building. Trends in energy consumption. Energy audit: evaluation of energy performance of existing buildings, use of computer models, impact of people behavior. Energy efficiency in buildings: approaches, materials and equipment, operating strategies, evaluation methods of energy savings. Optimum Selection of energy sources. Air-to-air energy recovery.

**CONTROL SYSTEMS IN BUILDINGS**

Introduction to automatic control systems, control issues related to energy conservation, interior air quality and thermal comfort in buildings – ventilation. Classification of HVAC control system: selection and sizes of sensors, actuators and controllers. Practical HVAC control system Designing and turning controllers – Building automation systems, design for security.

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1. Moore F., "Environmental control system" McGraw Hill, Inc., 1994.
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4. James M Sinopoli, "Smart Building Systems for Architect", Owners and Builders Publisher, Butterworth- Heinemann, 2009.