

AR 2018

**COURSE STRUCTURE & SYLLABUS
FOR
UNDER GRADUATE PROGRAMME
IN
ARCHITECTURE**



**COLLEGE OF ENGINEERING AND TECHNOLOGY
BHUBANESWAR**

**An Autonomous and Constituent College of
BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, Rourkela, Odisha**

COURSE: B. Arch. (Bachelor of Architecture)

Duration: 5 years

COURSE: B. Arch. (Bachelor of Architecture) Duration: 5years (Ten Semesters)

Abbreviations Used:

L = Lectures

T= Tutorial

P = Practical or Laboratory

SE = Semester Examination

IA= Internal Assessment

EA= External Assessment

1st SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	BS	UBSAR101	Mathematics	3	0	0	3	30	70		100
2	ES	UESAR102	Mechanics-I	3	0	0	3	30	70		100
3	PC	UPCAR103	Introduction to Architecture	3	0	0	3	30	70		100
4	PC	UPCAR104	Building Material-I	2	0	0	2	30	70		100
5	LC	ULCAR101	Basic Design	0	0	6	4	30		50	100
6	LC	ULCAR102	Descriptive Geometry-I	0	0	6	4	30		50	100
7	LC	ULCAR103	Architectural Workshop	0	0	3	2	50		50	100
8	LC	ULCAR104	Building Construction-I	0	0	3	2	50		50	100
9	LC	ULCAR105	Communicative English	0	0	3	2	50		50	100
Total				11	0	21	25				900

2nd SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	ES	UESAR201	Mechanics-I	3	0	0	3	30	70		100
2	BS	UBSAR202	Environmental Science	3	0	0	3	30	70		100
3	PC	UPCAR203	History of Architecture-I	3	0	0	3	30	70		100
4	PC	UPCAR204	Building Material-II	2	0	0	2	30	70		100
5	PC	UPCAR205	Climatology in Architecture	3	0	0	3	30	70		100
6	LC	ULCAR201	Architectural Design Studio – I	0	0	6	4	50		50	100
7	LC	ULCAR202	Descriptive Geometry-II	0	0	6	4	50		50	100
8	LC	ULCAR203	Building Construction-II	0	0	3	2	50		50	100
9	LC	ULCAR204	Documentation and Measured Drawing	0	0	3	2	50		50	100
Total				14	0	18	26				900

3rd SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR301	History of Architecture – II	3	0	0	3	30	70		100
2	ES	UESAR302	Surveying	3	0	0	3	30	70		100
3	PC	UPCAR303	Building Services – I : Water Supply And Sanitation	3	0	0	3	30	70		100
4	ES	UESAR304	Building material – III	2	0	0	2	30	70		100
5	ES	UESAR305	Theory of Structure	3	0		3	30	70		100
6	LC	ULCAR301	Architectural Design Studio – II	0	0	9	6	50		50	100
7	LC	ULCAR302	Building Construction – III	0	0	3	2	50		50	100
8	LC	ULCAR303	Surveying Lab	0	0	3	2	50		50	100
9	LC	ULCAR304	Computer Application – I (2D & 3D)	0	0	3	2	50		50	100
			Total	14	0	18	26				900

4th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR401	Environmental Psychology & Behavioral Architecture	3	0	0	3	30	70		100
2	PC	UPCAR402	History of Architecture-III	3	0	0	3	30	70		100
3	PC	UPCAR403	Building Services-II (Acoustic design)	3	0	0	3	30	70		100
4	ES	UESAR404	Building Material-IV	2	0	0	2	30	70		100
5	ES	UESAR405	Design of Concrete Structures	3	0	0	3	30	70		100
6	LC	ULCAR401	Architectural Design Studio – III	0	0	9	6	50		50	100
7	LC	ULCAR402	Architectural Graphics & Communication	0	0	3	2	50		50	100
8	LC	ULCAR403	Building Construction-IV	0	0	3	2	50		50	100
			Total	14	0	15	24				800

5th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR501	Principles of Architecture and Theory of Design	3	0	0	3	30	70		100
2	ES	UESAR502	Building services – III : Illumination and Electrical Design	3	0	0	3	30	70		100
3	PC	UPCAR503	Interior Design	3	0	0	3	30	70		100
4	PC	UPCAR504	Contemporary Architecture and Trends	3	0	0	3	30	70		100
5	ES	UESAR505	Design of Steel Structures	3	0	0	3	30	70		100
6	LC	ULCAR501	Architectural Design Studio – IV	0	0	9	6	50		50	100
7	LC	ULCAR502	Working Drawing – I	0	0	6	4	50		50	100
8	LC	ULCAR503	Interior Design Studio	0	0	3	2	50		50	100
			Total	15	0	18	27				800

6th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR601	Vernacular Architecture	3	0	0	3	30	70		100
2	PC	UPCAR602	Landscape Design and Site Planning	3	0	0	3	30	70		100
3	ES	UESAR603	Building services – IV : HVAC	3	0	0	3	30	70		100
4	ES	UESAR604	Specification, Cost Estimation & Budgeting	3	0	0	3	30	70		100
5	PC	UPCAR605	Principles of Town Planning	3	0	0	3	30	70		100
6	LC	ULCAR601	Architectural Design Studio – V	0	0	9	6	50		50	100
7	LC	ULCAR602	Working Drawing – II	0	0	6	4	50		50	100
8	LC	ULCAR603	Landscape Design Studio	0	0	3	2	50		50	100
			Total	15	0	18	27				800

7th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR701	Housing and Community Planning	3	0	0	3	30	70		100
2	PC	UPCAR702	Urban Design	3	0	0	3	30			100
3	PC	UPCAR703	Disaster Resistant Architecture	3	0	0	3	30			100
4	PC	UPCAR704	Energy Efficient Architecture	3	0	0	3	30			100
5. ELECTIVE – I				3	0	0	3	30	70		100
	PE	UPEAR701	Inclusive Design								
	PE	UPEAR702	Industrial Architecture								
	PE	UPEAR703	Pre-fabrication and Modular Coordination								
6	LC	ULCAR701	Architectural Design Studio – VI	0	0	9	6	50		50	100
7	LC	ULCAR702	Architectural Details	0	0	3	2	50		50	100
8	LC	ULCAR703	Structural Drawing and Details	0	0	3	2	50		50	100
Total				15	0	15					800

8th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR801	Professional Practice	3	0	0	3	30	70		100
2	PC	UPCAR802	Research Methodology	3	0	0	3	30	70		100
3	PC	UPCAR803	Advanced Building Systems And Services	3	0	0	3	30	70		100
4. ELECTIVE – II				3	0	0	3	30	70		100
	PE	UPEAR801	Product Design and Ergonomics								
	PE	UPEAR802	Transportation Planning								
	PE	UPEAR803	Building Repair and Maintenance								
5. ELECTIVE – III				3	0	0	3	30	70		100
	PE	UPEAR804	Building Performance and Compliances								
	PE	UPEAR805	Aesthetics & Art Appreciation								
	PE	UPEAR806	Medical Architecture								
6	LC	ULCAR801	Architectural Design Studio – VII	0	0	12	8	50		50	100
7	LC	ULCAR802	Pre Thesis Seminar	0	0	3	2	50		50	100
Total				15	0	15	25				700

9th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
			Architectural Office Training								
1	PR	UPRAR901	Office Training	0	0	6	4	50		50	100
2	PR	UPRAR902	Site Supervision Work and Documentation	0	0	4.5	3	50		50	100
3	PR	UPRAR903	Field Documentation and Architectural Details	0	0	4.5	3	50		50	100
4	PR	UPRAR904	Critical Appraisal of Buildings	0	0	3	2	50		50	100
5	PR	UPRAR905	Field Observation Studies	0	0	3	2	50		50	100
			Total	0	0	21	14				500

10th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	ES	UESAR001	Construction and Project Management	3	0	0	3	30	70		100
2	PC	UPCAR002	Building Economics & Real-Estate Management	3	0	0	3	30	70		100
3 ELECTIVE – IV				3	0	0	3	30	70		100
	PE	UPEAR001	Architectural Conservation								
	PE	UPEAR002	Architectural Journalism								
	PE	UPEAR003	Geometry of Forms								
4	PR	UPRAR001	Thesis	0	0	18	12	50		50	100
5	LC	ULCAR001	Comprehensive Viva Voce	0	0	3	2	50		50	100
			Total	9	0	21	23				500

Total Teaching Hours and Maximum Marks at a Glance

Semester	Teaching Hours				Credits	Maximum Marks
	L	T	P	Total		
1st Semester	11	0	21	32	25	900
2nd Semester	14	0	18	32	26	900
3rd Semester	14	0	18	32	26	900
4th Semester	14	0	15	29	24	800
5th Semester	15	0	18	33	27	800
6th Semester	15	0	18	33	27	800
7th Semester	15	0	15	30	25	800
8th Semester	15	0	15	30	25	700
9th Semester	0	0	21	21	14	500
10th semester	9	0	21	30	23	500
Total	122	0	180	302	242	7600

NOTE:

- 1) Credits for Theory: One credit for one hour of teaching per week.
- 2) Credits for Practical: One credit for one and half hrs of practical per week.
- 3) Six Weeks Training after Second Semester during the summer vacation is mandatory for which the Review will be held in Third Semester.
- 4) Each student shall undertake training in planning (or related field) during summer vacation. The exact period and place of training will be decided in consultation with the coordinator in charge of training.
- 5) Review of Six Weeks Mandatory Training during Summer Vacation after Second Semester.

1st SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	BS	UBSAR101	Mathematics	3	0	0	3	30	70		100
2	ES	UESAR102	Mechanics-I	3	0	0	3	30	70		100
3	PC	UPCAR103	Introduction to Architecture	3	0	0	3	30	70		100
4	PC	UPCAR104	Building Material-I	2	0	0	2	30	70		100
5	LC	ULCAR101	Basic Design	0	0	6	4	30		50	100
6	LC	ULCAR102	Descriptive Geometry-I	0	0	6	4	30		50	100
7	LC	ULCAR103	Architectural Workshop	0	0	3	2	50		50	100
8	LC	ULCAR104	Building Construction-I	0	0	3	2	50		50	100
9	LC	ULCAR105	Communicative English	0	0	3	2	50		50	100
Total				11	0	21	25				900

THEORY SUBJECTS

SUBJECT TITLE	MATHEMATICS	CONTACT HOURS	L	T	P
SUBJECT CODE	UBSAR101		3	0	0
SUBJECT TYPE	BS	CREDITS	3		
OBJECTIVE					
The course is aimed to develop basic mathematical techniques required to support architectural and engineering concepts, and is also oriented to understand and analyze practical engineering problems. The intent of the mathematics courses for architecture students is three fold (i) modeling: Converting given data of a physical situation into a mathematical form (ii) solving them by standard techniques and (iii) interpreting the results. It is expected that students should not only know different mathematical techniques but should also be conversant with different applications.					
Module 1					
Calculus: Curve tracing, curvature, asymptotes					
Ordinary Differential Equations: First order differential equations, separable equations exact differential equations. Bernoulli's equation.					
Module 2					
Linear differential equations of second and higher order, homogeneous equation with constant coefficient.					
Module 3					
Series solution of differential equation: Power series method, Legendre's equation, Legendre's polynomial. Bessel's equation, Bessel's functions $J_n(x)$					
Module 4					
Laplace transformation and its use in solving differential equations. Convolution, Integral equations.					
REFERENCES					
1. Calculus: Gorakh Prasad: 2. Advance Engineering Mathematics - E. Kreyszig 3. John Wiley & sons Inc. - 8th edition Chapter 1 (1.1-1.7, Chapter 2 (2.1. - 2.10, 2.12) ,Chapter 4 (4.1- 4.6) , Chapter 5 (5.1- 5.7)					

SUBJECT TITLE	MECHANICS-I	CONTACT HOURS	L	T	P
SUBJECT CODE	UESAR102		3	0	0
SUBJECT TYPE	ES	CREDITS	3		
Statics					
MODULE - I (Force Analysis)					
Principles of Statics, Equilibrium of concurrent forces in a plane, Plane Trusses: Method of Joints, Method.					
MODULE II - (Centre of Gravity)					
Centre of Parallel Forces in a plane, Centre of gravity, Centroids of composite Plane Figures, Centroids of curves, Distributed force in a plane.					
Dynamics					
MODULE - III (Kinematics)					
Rectilinear Translation: Kinematics of rectilinear motion, Principles of dynamics, Differential equation of rectilinear motion, Force as a function of time, Force proportional to displacement.					
MODULE - IV					
D'Alembert's Principles, Momentum and Impulse, Work and Energy, Conservation of Energy, Impact.					
REFERENCES					
1.Engineering Mechanics, K. L. Kumar, TMH					
2. Engineering Mechanics by: S. Timoshenko, D.H. Young, Mc-Graw Hill International Edition. Chapters: 1, 2, & 6.					
3. Fundamentals of Engineering Mechanics, Second Edition, Publisher: Vikas Publishing House Pvt. Ltd. by S. Rajashekharan and G. Sankara Subramanian.					

SUBJECT TITLE	INTRODUCTION TO ARCHITECTURE	CONTACT HOURS	L	T	P
SUBJECT CODE	UPCAR103		3	0	0
SUBJECT TYPE	PC	CREDITS	3		
OBJECTIVE					
To provide a comprehensive understanding of Architecture and help students to develop an active interest in the field of study.					
Module: 1					
Understanding Architecture: Definitions, interpretations and explanations; distinctive aspects of architecture, Architecture as a fine art, a technological field and as a profession; Language and medium of architecture.					
Module: 2					
The inter-linkages between Architecture, Nature and Culture: The concepts of Nature and Environment as systems and Architecture and Culture as sub-systems; Architecture as manifestation of culture; Traditional and vernacular architecture; Design as a theme in nature and architecture.					
Module: 3					
Evolution of shelters.					
Factors influencing architecture of a region. Climate, material, technology and socio-cultural forces.					
Module: 4					
Architectural Education: Curricular framework and content of architectural education; Similarities and differences between engineering disciplines and architecture. Specializations in architectural education and profession; Requirements and qualities of a student of architecture.					
Module: 5					
Architecture as a profession: Unique aspects of architectural profession; Nature of job of an architect and the					

services provided by him; Role, responsibilities and essential qualities of an architect; related professions. Distinctive institutions of education and profession in India and abroad; Architectural challenges within and outside India.

Examples of good architectural works of famous architects

REFERENCES

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
3. K.W.Smithies, Principles of Design in Architecture, Van Nostrand Reinhold Company, 1981 4.
- 4.Sam F. Miller, Design Process - A Primer For Architectural & Interior Design, Van Nostrand Reinhold Company , 1995
5. Ernest Burden, Elements of Architectural Design – A Visual Resource, Van Nostrand Reinhold Company , 1994
6. Vitruvius, Translation: Morris, H. M. (1960).

SUBJECT TITLE	BUILDING MATERIAL - I	CONTACT HOURS	L	T	P
SUBJECT CODE	UPCAR104		2	0	0
SUBJECT TYPE	PC	CREDITS	2		

OBJECTIVE

The basic idea of the subject is to make aware of the primary building materials used in construction. Their properties, types and common usage. This will enable students to equip themselves with the knowledge of materials and their judicial usage.

To classify the different types of building materials used primarily in building construction work.

To identify the types of materials and their compositions.

To list, label and define the materials.

To illustrate use of materials and ascertain their application.

To identify the specific use and related technique for a required material.

Module: 1

SOILS:

Formation, index property, specific gravity, grain size distribution, plasticity and identification of local names. I.S.I classification.

Module: 2

SAND:

Sources of Sand, Classification, Test of Sand. Grades of sand and their uses

MORTAR: Types of mortar – lime mortar, mud mortar, lime-surkhi mortar, cement mortar. Different grades of mortar, their compositions and properties. Preparation of cement mortar. Use and selection of mortar for different construction work.

Module: 3

BRICK:

Composition, Sizes, Properties and Classification of bricks, Tests for bricks. Introduction of Brickworks: masonry bonding & ornamental bonding, Substitutes for bricks. Brick manufacturing process.

Module: 4

STONES:

Classification of stones. Common building stones used in India. Characteristics and use of stones. Dressing of stone. Artificial stones. Introduction of Stonework: Rubble and Ashlars masonry. Stone quarrying methods.

Module: 5

LIME:

Classification of lime. Fat and hydraulic lime – properties and use.

CEMENT: Composition of ordinary cement. Function of cement ingredients. Properties of cement – Fineness, Soundness, Setting times, etc. Grades of cement and different types of cements used in construction.

REFERENCES

1. B. C. Punmia; *Building Materials and Construction*.
2. Bindra & Arora; *Building Materials and Construction*.
3. W.B. McKay, '*Building Construction*', Vol. 1,2,3 Longmans, U.K. 1981.

SESSIONAL SUBJECTS

SUBJECT TITLE	BASIC DESIGN	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR101		0	0	6
SUBJECT TYPE	LC	CREDITS	4		

OBJECTIVE

To help the students grasp the fundamentals of design as a basic creative activity.

To help the students grasp the basics of Architectural aesthetics.

To help the students learn about the basic elements of visual aesthetics through exercises aimed at experimentation.

To make the students become familiar with visual and verbal vocabularies of architecture. To develop analytical thinking and move toward spatial analyses of visual culture. To encourage the students to enjoy looking at, talking about, and thinking about architecture and built spaces.

Module: 1

Basics of Sketching and Drawing

Free-hand drawing appropriate to visual & architectural representation, indoor & outdoor sketching, drawing from observation, terminology, abbreviations and signage used in visual representation.

Module 2

Freehand presentations and rendering techniques

- Freehand perspective sketching. Rendering, shades and shadows.
- Introduction to represent different textures and finishes in plan and elevation of interior and exterior spaces.
- Graphical representation of furniture, automobiles, human figures, etc. in plans and elevations and 3-dimensions.

Module 3

Manual techniques for painting/coloring of Architectural Drawings

- Techniques Colouring of architectural presentation drawings in various medium
- Monochromatic shades, Shades and shadows in multi-coloured drawings

Module: 4

Understanding Architectural Aesthetics - Exercises to understand the visual properties of two dimensional forms of both geometric and non-geometric surfaces. And Forms in Nature (Animate and Inanimate).

Exercises to demonstrate graphically the Visual Qualities of Point, Line, Size, Form, Pattern, Proportions, Repetition, Rhythm, Harmony, Contrast, Unity, Shape and Texture.

Module: 5

Studies of Principles of Organization of Form & Space with exercises of Block Model; Principles of three-dimensional Compositions.

Module: 6

Study of anthropometry and its association with built environment

Critically appraise and Design of an object in everyday use like Table, Chair, Stool, Drawing Board, T-Scale, etc.
Expressing design idea/s through presentation drawings

REFERENCES

1. C. D. Joseph and Callender John; Time Saver Standards for Building Types.
2. C. D. Joseph and Callender John; Time Saver Standards for Architectural Design Data.
3. Christopher Alexander; A Pattern Language
4. Francis D.K. Ching; – Architecture: Form Space and Order; Van Nostrand Reinhold Co., (Canaa), 1979.
5. Pearce Peter; Structure in Nature – Strategy for Design.
6. Pickering, Ernest; Architectural Design, John Wiley and Sons Inc., Canada, 1949.
7. Neufert’s Architect’s Data.
8. V.S. Paramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi – 1973.
9. VonMeissPieree; Elements of Architecture.

SUBJECT TITLE	DESCRIPTIVE GEOMETRY-I	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR102		0	0	6
SUBJECT TYPE	LC	CREDITS			4

OBJECTIVE

Introducing and familiarizing students with drafting tools and accessories and provide basic knowledge and skill to draft a drawing manually.

To acquire the knowledge and develop the skills listed below:

To present the fundamental principles of architectural descriptive geometry and its application to architectural problems.

To be able to express her/his ideas by drawing

COURSE CONTENT**Module 1: Introduction**

- Drawing instruments and its uses • Sheet layout and sketches • Lines, lettering , scales and dimensioning

Module 2: Orthographic Projections

- Introduction to Projections • Concept, Principle and Methods of Projections
- Orthographic Projections of Point, Line and Plane • Projections of Solids in different positions
- Application of Projection for preparing architectural drawings

Module 3: Application of Sections in Architectural Drawings

- Introduction of section of solids with simple forms • Concept and methods of drawing section of solids • Application of sections for simple building drawings • Section of complex form or structures

Module 4: Metric Drawing - Architectural Drawing Techniques

- Types used & advantage • Isometric, Axonometric & Oblique view • Metric drawings, projections and their dimensions • Difference between perspective and metric projections

Module 5: Development of Surfaces

- To draw and fold at the required positions to prepare the 2- dimension shape into 3- dimension model• Introduction to development of surfaces and its uses. • Methods of development of surfaces • Development of lateral surfaces of simple solids as cube, cone, pyramids and prism. • Development of complex solids, when two or more simple solids are joined together.

REFERENCES

- 1.Elementary Engineering Drawing: Plane and Solid Geometry by N. D. Bhatt
- 2.Rendering with Pen and Ink by Robert W. Gill

- 3. Architectural Graphics by Francis D. K. Ching
- 4. Engineering Drawing by B.V.R. Gupta
- 5. Engineering Drawing: With Creative Design, Volume 2, by Hiram. E. Grant
- 6. Architectural Drawing: Perspective, Light and Shadow, Rendering by Sherley W.Morgan
- 7. Rendering in Pen and Ink by Arthur L. Guptil

SUBJECT TITLE	ARCHITECTURAL WORKSHOP	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR103		0	0	3
SUBJECT TYPE	LC	CREDITS	2		
OBJECTIVE					
<p>After completion of this course student will be able to :</p> <p>Review various tools and techniques and incorporate them in visual communication and model making.</p> <p>Critique the property of different materials for various products for designing and model making.</p> <p>Review requirements and critique the design consideration of complementing field of architecture and designing such as photography and set designing.</p> <p>Evaluate various methods and material of model making and incorporate in product design.</p> <p>Design a functional model for real life situation.</p> <p>Evaluate complete product designing project; analyze its problem, situation, user eco friendliness and cost.</p>					
<p>Exercises to understand fundamentals of colour and colour psychology.</p> <p>Study built environment, light and shade pattern, surface texture, scale and proportion.</p>					
Module 1					
Study and develop 3D forms: using plastic material such as clay and plaster of Paris, putty. Develop 2/ 3D forms using hard material such as paper, paper board, thermo Cole, wire, cardboard, wax, POP, acrylic sheets, wood, plastics, glass fiber.					
Module 2					
Models of Structural Systems: Making models of the various structural systems used in buildings like; Space frames – using Match sticks, wires; Different forms of shell roofs using POP, Clay, Soap; Tensile structures using fabric.					
REFERENCES	<ol style="list-style-type: none"> 1. Wenninger (Magrus. J.) Spherical Models, Cambridge University Press, 1979 2. John W. Mills, The Technique of Sculpture, B.T. Batsford Ltd., New York Reinhold Publishing Corpn, London, 1966. 3. Mitchell, W. J., Digital Design Media by, Published by Van Nostrand Reinhold, USA 				

SUBJECT TITLE	BUILDING CONSTRUCTION-I	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR104		0	0	3
SUBJECT TYPE	LC	CREDITS	2		

OBJECTIVE

To understand fundamental building material in the context of various construction methods.

Focus on various building materials would be emphasized based on the performing standards and codes, wherein application of each material would be discussed in detail, both in the context of traditional and modern construction methods and practices. Based on the lecture delivered, the students are required to produce report on materials, construction and detail drawings. With time, each topic can also focus on latest trends in practice and usage of new technology/materials.

Module 1

Basic Building Components

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

Module 2

Brick masonry. Different types of bricks. Bonding of bricks, Stop end, T, L & cross Junctions of English bond & Rat trap bond and Non-structural bond. Attached & detached piers. Brick jallis, Corbelling, Cornices, Types of coping, pointing & Threshold.

Module 3

Stone Masonry-Random rubble masonry, Ashlars masonry, coursed and uncoursed rubble masonry etc. Walls with stone facing and brick backing (composite wall).

Module 4

Types of joints in wood work: lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and Tenon etc.

Masonry tools & equipment.

NOTE:

Site visits to be arranged as a part of the curriculum.

REFERENCES

1. Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi: East-West Press.
2. Foster, J. and Mitchell, S. (1963). Building Construction: Elementary and Advanced, 17th Ed. London: B.T. Batsford Ltd.
3. McKay, W. B. (2005). Building Construction Metric Vol. I–V. 4th Ed. Mumbai: Orient Longman.
4. Hailey and Hancork, D. W. (1979). Brick Work and Associated Studies Vol. II. London: MacMillan.
5. Merritt, F.S. and Ricketts, J.T., Building Design and Construction Handbook, McGraw Hill.
6. Rangwala, S. C. (1963). Building Construction: Materials and types of Construction. 3rd Ed. New York: John Wiley and Sons.
7. Chudley, R. (2008). Building Construction Handbook. 7th Ed. London: Butterworth-Heinemann.
8. Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi: Standard Publishers.
9. Ching, F. D.K – Building Construction illustrated. VNR, 1975
10. A. Agarwal –Mud: The potentials of earth based material for third world housing – IIED, London, 1981.

SUBJECT TITLE	COMMUNICATIVE ENGLISH	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR105		0	0	3
SUBJECT TYPE	LC	CREDITS	2		

OBJECTIVE

This is a practice-oriented, need-based, functional-communicative course. It seeks to develop the student's skills of communication in listening, speaking and writing. Reading, though formally not included, is still a recommended activity. The student is advised to cultivate the habit of reading newspapers, magazines and books in a free, extensive manner to consolidate the skills already achieved. A more interactive process of teaching/learning is called for in order to achieve the skills of effective communication.

The course attempts to familiarize the student with the sounds of English in a nutshell, particularly long and short vowels, some consonants, stress and intonation. Provide adequate listening and speaking practice so that the learner can speak with ease, fluency and reasonable clarity in common everyday situations and on formal occasions. Use of grammar in meaningful contexts and doing things with words, i.e. performing functions like ordering, requesting, inviting and so on are to be extensively practiced.

Module 1

COMMUNICATION

Verbal and non-verbal spoken and written; Language functions-descriptive, expressive and social; To inform, enquire, attract, influence, regulate and entertain; Bias-free and plain English Formal and informal style.

Module 2

WRITING I

Paragraph writing - topic sentence, cohesion and coherence - sentence linkers (so, but, however, etc.); Preparation of a business report - writing a business proposal - format, length, structure

Module 3

WRITING II

Preparing notes - writing business letters and E-Mail messages;
Documentation: *References*, notes and bibliographies.

Module 4

WRITING III

Writing curriculum vitae (both chronological and functional) along with an application for a job; Public relations - concept and relevance; PR in a business organization - handling the media.

Module 5

MEETING AND PRESENTATION

Organizing a meeting, preparing an agenda, chairing a meeting, drafting resolutions, writing minutes; Making an oral Presentation; Facing an interview.

REFERENCES

1. Geoffrey Leech and Jan Swartvik "A communicative Grammar of English, Longman
2. O'connor, J.D., Better English Pronunciation, ELBS.
3. Chand, J.K. and Das, B.C., A Millennium Guide to writing and Speaking English, Friends 'Publishers
4. John, S., Oxford Guide to Writing and Speaking English, OUP.
5. BoveeEtal, Business Communication Today, Pearson Education.

2nd SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	ES	UESAR201	Mechanics-I	3	0	0	3	30	70		100
2	BS	UBSAR202	Environmental Science	3	0	0	3	30	70		100
3	PC	UPCAR203	History of Architecture-I	3	0	0	3	30	70		100
4	PC	UPCAR204	Building Material-II	2	0	0	2	30	70		100
5	PC	UPCAR205	Climatology in Architecture	3	0	0	3	30	70		100
6	LC	ULCAR201	Architectural Design Studio – I	0	0	6	4	50		50	100
7	LC	ULCAR202	Descriptive Geometry-II	0	0	6	4	50		50	100
8	LC	ULCAR203	Building Construction-II	0	0	3	2	50		50	100
9	LC	ULCAR204	Documentation and Measured Drawing	0	0	3	2	50		50	100
			Total	14	0	18	26				900

THEORY SUBJECTS

SUBJECT TITLE	MECHANICS - II	CONTACT HOURS	L	T	P
SUBJECT CODE	UESAR201		3	0	0
SUBJECT TYPE	ES	CREDITS		3	

Statics

MODULE - I (Virtual Work)

Principles of virtual work: Equilibrium of Ideal Systems, Efficiency of simple mechanics, Stable and unstable equilibrium.

Text: Timoshenko, Ch-5

Dynamics

MODULE - II (Kinematics)

Kinematics of Curvilinear motion, Motion of Projectile, Moment of Momentum, Work & Energy in curvilinear motion.

Kinematics of Rotation, Rotation under the action of a constant moment, The compound pendulum,

MODULE - III (Moment of Inertia)

Moments of Inertia of Plane Figures with respect to an axis in it's plane, with respect to an axis perpendicular to the plane, Parallel axis theorem, Product of inertia, Principal axes and Principal moments .1

of inertia.

Solid Mechanics

MODULE - IV (Concepts of Stress & Strain)

Concepts of Stress and Strain, Normal stress, Sheer stress, normal strain, shear strain, Hooke's law, Poisson's ratio, Principal stresses, Principal strains, Mohr's Circle for stress and strain.

REFERENCES	1. Engineering Mechanics by S. Timoshenko, D.H. Young, Mc-Graw Hill International Edition Chapters: 1,2,3 & 6. 2. Fundamentals of Engineering Mechanics, Second Edition, Publisher: Vikas Publishing House Pvt. Ltd. by S. Rajashekharan and G. Sankara Subramanian. 3. Engineering Mechanics, K. L. Kumar, TMH 4. Elements of Strength of Materials by Timoshenko & Young
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SUBJECT TITLE	ENVIRONMENTAL SCIENCE	CONTACT HOURS	L	T	P
SUBJECT CODE	UBSAR202		3	0	0
SUBJECT TYPE	BS	CREDITS		3	

OBJECTIVE
 To introduce the basics of environmental science and its relevance to mankind, the built envelop around. To also introduce fundamentals of Climatology in view of its integral importance for students of Architecture.

Module 1

Introduction to Ecosystems and Environment, environmental resources

Types of ecosystems, characteristics features, structure and functions of Ecosystems – Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries). Land, Forest, Water and Energy as environmental resources.

Module 2

Bio-diversity and its conservation

Value of bio-diversity - consumptive and productive use, social, ethical, aesthetic and option values. Bio-geographical classification of India – India as a mega diversity habitat. Threats to biodiversity-Hotspots, habitat loss, poaching of wildlife, loss of species, seeds etc. Conservation of bio-diversity, in-situ and ex-situ conservation.

Module 3

Environmental problems in India

Local and Global Issues, Causes, effects and control measures of Air pollution, Indoor air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste management, composting, vermin culture, Urban and Industrial wastes, recycling and re-use. Nature of thermal pollution and nuclear hazards, Global warming, Acid rain and Ozone layer depletion.

Module 4

Ecological aspects of built environment

Impact of built environment on natural environment (unsustainable to sustainable development), urban problems related to energy; human population and environment- population explosion, resource exploitation and depletion, human-wild conflict, loss of wet lands, mangroves, increasing desert areas, spread of diseases.

Module 5

Institutions and Governance

Introduction to Government regulations, Monitoring and enforcement of environmental regulations, Introduction to Environmental Acts, viz., Water (Prevention and Control of Pollution) Act, Air Prevention and Control of pollution act, Environmental Protection Act, Wild life protection Act, Forest Conservation Act, etc.

REFERENCES

1. Agarwal, K. C. (2001). *Environmental Biology*. Bikaner: Nidhi Publications Ltd.
2. Benny, J. (2005). *Environmental Studies*. New Delhi: Tata McGraw Hill.

3. Bharucha, E. (2005). *Text book of environmental studies for undergraduates courses*. New Delhi: Universities Press, UGC. .
4. Brunner, R.C. (1989). *Hazardous Waste Incineration*. New Delhi: McGraw Hill.
5. Kaushik, A. and Kaushik, C. P. (2010). *Basics of Environment and Ecology*. New Delhi: New Age International Publishers.

SUBJECT TITLE	HISTORY OF ARCHITECTURE-I	CONTACT HOURS	L	T	P
SUBJECT CODE	UPCAR203		3	0	0
SUBJECT TYPE	PC	CREDITS		3	

Pre Historic and Late Ancient (5000BC – 1st Century AD)

Objective

To provide an insight into the architecture of prehistoric period and late ancient civilizations, and the architecture of Classical antiquity of late ancient period. Social, religious and political character, construction methods, building materials and how they influenced their built form and settlement pattern shall be explained with suitable examples. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is embedded in place specific context. The study must enable students to do a comparative evaluation of various civilizations, Appreciate chronological developments along the timeline and across geographies.

Module1

PRE-HISTORIC ARCHITECTURE & SETTLEMENT:

Introduction to human settlement: People, their shelter, settlement (growth, factors influencing the development of a settlement), burial systems, megaliths, memorials. (Structures: Different types of graves, Stonehenge; & Settlements – World: CatalHoyuk, Jericho; India: Mehrgarh etc.)

Indus Valley Civilization (IVC)

Indus - People, their shelter & civic buildings (typology, planning, construction & aesthetics), settlement pattern & citadel (Structures: Great Bath/Great Granary, simple Harappan house; & Settlements – Mohenjo-Daro/ Harappa)

VEDIC:

People, their shelter & buildings (typology, planning, construction & aesthetics), settlement (typical village, planning, shelter types, materials) (Structures – Vedic houses, Torana, railing around villages; & Settlements – Patliputra)

Module 2

NILE VALLEY CIVILIZATION

People, their shelter & buildings, settlement (growth, factors influencing the development of architecture & character, settlements of NVC) and religious (cult temples) & burial structures (typology, planning, construction & aesthetics) (Structures: Mastabas, Pyramids: stepped, bent & Great Pyramids of Cheops; Temple of Abu-Simble/Amun-Ra)

MESOPOTAMIAN (EUPHRATES & TIGRIS) CIVILIZATION:

Sumerian, Babylonian & Persian people, their shelter & buildings, settlement (growth, factors influencing the development of architecture & character, settlements) and religious structures. (Structures – Ziggurats, Persepolis; & Settlements – Planning of Ur & Babylon)

Module 3

CLASSICAL ARCHITECTURE OF ANCIENT GREECE (AEGEAN CULTURE):

Evolution of city states, Hellenic & Hellenistic period, factors influencing Greek Architecture, orders in Greek Architecture, proportion, optical correction. (Structures – Parthenon, Theatre, Agora, Stoas, & Settlements – Athens & Acropolis of Athens and Delphi)

Module 4

ROMAN ARCHITECTURE (ETRUSCAN CULTURE)

Evolution of Republican States, Roman construction techniques (masonry, vaults, domes, orders, use of concrete), building typology (Structures – Forum, Pantheon, Thermae, Basilica, Circus, Colosseum, etc.)

Module 5

Assignments on innovative interpretation of the periodic architectural styles. (To be decided by the subject teacher.)

REFERENCES

1. Fletcher, B. (1996). A History of Architecture on the Comparative Method. 20th Ed. London : B.T.Batsford Ltd.
2. Coplestone, T. and Lloyd, S. (1971). World Architecture: An Illustrated History. London : Verona Printed.
3. Brown, P. (2010). Indian Architecture: Buddhist and Hindu period. Mumbai: D.B. Taraporevala Sons and Co.
4. Lloyd, S. and Muller, H.W., (1986), History of World Architecture Series, Faber and Faber Ltd., London.
5. Crouch, P. D. (1985). History of Architecture: Stonehenge to Skyscrapers. London: McGraw-Hill.
6. Dutt, B. B. (2009). Town Planning in Ancient India. Delhi: Isha Books.
7. Grover, S. (2003). Buddhist and Hindu Architecture in India. 2nd Ed. New Delhi: CBS Publishers.
8. Roth, M. L. (2006). Understanding Architecture: Its Elements, History, and Meaning. Columbia: West-view Press.
9. Harris, M. C. (1977). Illustrated Dictionary of Historic Architecture. New York : M. Courier Dover Publications.
10. Ingersoll, R. And Kostof, S. (2013). World architecture: a cross-cultural history. Oxford : Oxford University Press.
11. Singh, U. (2009). A history of ancient and early medieval India: from the Stone age to the 12thcentury. Delhi: Pearson India.
12. Hiraskar, G.K., Great Ages of World Architecture, Dhanpat Rai & Sons, Delhi.

SUBJECT TITLE	BUILDING MATERIAL – II	CONTACT HOURS	L	T	P
SUBJECT CODE	UPCAR204		2	0	0
SUBJECT TYPE	PC	CREDITS	2		

OBJECTIVE

The basic idea of the subject is to make aware of the primary building materials used in construction. Their properties, types and common usage. This will enable students to equip themselves with the knowledge of materials and their judicious usage.

To classify the different types of building materials used primarily in building construction work.

To identify the types of materials and their compositions.

To list, label and define the materials.

To illustrate use of materials and ascertain their application.

To identify the specific use and related technique for a required material.

Module 1**METALS: IRON & STEEL**

Pig iron, cast iron, wrought iron – types, properties, steel – properties, types, market form of steel and uses of steel in construction, properties of mild steel and hard steel, defects in steel.

Module 2**GLASS**

Speciality Glass as a contemporary building material. Laminated, curved and tempered glass, Kinetic glass, Smart glass and smart windows. Introduction to Digital building facades: Building kinetics and facade engineering, sensor glasses for interiors.

Module 3**TIMBER:**

Qualities of timber for construction. Seasoning, Storage and Preservation of timber. Use of different type wood in various parts of building. Industrial timber: veneers, plywood, fiberboard, etc.

Module 4**WOOD AND COMPOSITES**

Wood as an advanced material for buildings: Reconstructed wood, cross laminated timber, Ply boards, composite boards, Acoustics boards, and panelling materials, laminates and veneers, wood foam.

Advanced fiber composite materials: Bamboo, glass-reinforced plastic (GRP), Fibre reinforced polymers (FRP), Shape memory polymer composites.

REFERENCES

1. Al-homound, M.S., Performance Characteristics and Practical Applications of Common Building Thermal Insulation Materias, Building and Environment, Vol-40(3), 2005.
2. Duggal, S.K., Building Materials, New Age International Publishing Co., (3rd Ed.), 2008.
3. Varghese, P.C., Building Materials, PHI Learning Pvt. Ltd., 2005.

SUBJECT TITLE	CLIMATOLOGY IN ARCHITECTURE	CONTACT HOURS	L	T	P
SUBJECT CODE	UPCAR205		3	0	0
SUBJECT TYPE	PC	CREDITS			3

OBJECTIVE

To impart knowledge of climatic elements, their influence on building design and passive design strategies

Module 1

Introduction to Climatology in Architecture: Climatic zones, macro and micro climate, elements of climate and climatology data required for design of buildings

Human Comfort: Human heat balance and comfort, heat stress, comfort index, Corrected Effective Temperature, Thermal Stress Index and Bioclimatic Analysis

Module 2

Climatic Elements: Air temperature and humidity, Sol-Air temperature, heat exchange through conduction, convection, radiation and evaporation; wind study -diurnal and seasonal variations, heating and cooling of land and sea, effect of topography; Precipitation- water vapour, condensation, rain, fog, snow and architectural responses; Graphical representation of climatic elements- wind rose; Tools for measurement

Module 3

Solar Radiation: Apparent movement of sun, solar radiation and intensity on surfaces and buildings in different latitude, sun path diagram, shading device and its design, heliodon and its use; Opaque building and heat transfer through its multi-layered envelope; Transparent surface and solar radiation on it, absorbance, reflectance,

transmittance and emittance.

Module 4

Daylighting: Fenestration, lighting level and glare, amount of light, sky as a source of light and daylight factor, effect of different types of fenestrations, their size, shape in different planes with and without obstructions

Natural Ventilation and Air Movement: Air movement in and around building, stack effect, Venturi effect, cross ventilation, influence of opening size and positions, wind eddies, effect of wind on location for industrial areas, airport and other land uses

Module 5

Site Climate: Microclimate, site climate data, local factors, presence of water body and vegetation, topography, special characteristics, urban climate cooling degree days and heating degree days

Module 6

Passive Design Strategies: Orientation-sitting of building with respect to sun, wind and view, use of evaporative cooling, ground cooling-earth air tunnel, thermal mass-cavity wall, natural ventilation of attic space, night time cooling, reflective surfaces and radiant barrier, cool roof and green roof, solar radiation and sun space.

REFERENCES

1. Koenisberger, O.H., Ingersoll, T.G., Mayhew A., and Szokolay, S.V, "Manual of Tropical Housing and Building- Part I: Climatic Design", Orient Longman,2004
2. Givoni, G., "Climatic Considerations in Building and Urban Design", Van Nostrand Reinhold,1998
3. Hausladen, G., "Climatic Design: Solutions for Buildings that can do more with less Technology", Birkhauser,2005
4. Bansal, N.K., Hauser, G. and Minke G., "Passive Building Design: A Handbook of Natural Climate Control", Elsevier Science.,1994
5. Drake, S., "The Third Sin: Architecture, Technology and Environment", UNSW Press

SESSIONAL SUBJECTS

SUBJECT TITLE	ARCHITECTURAL DESIGN STUDIO – I	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR201		0	0	6
		CREDITS	4		

OBJECTIVE: After completion of this course student will be able:
 To identify and relate the concepts of space, form and order.
 To distinguish and analyze three dimensional designed space.
 To design objects based on the concept of space and form.
 To classify different functional spaces and analyze their space requirements.
 To compile data required for architectural designing.
 To identify the human standards of design based on ergonomics.
 To innovate, modify and evaluate an existing space.

Module 1

Basic graphical presentation of objects and symbols in architectural drawings.
 Relationship between Basic Design and Architectural Design: comprehensive understanding of space, form, function and design. .

Module 2

Application of elements of design to achieve design principles in creative work.
 Design of small objects (parts of building, like, window grill, boundary wall, floor tiles and similar projects) with respect to function structure aesthetics.

Module 3

Introduction to external and internal form concept, their quality, concept of space, relation of space and volume.

Approach to design as a continuous process through aesthetics, function and technology; study of basic components of a building and their functions.

Examples of Dimensions of different rooms.

Principal of design with reference to function, various activities and related spaces; Data collection, environments, climate, orientation, site conditions, circulation flow diagrams.

Module 4

Study of basic human needs, standard measurements of human activities and allocation of spaces: Concepts of Anthropometrics and ergonomics.

Study and design of single units like living spaces, sleeping and cooking spaces, stalls, bus-stops, telephone booths, etc. detailed design of single room for simple function showing relationship with adjoining areas for other activities not more than 25sq.mts.

Module 5

Design problems dealing with planning for activities such as individual living units shops, stalls, snack bars, unilevel activities with three to four functions of total area up to 80 sq.mts.

REFERENCES

1. Ching, D.K; From, Space and Order.
2. Robin Boyd; Puzzle of Architecture

SUBJECT TITLE	DESCRIPTIVE GEOMETRY-II	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR202		0	0	6
SUBJECT TYPE	LC	CREDITS	4		

OBJECTIVE

The course would help students identify suitable methods of representation and methods in different built environment scenarios.

COURSE CONTENT

Module 1

Basics of perspective drawings

- Anatomy of perspective: Station point, Eye level, Cone of vision, Picture plane, Horizon line, Ground line, Vanishing points
- Types of perspectives : One point, Two point, Three point

Module 2

Perspective drawings for exteriors

2 point perspectives of building exterior

- 3 point perspectives of simple architectural forms

Perspective drawings of interior spaces

One point and two points perspectives of interiors

- Perspectives of simple household furniture items

Module 3

Application of Sciography in 2 dimensional drawings with rendering techniques

Sciography in perspectives

REFERENCES

- 1.Perspective From Basic to Creative by Robert W. Gill, Thames and Hudson
- 1.Rendering with Pen and Ink by Robert W. Gill
- 2.Sherkey W, MORGAN; Architectural Drawing, Mc Graw Hill

SUBJECT TITLE	BUILDING CONSTRUCTION-II	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR203		0	0	6
SUBJECT TYPE	LC	CREDITS	2		

OBJECTIVE

To understand fundamental building material in the context of various construction methods. Focus on various building materials would be emphasized based on the performing standards and codes, wherein application of each material would be discussed in detail, both in the context of traditional and modern construction methods and practices. Based on the lecture delivered, the students are required to produce construction and detail drawings. With time, each topic can also focus on latest trends in practice and usage of new technology/materials.

Module 1

Lintel and Arches: Brick, stone, timber and RC.C.

Flat, segmental, semicircular, parabolic, elliptical in brick and stone masonry, Joggle joint.

Module 2

Simple Timber Doors: Ledged braced battened and paneled door.

Module 3

Simple Timber Roofs: Roof layout, ridge, hip, valley, gable etc., Lean to, couple and collar roof with tile and sheet covering.

REFERENCES

1. Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi: East-West Press.
2. Foster, J. and Mitchell, S. (1963). Building Construction: Elementary and Advanced, 17th Ed. London: B.T. Batsford Ltd.
3. McKay, W. B. (2005). Building Construction Metric Vol. I–V. 4th Ed. Mumbai: Orient Longman.
4. Hailey and Hancock, D. W. (1979). Brick Work and Associated Studies Vol. II. London: MacMillan.
5. Merritt, F.S. and Ricketts, J.T., Building Design and Construction Handbook, McGraw Hill.
6. Rangwala, S. C. (1963). Building Construction: Materials and types of Construction. 3rd Ed. New York: John Wiley and Sons.
7. Chudley, R. (2008). Building Construction Handbook. 7th Ed. London: Butterworth-Heinemann.
8. Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi: Standard Publishers.
9. Ching, F. D.K – Building Construction illustrated. VNR, 1975
10. A.Agarwal –Mud: The potentials of earth based material for third world housing – IIED, London, 1981.
11. HUDCO – All you wanted to know about soil stabilized mud blocks, New Delhi, 1989

SUBJECT TITLE	DOCUMENTATION & MEASURED DRAWING	CONTACT HOURS	L	T	P
SUBJECT CODE	ULCAR204		0	0	3
SUBJECT TYPE	LC	CREDITS	2		
OBJECTIVE					
<p>Visual documentation enables to enhance effective use of graphics and artistic skill for visual communication. Measured drawing helps to develop understanding of real built spaces and represent them graphically. To expose the students to real world situation and to represent the observation and understanding through graphics, sketches and architectural technical drawings</p>					
Module 1					
DOCUMENTATION:					
<p>Visual documentation techniques: through sketches, freehand drawings and photographs. On site activity analysis of public spaces and documentation of user-activity-space.</p> <p>On site and off site data collection techniques. Documentation of progressive work on site and preparation of report for the same. Data presentation techniques: use of charts, diagrams and other infographics.</p>					
Module 2					
MEASURED DRAWING					
<p>Understanding of different scales, measurement device and their uses in practice – Drawings to scale, geometrical representation techniques and drafting skill; Examples of Measured drawings- Furniture, Class room /Studio plan, Doors, Windows, Entrance Gate, buildings in different context (Rural, Heritage and Urban). Drawings include plan, elevations and sections with all measurements and geometrical views (whole or sectional) of the structure.</p>					
REFERENCES					
<p>1. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. Hoboken: John Wiley & Sons. 2. Lockard, W. K. (1992). Drawing as a Means to Architecture. 6th Ed. Newyork: Van Nostrand Reinhold Company.</p>					

3rd SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR301	History of Architecture – II	3	0	0	3	30	70		100
2	ES	UESAR302	Surveying	3	0	0	3	30	70		100
3	PC	UPCAR303	Building Services – I : Water Supply And Sanitation	3	0	0	3	30	70		100
4	ES	UESAR304	Building material – III	2	0	0	2	30	70		100
5	ES	UESAR305	Theory of Structure	3	0		3	30	70		100
6	LC	ULCAR301	Architectural Design Studio – II	0	0	9	6	50		50	100
7	LC	ULCAR302	Building Construction – III	0	0	3	2	50		50	100
8	LC	ULCAR303	Surveying Lab	0	0	3	2	50		50	100
9	LC	ULCAR304	Computer Application – I (2D & 3D)	0	0	3	2	50		50	100
			Total	14	0	18	26				900

SUBJECT TITLE	History of Architecture – II	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR301	L	T	P	3
SUBJECT TYPE	PC	3	0	0	

Late Ancient and Early Medieval (1st Century AD – 1000AD)

OBJECTIVE

To provide an insight into the architecture of Classical antiquity & early Medieval period. Social, religious, political and architectural character, construction methods, building materials and settlement planning shall be explained with suitable examples. To provide an understanding of the evolution of Classical architecture in the west, Indian Architecture in its various stylistic modes characterized by technology, ornamentation and planning practices. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is embedded in place-specific context. The study must enable students to do a comparative evaluation of developments in a chronological manner along the timeline and across different geographies. Also, students must be enabled to appreciate tangible and intangible aspects of heritage associated with history.

COURSE CONTENT

Module 1

EARLY CHRISTIAN ARCHITECTURE:

Evolution of church form from the Roman Basilica, architectural character & space planning, Schism of Roman Empire to Western & Eastern Provinces, Polymath architecture & Baptisteries, (Structures – St. Peters Basilica, St. Clemente).

Module 2

CHURCH ARCHITECTURE OF BYZANTINE:

Factors influencing Byzantine Architecture, development of Domes & Pendentives, (Structures – Hagia Sophia at Constantinople); Romanesque – evolution of religious orders in Christianity –Italy (Pisa Cathedral

complex) & England (Tower of London).

Module 3

BUDDHIST AND JAIN ARCHITECTURE:

Symbolism of Buddhist Architecture, rock-cut architecture, Ashokan School (Hinayana & Mahayana Period), development of stupa, Buddhist schools – Mathura School & Takshashila School (Greek influence) (Structures – Chaitya & Vihara, Monolithic Ashokan Pillars, Rock-edicts, Stupa of Sanchi / Amravati) Symbolism of Jain Architecture, rock-cut architecture, general planning, sitting and decorative treatments of Jain temples. (Structures – Jain temples of Mt. Abu)

Module 4

EARLY TEMPLE ARCHITECTURE:

Evolution of Hindu temples, early shrines of Gupta (Tigwa, Sirpur, Deogarh)& Chalukya (LadhKhan, Durga Temple), Development of Indo-Aryan style (Papanatha, Virupaksha at Pattadakal), Dravidan Style: Rock-cut of Pallavas (Rathas & Mandapa)& Structural (Shore temple of Mahabalipuram). Temples and Pagodas of South East Asia: Cambodia- Angkor Wat, Borobudur; Nepal

Module 5

Study on development of fortification, walled towns, settlement pattern, and the causative factors in India. (Places to be decided by the subject teacher)

REFERENCES

1. Brown, P. (2010). *Indian Architecture: Buddhist and Hindu period*. Mumbai : D. B. Taraporevala Sons and Co.
2. Bubbar, D. K. (2005). *The Spirit of Indian Architecture*. New Delhi : Rupa & Co.
3. Copplestone, T. and Lloyd, S. (1971). *World Architecture: An Illustrated History*. London : Verona Printed.
4. Crouch, P. D. (1985). *History of Architecture: Stonehenge to Skyscrapers*. London : McGraw-Hill.
5. Costof, S. (2012). *A History of Architecture: Settings and Rituals*. New York : Oxford University Press.
6. Dutt, B. B. (2009). *Town Planning in Ancient India*. Delhi : Isha Books.
7. Kimball, F. and Edgell, G. H. (2012). *A History of Architecture*. Amazon : Ulan Press.
8. Fletcher, B. (1996). *A History of Architecture on the Comparative Method*. 20th Ed. London : B.T. Batsford Ltd.
9. Grover, S. (2003). *Buddhist and Hindu Architecture in India*. 2nd Ed. New Delhi : CBS Publishers.
10. Hamlin, T. F. 1953. *Architecture through the Ages*. New York : Putnam Adult.
11. Harris, M. C. (1977). *Illustrated Dictionary of Historic Architecture*. New York : M. CourierDover Publications .
12. Ingersoll, R. and Kostof, S. (2013). *World architecture: a cross-cultural history*. Oxford : Oxford University Press.
13. Pramar, V. S. (2005). *A social history of Indian architecture*. New Delhi : Oxford University Press India.
14. Roth, M. L. (2006). *Understanding Architecture: Its Elements, History, and Meaning*. Columbia : West-view Press.
15. Sengupta, B. K., Sen, J. and Banerji, H. (2010). *Reading material on Human Settlements*. Institute of Town Planners of India, New Delhi.
16. Singh, U. (2009). *A history of ancient and early medieval India: from the Stone age to the 12th C*. Delhi : Pearson India.
17. Watkin, D. (2005). *A History of Western Architecture*. 4th Ed. London: Laurence King Publishing.

SUBJECT TITLE	SURVEYING	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR302	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	
OBJECTIVE					
<ul style="list-style-type: none"> To interpret the booking for field notes To apply the fundamental of chain and compass surveying for field survey To work out the contour surveying with the help of levelling instrument To determine the triangulation with the help of Theodolite To define and classify the various types of modern survey 					
COURSE CONTENT					
Module - 1					
<p>Chain Surveying -Principles of survey, equipment required, selection of station, methods of taking off sets. Booking the field notes, obstacles in chaining, errors in chaining, chaining on sloping ground and reciprocal ranging.</p> <p>Compass Surveying- The prismatic compass; its construction and uses. Other types of compasses. Reduced and whole circle bearing, magnetic declination, effects local attraction. Compass traverse & balancing the closing error.</p>					
Module - 2					
<p>Levelling - Different types of levels, their temporary and permanent adjustment levelling staff. Book of the readings and reduction of levels, errors in levelling. Curvature and refraction reciprocal levelling profile, levelling cross sections.</p> <p>Plane table Survey and Contouring– Equipment and methods of plane table survey. Two points & three points’ problems. Characteristics of contour lines, direct and indirect methods of contouring, interpolation of contours.</p>					
Module - 3					
<p>Minor Instruments – The hand level, abney level, tangent chinometer bon, sextant and pantograph.</p> <p>Theodolite Surveying - Theodolite its temporary and permanent adjustment measuring of magnetic bearings, horizontal & vertical angles. Theodolite traverse and balancing the closing error.</p>					
Module - 4					
Introduction to modern surveying equipment					
Total Station, GPS, Use of Distomat and Theomat, Aerial Photography, Digital Levels and Auto-Levels. (Preliminary information and use).					
REFERENCES					
<ul style="list-style-type: none"> B.C. Punmia – <i>Surveying Vol. I</i> – Standard Book House, New Delhi – 1983. P. B. Shahani – <i>Text of surveying Vol. I</i>, Oxford and IBH Publishing Co – 1980 					

SUBJECT TITLE	Building Services – I : Water Supply And Sanitation	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR303	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	
OBJECTIVE					
<p>Identify the different sources of water, list them and describe the method of intake. List the methods of water purification and describe them. List and identify water distribution components and networks. List and identify sanitation systems in India and their functioning process. Quantify the amount of storm water, runoff in different situations. Design of septic tank, sewers. Design Plumbing layout and draw plumbing working drawings with specifications for buildings.</p>					
COURSE CONTENT					
Module 1					
<p>Water Supply: Sources of water supply, standards of purity and treatment of water, qualities of potable water. Domestic water demand, capacity of overhead tanks and calculation of water consumption.</p>					
<p>Domestic water piping systems: Water distribution networks. Cold and hot water distribution within the building. Specifications and sketches of various plumbing fittings for buildings. Uses of valves, taps, and their different types. House/service connection. Layout of water supply lines in a domestic house.</p>					
Module 2					
<p>Sanitation: Basic principles of sanitation and disposal of waste matter from building. Brief description of various systems of sewage disposal and their principles. Details of a Septic tank and capacity calculation.</p>					
<p>Sewer System: Quantity of sewage and storm water, infiltration, runoff calculation, Manning’s formulae, partial flow diagram. Design of Sewers, shapes of sewers, factors affecting the design of sewers. Materials, bend, pipe joints used in sewer systems.</p>					
Module 3					
<p>Sewer appurtenances: Manholes, Sub drains, culverts, ditches and gutters, drop inlets and catch basins roads and pavements, storm overflow/regulators. Intercepting chambers, inspection chambers and their proper location and ventilation of sewers. Laying and testing of sewer. Gradient used in laying of drains and sewers, and respective sizes.</p>					
<p>Sewage treatment: The process of self-purification Disposal of sewage from isolated building (septic tank, imhoff tank), sewage breakdown. Plumbing definitions and related terms, plumbing systems (one pipe, two pipe; etc), House drainage system and sanitary appliances and traps.</p>					
Module 4					
<p>Design considerations on drainage scheme: Preparation of plan, planning of bathrooms, lavatory blocks and kitchen in domestic and multistoried buildings. Indian standards for sanitary convenience. Model bye laws regarding sanitation of buildings</p>					
REFERENCES					
<p>N.B. The treatment of the subject will be mainly descriptive along with tutorial assignments related to the architectural designs already prepared by the students and also planning and layout of water supply and sewerage system plan.</p>					
Recommended books:					
<p>1. B. C. Punmia; Water Supply and Sanitation.</p>					
<p>2. S.C. Rangwala, Water Supply and Sanitary Engineering, Charter Publishing House, Anand 388 601, 1989.</p>					
<p>3. C.S, Shah; Water supply and Sanitation Engineering.</p>					

SUBJECT TITLE	Building material – III	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR304	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	
OBJECTIVE					
The course intends to introduce different materials used in modern building exterior, and innovative alternative materials that are being used to make the building more energy efficient and sustainable. Application and performance of each material is highlighted.					
COURSE CONTENT					
MODULE 1 INTRODUCTION TO ADVANCED MATERIALS					
Introduction to advanced building materials in building industry. Role of advance materials in building performance. Contemporary materials in super structure.					
MODULE 2 ADVANCED CONCRETE					
Ultra high performance concrete, Ferrock, Liquid granite, Litracon etc. High-Ductility Concrete for Resilient Infrastructures: Engineered Cementitious Composite (ECC), Engineered stone, etc.					
MODULE 3 GLASS					
Speciality Glass as a contemporary building material. Types and categories of Glass and its application in building facades. Laminated, curved and tempered glass, Kinetic glass, Smart glass and smart windows. Introduction to Digital building facades: Building kinetics and facade engineering, sensor glasses for interiors.					
MODULE 4					
Energy efficient materials for building exterior and landscaping applicable to: Residential, commercial and public buildings. Role and use of sustainable building materials. Use of vernacular materials in modern designs as sustainable/cost effective solution. Students are required to visit building material outlets and construction sites, and collect product information.					
REFERENCES					
1. Al-homound, M.S., Performance Characteristics and Practical Applications of Common Building Thermal Insulation Materias, Building and Environment, Vol-40(3), 2005. 2. Duggal, S.K., Building Materials, New Age International Publishing Co., (3rd Ed.), 2008. 3. Varghese, P.C., Building Materials, PHI Learning Pvt. Ltd., 2005.					

SUBJECT TITLE	Theory of Structure	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR305	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	
OBJECTIVE					
To strengthen the students' knowledge about fundamental structural forces in buildings and the methods of analysis and calculations. To introduce to the forces acting on vertical structural members and fundamentals of soil mechanics.					

COURSE CONTENT	
Module – 1	
Deflections of determinate beams	
Deflections of determinate beams, cantilevered and simply supported with different loading, relation between slope, deflection and curvature, double integration method, moment area methods-application to simple cases including overhanging beams.	
Module – 2	
Analysis of Beams	
Analyze Continuous beams by Theorem of Three moments and draw SFD, BMD. Analyze Continuous beams, Portal frames and Substitute frames by Moment Distribution Method and draw SFD, BMD.	
Module – 3	
Analysis of Columns.	
Types of columns, columns and struts, buckling and crushing failure, Euler's theory, equivalent length and slenderness ratio, Rankine's formula. Equivalent length and critical loads of Columns.	
Module – 4	
Bearing Capacity of Soils, and Settlements of Foundations, Bearing Pressures	
Introduction, terminology, factors affecting bearing capacity of soils, methods of determining bearing capacity; Types of failures in soil, General, Local and Punching shear failure.	
Methods of improving bearing capacity of soil, settlement of foundations, Causes and Effect of settlement - Plate load test - Simple problems.	
Concept of Bearing Pressures, Calculation of maximum and minimum bearing pressures, checking the stability of Retaining walls.	
REFERENCES	
1. Dass, M. M. <i>Structural Analysis</i> . New Delhi: PHI Learning.	
2. Jindal, R. L. <i>Elementary Theory of Structures</i> .	
3. Junnarkar, S. B. (1997). <i>Mechanics of Structures</i> . Vol. II. 22nd Ed. Charotar Publishers.	
4. Punmia, B. C., Jain, A. K. and Jain, A. K. (1992). <i>Theory of Structures</i> . 9th Ed. New Delhi: Laxmi Publications.	
5. Ramamrutham, S. <i>Theory of Structures</i> . New Delhi: Tata McGraw Hill Education.	
6. Reddy, C. S. (1999). <i>Basic Structural Analysis</i> . New Delhi: Tata McGraw-Hill Education.	
7. Vazirani and Ratwani. (2008). <i>Analysis of Structures</i> . Vol. I. New Delhi : Khanna Publishers.	
8. Wamock, F. V. <i>Strength of Materials</i> .	

SUBJECT TITLE	Architectural Design Studio - II	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR301	L	T	P	6
SUBJECT CATEGORY	LC	0	0	9	
OBJECTIVE	The students are now well versed with visual grammar dealt in the previous semesters. The current semester will involve the formulation of design concepts and developing simple single storied load bearing structures in the immediate or observable environment. The semester focuses on the understanding of context and elements of the built form in an existing setting. The projects would connect horizontal circulation reflecting their creative approach drawn from data analysis and climatic consideration to the physical setting. They will address spatial requirements from activities and known spaces to sites without formal byelaws. There will be at least one major and one minor design exercise. The faculty can take up the exercises as per their order of preference. The order should be common in				

both sections. The faculty may achieve the stated minimum outcomes using appropriate strategies. The subject will be integrated with Visual Arts, Art Appreciation, History, BMC, Climate Responsive Architecture, Water Supply and Sanitation and Structures. The design process should result in form and function. Suggested typologies: residences, community centre, aanganwadi, primary health centre, public toilet, etc. Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work

COURSE CONTENT

Module 1 :

LO1: To develop sensitivity towards existing habitat spaces with its building elements

LO2: To map gathered information of visited physical setting

LO3: To critique the materials, construction techniques and structural system used in the elements of built forms.

Module Contents

- This module will involve the study of the context and elements of built and un- built spaces in an observable setting to develop the understanding of socio-cultural attributes of the physical environment, methods of construction emerging out of the way of life of the people in a given place including topographical and climatic survey.
- To achieve LO2 and LO3, students will present the documentation work through visual, verbal and graphical communication skills. The students may work in groups at this stage. They may use some of the techniques like measured drawings, rendered hand drawn sheets, models, role play, etc. Students will integrate attributes in terms of facilitation, plan form, volume, orientation, climatic considerations and space organization.
- The assessment/ evaluation strategy for the module may be based on reviews in the form of desk crits/ informal crits /interim crits/group crits.

Module 2 :

LO4: To apply climate responsive techniques to simple single storied load bearing structures. Module Contents Students will integrate knowledge from other associated subjects mentioned earlier to evolve a design for simple single storied load bearing structures. Students will keep in mind the spatial requirements emerging out of activities, aesthetic appeal, functional quality and elementary structural concepts required to evolve the specific form. Climatic consideration for the design, orientation of building on site their application in elevations as functional/aesthetic solutions will also be a part of the design exercise.

REFERENCES

- Encyclopedia Of Vernacular Architecture by Paul Oliver
- Vernacular Architecture In The Twenty First Century by Macel Vellinga & Lindsay Asquith
- Architecture without Architects by Bernard Rudofsky
- Architecture For The Poor by Hassan Fathy

SUBJECT TITLE	BUILDING CONSTRUCTION -III	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR302	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	
OBJECTIVE					
<ul style="list-style-type: none"> • To familiarize the students with the temporary supporting structures required for construction. • To give knowledge about the various Arch forms and their methods of construction. • To introduce to the students with the classification and types and details of construction of roofs. 					

- And to give complete knowledge about the various types of flooring and its construction details.

COURSE CONTENT

Module 1: Temporary Supporting Structures

Learning Objectives

Make students aware of temporary structures.

Module Contents

- Form work and shuttering for different types of RCC elements, trench timbering, scaffolding, shoring and underpinning.

Module 2: Timber Roofs

Module Contents

- Classification of roofs: (a) Single roofs; flat roofs, lean-to roofs, double lean-to, couple, close couple and collar roofs (b) Double or Purlin Roofs. (c) Trussed rafter roofs (d) Triple or framed roofs (e) Common roof coverings with its laying
- Waterproofing, rainwater gutter details.
- King post and Queen post roof trusses

Module 3: Timber Floors

Module Contents

- Timber floors: construction techniques, types of timber floors: single, double and triple joist timber floors,
- Furnishing of floors with different floor finishes like cement, coloured cement, mosaic, terrazzo, tiles etc. special consideration for rubber and PVC flooring, methods of laying

Module 4: Timber Partitions

Module Contents

- Types of timber partitions: Single, double and flushed timber partitions

Module 5: Introduction to RCC elements like Columns, Beams and Slabs

Learning Objectives

To familiarize students with basic information about construction procedures and reinforcement detailing about RCC elements like Columns, Beams and Slabs. Also to make students aware of joining details of columns, beams and slabs.

Module Contents Reinforcement detailing of RCC building elements like columns, beams and slabs through sketches and site visits.

Module 6: Materials

Learning Objectives

Learning of various materials like panel walls, ferrous and nonferrous Metals and roofing material.

Module Contents

- Hollow and Panel walls: Economy and advantages over solid load bearing walls, practical consideration during construction hollow concrete block construction, different types of partition wall. Reinforced brick work.
- Ferrous Metals: Pig iron, cast iron, wrought iron – types, properties, steel – properties, types and uses of steel in construction, properties of mild steel and hard steel, defects in steel.
- Nonferrous Metals and alloys: Aluminium, copper, lead Nickel Important alloys like - brass, bronze, etc.
- Corrosion of both ferrous and nonferrous metals – types and preventive measures.
- Roofing Material: Study of contemporary roofing materials

REFERENCES

- Building Construction Illustrated by Francis D. K. Ching
- Building Construction by W. B. McKay
- Building Construction by Sushil Kumar
- Building Construction by Rangwala
- Engineering Materials by Rangwala

- Building Construction by B. C. Punmia
 - Building Materials: Materials of Construction by Gurcharan Singh
 - Building Construction Handbook by R. Chudely
- Each module should include market surveys and construction site visits compulsorily.

SUBJECT TITLE	Surveying Lab	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR303	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	
OBJECTIVE					
To interpret the booking for field notes					
To apply the fundamental of chain and compass surveying for field survey					
To work out the contour surveying with the help of levelling instrument					
To determine the triangulation with the help of Theodolite					
To define and classify the various types of modern survey					
COURSE CONTENT					
Actual field Survey by the following methods:					
1. Chain Surveying					
2. Compass Surveying					
3. Plane table Surveying					
4. Levelling					
5. Theodolite Surveying					
REFERENCES					
1. B.C. Punmia – <i>Surveying Vol. I</i> – Standard Book House, New Delhi – 1983.					
2. P. B. Shahani – <i>Text of surveying Vol. I</i> , Oxford and IBH Publishing Co – 1980					

SUBJECT TITLE	Computer Application – I (2D & 3D)	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR304	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	
OBJECTIVE					
To familiarize students with basic understanding of documentation and presentation software. To develop skill in using Computer aided Architectural Design software for preparing architectural drawings.					
COURSE CONTENT					
Module 1					
Introduction to Applications of MS Office in presentation: Microsoft Word, Microsoft Power Point, Microsoft Excel, Adobe Page Maker.					
Module 2					

Introduction to computer aided design in architecture. Introduction to two dimensional drafting in CAD. Understanding commands like Draw, Modify, Use of tools, layers, plotting system and its applications etc.

Module 3

Customization of Auto-CAD, Auto-CAD express tools, creation of architectural library elements and blocks, applying materials and rendering. Google Sketch-up application in 3D architectural drawings, modelling, creation of entities, dimensioning, application of solids and surfaces.

Module 4

Application of CAD in small Architectural projects done in the previous semester design class through site plan, floor plan, presentation plan, elevation and section using appropriate software. Module-5 Seminar on another related software like ARCHICAD/INTELLICAD to understand basic differences between the two.

REFERENCES

1. Gindis, E. (2014). Up and Running with AutoCAD 2015: 2D & 3D Drawing and Modelling. Oxford: Elsevier.
2. Seidler, D. R. (2007). Digital Drawing for Designers: A Visual Guide to AutoCAD 2012. London: Fairchild Publications.

4th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR401	Environmental Psychology & Behavioral Architecture	3	0	0	3	30	70		100
2	PC	UPCAR402	History of Architecture-III	3	0	0	3	30	70		100
3	PC	UPCAR403	Building Services-II (Acoustic design)	3	0	0	3	30	70		100
4	ES	UESAR404	Building Material-IV	2	0	0	2	30	70		100
5	ES	UESAR405	Design of Concrete Structures	3	0	0	3	30	70		100
6	LC	ULCAR401	Architectural Design Studio – III	0	0	9	6	50		50	100
7	LC	ULCAR402	Architectural Graphics & Communication	0	0	3	2	50		50	100
8	LC	ULCAR403	Building Construction-IV	0	0	3	2	50		50	100
Total				14	0	15	24				800

SUBJECT TITLE	Environmental Psychology & Behavioral Architecture	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR401	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	
OBJECTIVE					
<ul style="list-style-type: none"> • The main intention of the course is to equip students with basic study of human behaviour and interaction with environment. • The course includes topics such as beliefs, meanings, values and attitudes of individuals or groups concerning various environments such as neighborhoods, cities, transport routes and devices, or recreational areas; evaluation and effectiveness of environments designed to accomplish specific objectives; Interrelationships between human environments and behavioral systems; practices aimed at controlling environments and behaviour. • The subject will have assignments in line with the understanding obtained from design studio, building materials & construction and history of architecture. 					
COURSE CONTENT					
Module 1: Introduction					
Module Contents					
<ul style="list-style-type: none"> • Psychology and its relation to built space • Behavioral Science and modern movement • Elements of behaviour 					
Module 2: User group and built environment					
Module Contents					

- Family, gender and group social behaviour, Community behaviour patterns
- Behavioral concept in neighborhood and communities

Module 3: Man-environment relationship

Module Contents

- Development of perception, Memory and thinking, mental map
- Gestalt theory of Perception – environmental cognition and effect, spatial behaviour,
- Failure of Gestalt theory in complex phenomena,

Module 4: Environment-behaviour information

Module Contents

- Environment as interacting system, Environmental perception,
- Environmental cognition, Field theory and Lewinian space.
- Semantic and Semiotic approaches to environmental design.

Module 5: Environment – Behavior: phenomena and design

Module Contents

- Behavior Settings: Fits and Misfits, Anthropometrics and ergonomics
- Proxemics and Personal Space
- Territoriality and Defensible space

Module 6: Environment – Behavior: phenomena and design

Module Contents

- Privacy, Density, Crowding and Stress
- Social space, Small group Ecology

Module 7: Social design aspects

Module Contents

- Safety, equity
- Age and built space
- Making space and place

REFERENCES

- Hidden Dimensions by T. Hall
- Personal Space by Sommer
- House Form And Culture by Amos Rappoport
- A Pattern Language by C. Alexander
- Life and Death of Great American Cities by Jane Jacobs

SUBJECT TITLE	History of Architecture-III	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR402	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

To provide an insight into the architecture of High & Late Medieval period. Social, religious and political character, building materials, construction methods, landscape and how they influenced their built form and settlement pattern shall be explained with examples. To provide an understanding of the Architecture in its various stylistic modes, characterized by technology, ornamentation and settlement planning practices. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture embedded in place specific context. The study must enable students to do a comparative evaluation of developments in chronological manner along the timeline and across different geographies. Also, students must be

enabled to appreciate tangible and intangible aspects of heritage associated with history.

COURSE CONTENT

History of architecture – III

Medieval - Early Modern (10th Century - 19th Century AD)

Objective

To impart understanding of the evolution in architecture and urbanism from the medieval to Early Modern times; Social, religious and political character, building materials, construction methods, landscape and how they influenced their built form and settlement patterns shall be explained with examples. Knowledge of European Renaissance and Mughal architecture in India is provided; Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is Embedded in place specific context.

Module 1

GOTHIC & RENAISSANCE ARCHITECTURE

Evolution of vaulting & development of structural system (flying buttress, pinnacles, spires, pointed arches); Italian Gothic (Vatican City and St Peters Cathedral), French Gothic (Notre Dame at Paris), English Gothic (Westminster Abbey). Renaissance architecture at Italy and France, Baroque Period.

Module 2

TEMPLE ARCHITECTURE

Indo-Aryan – salient features & development of Shikharas. Odishan – Early (Vaithal Deula / Parshurameswar), Middle (Lingaraj / Konark Sun Temple), Late (Mukteswar / Raja Rani); Gujarat (Surya Temple, Modhera); Central India (Khadariya Mahadev, Khajuraho); Dravidian – salient features & development of Vimanas & Gopuram. Chola style (Brihadeswara, Tanjore); Pandya Style (Gopuram & temple complex, Meenakshi Temple).

Module 3

ISLAMIC ARCHITECTURE

Evolution of Islamic architecture – features of a typical mosque, principles & influences; construction techniques – domes, arches, minarets, calligraphy, etc. Imperial Style (Delhi Sultanate) and Provincial Islamic Styles –Development of mosques & tomb prototypes in India (Structures – Qutab Complex at Delhi), Bengal (Adina Mosque), Gujarat (Jami Masjid), Deccan (Golgumbaz and Bijapur), Hyderabad (Charminar), Lucknow (Bara Imambada and Chota Imambada)

Module 4

MUGHAL ARCHITECTURE

Development of Mughal architecture under different rulers (Fatehpur Sikri, Taj Mahal, Redfort)

INDO SARACENIC ARCHITECTURE

Synthesis with Indian architecture and climatic factors – Mysore (Mysore Palace) / Lucknow (Char Bagh Railway Station/ La Martiniere) / Baroda (Laxmi Vilas Palace).

Module 5

Study of heritage along water front in India. (Subject teacher to decide)
Study of Palaces and Havelis

REFERENCES

1. Brown, P. (1983). *Indian Architecture (Islamic Period)*. Bombay : Taraporevala and Sons.
2. Catherine, A. (2001). *Architecture of Mughal India*. Cambridge University Press.

3. Faulkner, H. T. (1953). *Architecture through the Ages*. New York : Putnam Adult.
4. Grover, S. (2002). *Islamic Architecture in India*. New Delhi : CBS Publications.
5. Harris, M. C. (1977). *Illustrated Dictionary of Historic Architecture*. New York : M. Courier Dover Publications
6. Hillenbrand, R. (1994). *Islamic architecture - form, function and meaning*. Edinburgh : Edinburgh University Press.
7. Ingersoll, R. And Kostof, S. (2013). *World architecture: a cross-cultural history*. Oxford : Oxford University Press.
8. Mitchell, G. (1978). *Architecture of the Islamic world - its history and social meaning*. London : Thames and Hudson.
9. Nath, R. (1985). *History of Mughal Architecture Vols I-III*. New Delhi : Abhinav Publications.
10. Tadgell, C. (1990). *The History of Architecture in India*. New Delhi : Penguin Books.

SUBJECT TITLE	Building services-II (Acoustic design)	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR403	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

Building Services are what makes a building alive. These vital components vary in scale and complexity depending upon building profile and usage. Accordingly, an architect's role may range from designing services for a less complex structure to incorporating engineering solutions / designs provided by respective consultants in their design programme and to deliberate with them in order to provide best possible solution. Having already dealt with water supply & sanitation, lifts & escalators, electrical, illumination and fire fighting services in previous semesters, this semester deals with HVAC and acoustics.

- This course is designed to give architects an overview and introduction to heating, ventilation, and air conditioning focusing on different HVAC systems; their architectural considerations and their coordination with other services and architectural designs.
- In today's architectural environment, good acoustical design isn't a luxury – it's a necessity. This course deals with the science behind sound and its application to achieve desired acoustical performance in a specific building by using different building materials, systems and technologies.

The subject will be taught in congruence with the Design studio and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

COURSE CONTENT

Module 1: Fundamentals of Heating, Ventilation and Air Conditioning

Module Contents

- Basic principles, laws and terminologies related to HVAC.
- Psychometric chart and comfort zone.
- Evaporative cooling systems of air conditioning.
- Refrigerant Cycle (Vapour Compression System) and its reversal.
- Components of Mechanical Vapour Compression Refrigeration Systems.
- Natural and artificial ventilation.

Module 2: Types of Air Conditioning Systems

Module Contents

- Window Air Conditioners.
- Split Air Conditioners. • Packaged Air Conditioners. • Direct Expansion Air Conditioning Systems. • Central or All-water Air Conditioning Systems. • Selection criteria, design / structural considerations and energy requirements for above mentioned air conditioning systems. Module 3: Emerging Trends in HVAC and other Miscellaneous Topics Module Contents • Passive Heating and Cooling Systems. • Energy Saving through Design, Operation and Maintenance. • Emerging Technologies – VRV, VRF, Heat Recovery Systems, etc. • Developing Air Conditioning layouts for their current design exercise. • Coordination with other services, architectural and structural designs. • Case Studies and their critical appraisal. Module 4: Introduction to Basics of Acoustics Module Contents • Basic laws and terminologies related to Acoustics. • Sound Intensity and Sound Intensity Level. (Classroom exercise) • Sound Absorption, Transmission, Reflection, Diffusion and Diffraction. • Free field conditions and Inverse Square Law for noise reduction with distance. • Sound Absorbing Materials – descriptions and characteristics. Module 5: Acoustics for an Enclosure / Building Design Module Contents • Reverberation Time and its importance for acoustical performance of an enclosure. • Sabin’s Equation and its application for designing new auditoriums and correcting RT of existing ones. (Classroom exercise) • Acoustical defects in an auditorium and their remedies. • Acoustical design of auditorium and other acoustically sensitive enclosures meant for speech, music, lecture, etc. • Properties of materials and their application for acoustical treatment, shape analysis for different enclosures. • Designing enclosures for variable RT’s. • Sound Amplification Systems. Module 6: Noise Isolation and Control Module Contents • Noise and its effects. • Types of noise and its transmission. • Sound Insulation and Transmission Loss. • Speech privacy and noise control in specific situations. • Methods of Sound Insulation - control of mechanical noise and vibrations. • Codal Provisions

REFERENCES

1. Szokolay, S. V. (2008). Introduction to architectural science. Taylor & Francis.
2. Vigran, T. E. (2008). Building Acoustics. 1st Ed. Taylor & Francis.
3. Barron. M. (2009). Auditorium acoustics and architectural design. 2nd Ed. Taylor & Francis.
4. Eagan, D. Concepts in Architectural Acoustics.
5. Kang, J. (2006). Urban Sound Environment. 1st Ed. CRC Press.
6. Meyer, H. B. and Goodfriend, L. Acoustics for Architects. Reinhold.
7. Smith, B. J., Peters, R. J., and Stephanie, O. (1982). Acoustics and Noise Control. New York: Longman.

SUBJECT TITLE	Building Material-IV	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR404	L	T	P	2
SUBJECT CATEGORY	ES	2	0	0	

OBJECTIVE

The course intends to introduce different materials used in modern buildings, and innovative alternative materials that are being used to make the building more energy efficient and sustainable. Application and performance of each material is highlighted.

COURSE CONTENT

MODULE 1

Energy efficient materials and systems for building interior: Interior partition systems, ceiling and flooring.

MODULE 2

Vacuum insulation panel (VIP), stretched fabric wall systems External Thermal Insulation Cladding System (ETICS), Insulated Vinyl Siding.

Aluminium composite panels: application method in interior and exterior facades

MODULE 3

Paints and Varnishes, Reflective indoor coatings and High reflectance and durable outdoor coatings.

Nano-materials for building construction and finishes.

Different types of flooring and wall cladding tiles, Antistatic Vinyl surfaces. Interior cladding and surface finishing materials and techniques.

MODULE 4

Fabrics for interior furnishing.

Materials for furniture and modular storage.

Students are required to visit building material outlets and construction sites, and collect product information.

REFERENCES

1. Al-homound, M.S., Performance Characteristics and Practical Applications of Common Building Thermal Insulation Materias, Building and Environment, Vol-40(3), 2005.
2. Duggal, S.K., Building Materials, New Age International Publishing Co., (3rd Ed.), 2008.
3. Varghese, P.C., Building Materials, PHI Learning Pvt. Ltd., 2005.
4. Donald Watson, Building materials and systems, TMH publication 2009

SUBJECT TITLE	Design of Concrete Structures	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR405	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	

OBJECTIVE

- To classify various types of RCC material depending upon the strength and durability parameter
- To design a beam for a given system of loading and structural geometry, for flexure and shear
- To design a slab for given building floor for different end support conditions
- To design a column for given axial load and moments
- To design a dogleg staircase for given stair well space in residential or public building
- To outline the features of IS code provisions regarding limit state method for designing concrete structure
- To summaries the conceptual idea behind the development of pre-stressed structural component for general use

COURSE CONTENT**Module: 1****Basic Material Properties & Design Concept**

Introduction to Concrete Technology, Composition of Concrete and the properties, Strength and Durability, Modulus of Rupture, Creep and Shrinkage of Concrete, Reinforcing Bars, Types and grade, Stress-Strain Diagram of Steel and Concrete. Concrete Mix Design: Nominal Mix and Design Mix. Design Philosophies, Working Stress Method, Limit State Method, Various Limit States.

Design for Flexure

Introduction, assumption, flexure design of singly reinforced & doubly reinforced and T- beams by Limit

State Methods. IS-Coded provisions, Numerical Problems.

Module: 2

Design for Shear, Bond

Shear failure of beams. Shear reinforcement, Curtailment of reinforcement. Bond, Anchorage and Development length, IS-Code provisions, Design of a beam with flexural and shear consideration.

Reinforcement Detailing, Numerical Problems.

Design of Compression Members

Short and Long Columns, IS-Code Provisions, Design of Short Columns under Axial compression, Design of Columns under bi-axial bending, use of interaction diagram for design. Lateral ties. Reinforcement Detailing, Numerical Problems.

Module: 3

Design of Footing

Isolated footings for rectangular and circular columns. Reinforcement Detailing, Numerical Problems.

Design of Slabs & Stairs

Effective span, one way and two way slabs. Design of Slabs with various boundary conditions by IS-Code methods. Reinforcement Detailing, Numerical Problems.

Types of stairs, Design of Dog Legged & Open Wall Stairs. Reinforcement Detailing, Numerical Problems.

Module: 4

Introduction to Pre-stressed Concrete

Introduction to Pre-stressed Concrete, Pre and Post tensioning systems, Advantages, Basic design concept of Pre-stressed concrete beam, Analysis of prestress and bending stress, Resultant Stress, Thrust Line, Concept of Load balancing, Various losses of stresses. Simple Numerical Problems

IS Codes: IS 465: 2000, SP-16, SP-34

REFERENCES

Note:

1. All the Design of Concrete Structural Elements must be based on "Limit State Method"
2. Students are allowed to bring IS 465: 2000 and SP-16 in the examination hall for referring the design solutions.

Recommended Books:

1. B. C. Punmia; *Reinforced concrete structure (Vol - I)*.
2. S. Unnikrishna Pillai & Devdas Menon; *Reinforcement Concrete Design, Tata McGraw Hill, New Delhi.*
3. N.Krishna Raju; *Structural Design and Drawing, Reinforced Concrete and Steel, University Press (India) Ltd.*
4. Mallick and Gupta; *Reinforced Concrete.*
5. P.C.Varghese; *Limit State Design of Reinforced Concrete Structures.*
6. James R. Libby, *Prestressed Concrete Design and Construction, The Ronald Press Company.*
7. N.Krishna Raju; *Prestressed Concrete, Tata McGraw Hill, New Delhi.*

SUBJECT TITLE	Architectural design studio – III	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR401	L	T	P	6
SUBJECT CATEGORY	LC	0	0	9	
OBJECTIVE	The study of design shall continue with further progress and complexity in aesthetic qualities with more emphasis on architectural and functional aspects. The semester will focus on studying functional patterns in horizontal and vertical circulation for double storied framed structures with application of				

services. The design project will involve complexities like site restrictions and introduction to basic byelaws. The subject will be integrated with Art Appreciation, BMC, Contemporary History, Site Planning and Landscape Architecture, Electrical and Illumination, Concrete Structures. There will be at least two design problems, one major and one minor, arranged in sequence leading to more and more complexity. The faculty can take up the exercises as per their order of preference. The order should be common in both sections. The faculty may achieve the stated minimum outcomes using appropriate strategies. Suggestive Typologies: school, nursing home, hostel, homestead, motel

COURSE CONTENT

Module 1:

Module Content

- This stage will involve at least two projects- one major and one minor in continuation with the previous semester in an increasing order of complexity with considerations relating to horizontal and vertical circulation to a double storied framed structure.
- Introduction to byelaws with site restrictions is also initiated at this stage. Functional aspects of building services like drainage, water supply and electricity with structural concepts in the design will be a major part of the exercise. Site Planning and Landscape intentions shall also be involved in related stages of the design process.
- The student will study and collect data using case studies through literature reviews, site visits and gathering of data/ information through literary sources. The project outcome / design solutions will be in the form of sheets, elevations- sections, perspective views, etc.

Module 2: Presentation of the previous module

Module Contents

- 1. Documentation of historical- socio- cultural information,
- 2. Use of locally available materials leading to construction techniques in elements of built forms and in response to the climate of the region.
- 3. Structural System in the built forms
- 4. Identification of possible design intervention in the region/ settlement.

Module 3: Design Intervention in the Region mentioned in the above modules

Module Contents

- Justification of the Design Intervention
- Conceptual Design • Design development/ Form Development
- 4. Presentation/ Crits

Module 4: Introduction to the Design Problem, Site study and Area Programming

Learning Resources / References & Learning Strategy

- Lecture/ Presentation/ Creative Exercise by the Instructor
- Precinct studies through literature reviews and gathering of data through literary sources
- One to one as well as group discussions between students and instructors.

Module Contents

- Introduction to the Design Exercise/ Problem
- Site Visit and Site Analysis
- Case studies
- Collecting relevant data for the given design problem
- Synthesizing and Analyzing the above data
- Deriving Area Requirements for the Design Exercise

Module 5: Design Development

Module Contents

- Relation to various functional aspects of the design problem: Use of bubble diagrams, flow diagrams, zoning of site, etc.

- Conceptual Design
- 3. Finalization of design proposals: schematic 2D/ 3D / single line/ conceptual level site plan, floor plan, elevations and sections should be finalized

Module 6: Final Design Proposals

Learning Resources / References & Learning Strategy

- Lectures leading to generation of multiple concepts and design solutions can be given/ introduced through creative exercises. Input in the form of lectures/ presentations/ movies/ videos/discussions/etc. related to special issues can be given by the design instructor.

Module Contents

1. Final developed to scale drawings- site plan, plans, elevations, sections, elevations 2. Facilitation to the floor plan for justification of provided spatial proposals 3. Detailed Site Plan with built and un-built spaces and landscaping features 4. Development of views and construction details 5. Model of the proposed design

REFERENCES

1. Chaira, J. D. and Crosbie, M. J. (2001). Time Saver Standards for Building Types. 4th Ed. NewYork : McGraw-Hill.
2. Bousmaha Baiche & Nicholas Walliman, Neufert Architect"s data, Blackwell science Ltd.
3. Hareguchi, H. (1988). A Comparative analysis of 20th C. houses. London: Academy Editions.
4. Miller, S. F. (1995). Design Process: A Primer for Architectural and Interior Design. New York: Van Nostrand Reinhold.
5. Robson, D. (2002). Geoffrey Bawa: The Complete Works. New York : Thames & Hudson.
6. Schulz, N. C. (1985). The concept of dwelling. New York : Rizzoli International Publications.
7. Unwin S. (2010). Twenty Buildings every Architect should understand. New York : Routledge.
8. Meiss, V. and Pierre, Elements of Architecture: From Form to Place.

SUBJECT TITLE	Architectural Graphics & Communication	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR402	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	

OBJECTIVE

To enhance writing skills and awareness about architectural journalism. To equip students with digital and 3D presentation techniques, fundamentals of photography, basic skills about architectural photography, and documentation.

COURSE CONTENT

Module 1

ARCHITECTURAL JOURNALISM

Introduction to Architectural journalism, Skill improvement in reporting, writing, editing, criticism of architecture, descriptive and analytical writing, book reviews, reporting, review and analysis of historical and contemporary architectural examples and news, Page composition.

Module 2

DIGITAL PRESENTATIONS

Introduction of various software available for architectural presentation such as Photoshop & Coral. Basic Tools for Editing and Creating Graphics. Rendering AutoCAD drawings with appropriate materials.

Compiling and arranging drawings on sheet for presentation or portfolio. Image doctoring and manipulation using computer software for graphics and animation (Photoshop and Flash).

Module 3

COMMUNICATION TECHNIQUES

Advertising - Typography, artwork, Multimedia - digital graphic design techniques, surface decoration such as print, Printmaking – photo screen-printing and etching, scanning and laser printing.

Module 4

3D DIGITAL PRESENTATIONS

Movie making Flash movies, animation graphics, and walkthroughs, 3D Printing.

Module 5

PHOTOGRAPHY

Introduction to photography, types of Cameras, equipment- cameras & lenses, Principles of photo composition, properties & priorities: Exposure, Aperture, Speed, colour, black & white photography. Architectural Photography- Exterior and Interior photography. Practical exercises to understand composition, photo documentation of buildings, highlighting quality of architectural spaces.

REFERENCES

1. Dinsmore, G. A. (1968). Analytical Graphics. Canada: D. Van Nostrand, Company Inc.
2. Freeman, S. (1978). Written Communication. New Delhi: Orient Longman.
3. Sounders, D. (1988). Professional Advertising Photography. London: Mercurst.
4. Edward, J. F. and Lee, J. (2000). Feature Writing for Newspapers and Magazines. 4th Ed. Longman.
5. Harris, M. (2002). Professional Interior Photography. Focal Press.
6. Heinrich, M. (2008). Basics Architectural photography. Birkhauser Verlag AG.

SUBJECT TITLE	Building Construction-IV	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR403	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	

OBJECTIVE

This semester will provide knowledge about vertical circulation with carrying forward learning of RCC from previous semester.

- To familiarize students with the different types of vertical circulation possibilities in the form of Stairs, Escalators, Auto Walks/ Travellators and Elevators. Also types and construction details of all vertical circulation elements will be dealt with in detail. Market survey and site visit studies shall be an essential part of the teaching – learning strategy.
- To give complete knowledge about the various types of Cladding and surface finishes.
- The subject will be integrated with other core subjects like Architectural Design and Building Services of previous and same semester.

COURSE CONTENT

Module 1: Introduction to Vertical transportation and Staircases

Learning Objectives

Make students aware of vertical circulation through staircases with all technical terms related to it.

Module Contents

- Description of staircases, technical terminology involved, classification of staircases based on shape, material and its construction details.
- Vertical section through staircases with detailing at various levels

Module 2: Staircases

Learning Objectives

Make students aware of various types of staircases with reference to its placement, geometry and material used.

Module Contents

- Technical terminology involved, Different types of staircases-Dog legged, Circular, Open Well, Spiral, Elliptical, etc. Classification also based on materials like wooden, steel and RCC
- Staircase layout and its construction details, different elements of staircases, etc.
- Design and details of construction of staircases in timber, stone, RCC and steel.
- Cladding materials using traditional and contemporary materials

Module 3: Elevators

Learning Objectives

To understand the working of different types of elevators. Module Contents

- Design criteria for provision of Elevators
- Details of construction

Module 4: Escalators, Travellators and Auto Walks

Learning Objectives

Critically analyzing building to provide mechanical mode of circulations, installation detail with live examples Module Contents Installation, working mechanism of Escalators, Travellators and Autowalks

Module 5: Cladding

Learning Objectives

- Make student aware of the various materials and fixing details of surface cladding
- To understand the concept of Thermal comfort and construction detail of Cavity Wall.

Module Contents

- Details of cladding of wall with stone, tiles, timber and steel framing
- Construction of cavity wall with different thermal and acoustical insulative system

Module 6: Finishing Materials

Learning Objectives

Learning of various vertical and horizontal surface finishes, their properties and construction details

Module Contents

- SURFACE FINISHES: Paints and surface finishes; Composition, properties and methods of application of different types of paints: Oil, synthetic enamels, acrylic and other plastic emulsions and formulations, interior and exterior grade paints. Natural and synthetic clear varnishes, French polish. Cement based paints
- FLOOR FINISHES: PCC, terrazzo, stone slabs, brick and terracotta tiles, Synthetic materials (PVC, Timber). Floors of industrial buildings & warehouses. Ceramic wall & floor tiles.
- PLASTIC: Classification of plastic, moulding and fabrication, properties of plastic, use of plastic, PVC. Fiber glass.
- MISCELLANEOUS MATERIALS: Cork, rubber, Gypsum, sealants, heat and sound insulation materials.
- GLASS AND GLASS PRODUCTS: Plain, sheet, plate, textured, laminated, wired and shock resistant glass. Glass blocks, glass tiles, mirrors, heat reflecting glasses and Glass wool.

REFERENCES

- Building Construction Illustrated by Francis D. K. Ching
- Building Construction by W. B. McKay
- Building Construction by Sushil Kumar
- Building Construction by Rangwala

- Engineering Materials by Rangwala
- Building Construction by B. C. Punmia
- Building Materials: Materials of Construction, Gurcharan Singh
- Building Construction Handbook, R. Chudely

Each module should include market surveys and construction site visits compulsorily.

5th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR501	Principles of Architecture and Theory of Design	3	0	0	3	30	70		100
2	ES	UESAR502	Building services – III : Illumination and Electrical Design	3	0	0	3	30	70		100
3	PC	UPCAR503	Interior Design	3	0	0	3	30	70		100
4	PC	UPCAR504	Contemporary Architecture and Trends	3	0	0	3	30	70		100
5	ES	UESAR505	Design of Steel Structures	3	0	0	3	30	70		100
6	LC	ULCAR501	Architectural Design Studio – IV	0	0	9	6	50		50	100
7	LC	ULCAR502	Working Drawing – I	0	0	6	4	50		50	100
8	LC	ULCAR503	Interior Design Studio	0	0	3	2	50		50	100
Total				15	0	18	27				800

SUBJECT TITLE	Principles of Architecture and Theory of Design	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR501	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	
OBJECTIVE	The course will focus on creating a deep understanding about Architecture and Design from a theoretical perspective. The course will help students to develop a strong design vocabulary, how and by what means to communicate their design and to understand the philosophy and the undercurrents of the design process. It will impart knowledge of different aesthetic movement and philosophies that has influenced architectural principles and evolution of architectural style over time in the world.				
COURSE CONTENT	Module 1 INTRODUCTION TO DESIGN Definition of design, Value Judgments in Design (Design and Morality/Ethics, Socially Responsive Design Process, Inclusive Design), evaluation of design, Design Skills, General discussion on Manmade and Natural elements/structures Module 2				

DESIGN PROCESS AND THINKING

Context for architectural design problems.

Design process - stages in the design process, different ideas of design methodology, analysis and synthesis, simulation, action ability and implementation of intentions.

Understanding the terms - creativity, innovation, imagination, concept, idea, hypothesis, etc.

Theories on thinking: convergent and divergent thinking, lateral and vertical thinking, creative thinking techniques like checklists, brainstorming, and syntactic, etc., blocks in creative thinking.

Theories of perception and variability of perception: Phenomenology of perception -Merleau-Ponty

Module 3

DESIGN CONCEPTS AND PHILOSOPHIES

A chronological overview of principles and philosophy of architectural movement in art, design and architecture, worldview, theories & perceptions of time and space, mode of reasoning through discussion on works of notable architects

Modernism: Related to works of Walter Gropius, Le Corbusier, Mies vander Rohe, Frank Lloyd Wright, Louis Sullivan

Postmodernism: Work of Michael Graves, Robert Venturi, Philip Johnson

Structuralism: Charles Alexander Jencks, Aldo van Eyck, Herman Hertzberger, KenzōTange, and Claude Lévi-Strauss

Post-structuralism/Deconstruction: Bernard Tschumi, Peter Eisenman, Henri LeFebvre, FrankGehry, Daniel Libeskind, ZahaHadid. **Biomimicry/biomimetics:** Antoni Gaudi, Norman Foster

REFERENCES

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
3. Bryan Lauson - How Designers Think, Architectural Press Ltd., London, 1980.
4. Tom Heath - Method in Architecture, John Wiley & Sons, New York, 1984
5. Johnson, P, Wigley, M, (1988). "Deconstructivist Architecture" in Deconstructivist Architecture, New York: Museum of Modern Art, pp 10-20.
6. C. Jencks, (1991). "The Language of Post Modern Architecture" Wiley Academy.
7. P. Eisenman, (1999). "Diagram Diaries". Universe, New York.
8. Merleau-Ponty, M., (1964). "The primacy of perception". In The Primary Perception and other essays on phenomenological psychology, the philosophy of art, history, and politics,(J. M.Edie Trans), Northwestern University Press.
10. Robert Venturi, (1966) "Complexity and Contradiction in Architecture .New York: The Museum of Modern Art.
11. Tschumi, B. (1994). "Architecture and disjunction. Cambridge", Mass: MIT.

SUBJECT TITLE	Building services – III : Illumination and Electrical Design	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR502	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	
OBJECTIVE	<ul style="list-style-type: none"> To list the various components required in electricity distribution system To explain the electrical distribution in campus To develop the electrical layout diagram for building for the estimation and installation purpose To identify the various types of light requirement for different purpose To apply the fundamental of laws of illumination for analyse the light requirements of any space (both exterior and interior), To design the lighting scheme for interiors spaces 				
COURSE CONTENT	A. Electrical Services				
	Module 1				
	Sources of Electricity, Electricity generation, Basic Electrical Distribution System – Substation, transformer, overhead line, underground line. Three phase supply. Electrical distribution in campus				
	Module 2				
	Domestic wiring system, Material, classification, merits and demerits, Electrical accessories, Symbols and representation in architectural layout drawings, Single line-wiring diagram, Safety aspects, protection of buildings against lightning, NBC Recommendations, Earthing, Short circuit and overloading, Preliminary Estimation of Electrical & illumination works.				
	B. Lighting & Illumination				
	Module 3				
	Fundamentals of light. General definition of terms related to optical sensitivity, visual performance & vision, Visual field, Application of lighting and illumination in Architecture.				
	Module 4				
	Artificial sources of light; Lamps and their characteristics: Incandescent lamp, Fluorescent lamp, Gas filled lamp, HID lamp. Neon lamp and LED lamp. Polar Curves Luminaries and their applications				
	Module 5				
	Definition of Light power, light flux Light intensity, Laws of Illumination: inverse square law and Lambert’s Cosine law. Application of law of illumination. General formula for illumination calculation of distributed source. Coefficient of utilization.				
	Module 6				
	Standard level of illuminations for various tasks, Basic lighting design, Direct, Indirect and semi-direct lighting. General and local lighting, Glare and glare control.				
	Module 7				
	Lighting design of: Residential units, Shops & Restaurants, general office, conference hall, Art – gallery and Museum Parks & playgrounds Road/area lighting and Landscape Lighting.				
REFERENCES	Text/Reference books/ Journals :				
	1. Derek Philips; <i>Lighting in Architectural Design</i> .				
	2. G.K.Lal, <i>Elements of Lighting, 3-D Publishers</i> .				

3. R.G. Hopkinson and J.D.Kay, *The lighting of buildings*, Faber and Faber, London, 1969.
4. Philips Lighting in Architectural Design, McGraw Hill, New York, 1964.
5. I.E.S. Handbook.
6. International Lighting Review – Quarterly Journal.

SUBJECT TITLE	Interior Design	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR503	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

To study the Interior Design principles and their applications in interiors, and to foster creative ability and inculcate skills to understand and conceive architectural design.

COURSE CONTENT

Module 1

Introduction to Interior Architectural Design

Definition of interior design, Interior architectural design process, vocabulary of design in terms of principles and elements, Introduction to the design of interior spaces as related to typologies and functions, themes and concepts - Study and design.

Module 2

History of Interior Architectural Design

Brief study of the history of interior architectural design through the ages relating to historical context, design movements and ideas etc. Brief study of folk arts and crafts. (vernacular design in India) with reference to interior design and decoration.

Module 3

Elements of Interior Architecture - Enclosing Elements

Introduction to various elements of interiors like floors, ceilings, walls, staircases, openings, interior service elements, incidental elements etc., and various methods of their treatment involving use of materials and methods of construction in order to obtain certain specific functional, aesthetic and psychological effects.

Module 4

Elements of Interior Architecture – lighting accessories & interior landscaping

Study of interior lighting, different types of lighting their effects types of lighting fixtures. Other elements of interiors like accessories used for enhancement of interiors, paintings, objects-de-art, etc. Interior landscaping, elements like rocks, plants, water, flowers, fountains, paving, artifacts, etc. their physical properties, effects on spaces and design values.

Unit-V. Elements of Interior Architecture - Space Programming

Study of the relationship between furniture and spaces, human movements & furniture design as related to human comfort. Function, materials and methods of construction, changing trends and lifestyles, innovations and design ideas. Study on furniture for specific types of interiors like office furniture, children's furniture, residential furniture, display systems, etc. Design Projects on Residential, Commercial and Office Interiors.

REFERENCES

1. Ching, F. D. K. (1987). *Interior Design Illustrated*. New York : V.N.R. Publications.
2. Doshi, S. (Ed.) (1982). *The Impulse to adorn - Studies in traditional Indian Architecture*. Marg Publications.
3. Kathryn, B. H. and Marcus, G. H. (1993). *Landmarks of twentieth Century Design*. Abbey Ville Press.
4. Pendero, J. and Zelnik, M. (1979). *Human Dimension and Interior space: A Source Book of Design Reference Standards*. New York : Whitney Library of Design.

5. Slesin, S. and Ceiff, S. (1990). *Indian Style*. New York : Clarkson N. Potter.
6. Dorothy, S-D., Kness, D. M., Logan, K. C. and Laura, S. (1983). *Introduction to Interior Design*. Michigan : Macmillan Publishing.

SUBJECT TITLE	Contemporary Architecture and Trends	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR504	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

To impart an understanding of the evolution in architecture and urbanism from the medieval to industrial times; Understanding about European Renaissance and its contemporary Mughal architecture in India; Understanding about Industrial Revolution and its influence on the built form and settlement patterns; Colonial mercantile capitalism and spread of Western influences in India; Synthesis of architectural styles as modes of political accommodation. Also, students must be able to appreciate tangible and intangible aspects of heritage associated with history.

COURSE CONTENT

Module-I. European Renaissance

Renaissance in art and architecture in Italy and elsewhere; Changing relationship between Church and State; Rebirth of Graeco-Roman classicisms, building typologies and building elements, Public Squares, Plazas and ornamentation. Landscape architecture formal gardens;

Module-II. Industrial Revolution and its impact

Advent of Industrial Revolution, technological changes, Development of the railways and changes in settlement systems; Building of factory towns Rapid urbanization and urban crisis; Birth of modern town planning; Garden City, City Beautiful and other visionary movements; New building technologies and implications on architecture – usage of use of concrete, steel and glass; new Industrial Exhibitions.

Module-III. Art Nouveau, Arts and Crafts Movement

Roots of Art Nouveau as protest movement against classical architecture, fluidity and plasticity, organic influences; works of Antonio Gaudi, Victor Horta, C.R.Makintosh; Chicago school, Eclectism, Louis Sullivan's contribution to American architecture.

Module-IV. Early-Colonial Architecture in India

Spread of European mercantile capitalism and development of early colonial architecture, British, French and Portuguese influences; Inflow of new cultural practices and construction technology, Stylistic transformations: Neo-classicism, Gothic Revival and Indo Saracenic –Synthesis with Indian traditional motifs and climatic factor; bungalows architecture, PWD and institutionalization of architecture; Works F.W. Stevens, Henry Irwin etc. New settlement patterns – port cities, cantonments and hill stations.

REFERENCES

1. Brown, P. (1983). *Indian Architecture (Islamic Period)*. Bombay: Taraporevala and Sons.
2. Catherine, A. (2001). *Architecture of Mughal India*. Cambridge University Press.
3. Grover, S. (2002). *Islamic Architecture in India*. New Delhi : CBS Publications.
4. Hillenbrand, R. (1994). *Islamic Architecture-Form, Function and Meaning*. Edinburgh University Press.
5. Juneja, M. (Ed). (2001). *Architecture in Medieval India: Forms, Contexts, Histories*. New Delhi: Permanent Black.
6. Mitchell, G. (1978). *Architecture of the Islamic World - its history and social meaning*. London: Thames and Hudson.

7. Nath, R. (1985). *History of Mughal Architecture Vols I to III*. New Delh : Abhinav Publications.
 8. Tadjell, C. (1990). *The History of Architecture in India*. New Delhi : Penguin Books (India) Ltd.

SUBJECT TITLE	Design of Steel Structures	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR505	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	

OBJECTIVE

- To explain the structural property of structural steel
- To list the various market form of structural steel section available and their respective use
- To analyze the equilibrium of a riveted and welded joint
- To design a beam for a given system of loading and structural geometry, for flexure and shear
- To design a column and associate foundation for given axial load and moments
- To design a case specific connection between beam to beam and beam to column
- To outline the features of IS code provisions regarding design method of steel structure

COURSE CONTENT

Module: 1

Basic Material Properties & Design Concept

Material property of steel, Ductility, Behavior of steel in cyclic loading, Different structural steel section used in India and their use. Different types of steel structural systems. Steel cable structural system, Structural configuration of tall steel structures Innovative use of structural steel, Hollow Tubular steel sections, Corrosion and fire resistance property of steel.

Rivet & Weld

Rivet and Welded connections. Property and the merits and demerits of Rivet and Weld. Different types of joints, Failure of Rivet and Weld. Rivet value. Bracket connection with eccentricity with Rivet and Weld. Numerical Problems

Module: 2

Design of Beam

Design Fundamental of Beam, Laterally supported and laterally unsupported beam, IS code provisions, Built-up-beams. Numerical Problems

Design of Truss

Design fundamental of compression and tension member with angles. Design of simple trusses. Numerical Problems.

Module: 3

Design of Column

Design Fundamental of Axially and eccentrically loaded column, IS code provisions, Built-up-Columns, Lacing and battened column. Column Splice, Numerical Problems

Design of Connection

Framed connection; unstiffened and stiffened seated connections for the connection for beam-beam and beam-column-beam, Numerical Problems

Module: 4

Design of Foundation

Slab base and gusseted base, column base subjected to axial load and moment; design of isolated

grillage foundation, Numerical Problems

REFERENCES

IS Codes: IS 800, Steel Section Handbook

Recommended books:

1. S.K.Duggal; *Design of Steel Structures*, Tata McGraw Hill, New Delhi.
2. Ramchandra; *Design of Steel Structures* (Vol. I).
3. Negi; *Design of Steel Structures*.
4. SarwerAlam Raz; *Structural Design in Steel*, New Age International Publication
5. Thomas Burns; *Structural Steel Design*, Delmar Publication

SUBJECT TITLE	Architectural Design Studio – IV	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR501	L	T	P	6
SUBJECT CATEGORY	LC	0	0	9	

OBJECTIVE

The study of design shall continue with further progress and complexity in aesthetic qualities with more emphasis on architectural and functional aspects. The semester will focus on studying functional patterns in horizontal and vertical circulation for double storied framed structures with application of services. The design project will involve complexities like site restrictions and introduction to basic byelaws. The subject will be integrated with Art Appreciation, BMC, Contemporary History, Site Planning and Landscape Architecture, Electrical and Illumination, Concrete Structures. There will be at least two design problems, one major and one minor, arranged in sequence leading to more and more complexity. The faculty can take up the exercises as per their order of preference. The order should be common in both sections. The faculty may achieve the stated minimum outcomes using appropriate strategies. Suggestive Typologies: school, nursing home, hostel, homestead, motel

COURSE CONTENT

Module 1:

Module Content

- This stage will involve at least two projects- one major and one minor in continuation with the previous semester in an increasing order of complexity with considerations relating to horizontal and vertical circulation to a double storied framed structure.
- Introduction to byelaws with site restrictions is also initiated at this stage. Functional aspects of building services like drainage, water supply and electricity with structural concepts in the design will be a major part of the exercise. Site Planning and Landscape intentions shall also be involved in related stages of the design process.
- The student will study and collect data using case studies through literature reviews, site visits and gathering of data/ information through literary sources. The project outcome / design solutions will be in the form of sheets, elevations- sections, perspective views, etc.

Module 2: Presentation of the previous module

Module Contents

- 1. Documentation of historical- socio- cultural information,
- 2. Use of locally available materials leading to construction techniques in elements of built forms and in response to the climate of the region.

- 3. Structural System in the built forms
- 4. Identification of possible design intervention in the region/ settlement.

Module 3: Design Intervention in the Region mentioned in the above modules

Module Contents

- Justification of the Design Intervention
- Conceptual Design
- Design development/ Form Development
- 4. Presentation/ Crits

Module 4: Introduction to the Design Problem, Site study and Area Programming

Learning Resources / References & Learning Strategy

- Lecture/ Presentation/ Creative Exercise by the Instructor
- Precinct studies through literature reviews and gathering of data through literary sources
- One to one as well as group discussions between students and instructors.

Module Contents

- Introduction to the Design Exercise/ Problem
- Site Visit and Site Analysis
- Case studies
- Collecting relevant data for the given design problem
- Synthesizing and Analyzing the above data
- Deriving Area Requirements for the Design Exercise

Module 5: Design Development

Module Contents

- Relation to various functional aspects of the design problem: Use of bubble diagrams, flow diagrams, zoning of site, etc.
- Conceptual Design
- 3. Finalization of design proposals: schematic 2D/ 3D / single line/ conceptual level site plan, floor plan, elevations and sections should be finalized

Module 6: Final Design Proposals

Learning Resources / References & Learning Strategy

- Lectures leading to generation of multiple concepts and design solutions can be given/ introduced through creative exercises. Input in the form of lectures/ presentations/ movies/ videos/discussions/etc. related to special issues can be given by the design instructor.

Module Contents

1. Final developed to- scale drawings- site plan, plans, elevations, sections, elevations
2. Facilitation to the floor plan for justification of provided spatial proposals
3. Detailed Site Plan with built and un-built spaces and landscaping features
4. Development of views and construction details
5. Model of the proposed design

REFERENCES

1. Baiche, B. and Walliman, N. (2012). Neufert Architects Data, 4th Ed. Oxford: Wiley-Blackwell.
2. Chiara, J. D. and Michael, J. C. 2001. Time Savers Standards for Building Types. Singapore: McGraw Hill Professional.
3. Gauzin-Muller, D. (2002). Sustainable Architecture and Urbanism: Concepts, Technologies, Examples. 1st Ed. Basel: Birkhauser Verlag AG.

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SUBJECT TITLE	Working Drawing – I	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR502	L	T	P	4
SUBJECT CATEGORY	LC	0	0	6	

OBJECTIVE

Explanation and demonstration of basics in working drawing study of process and symbols of working drawings.

Building construction drawings to be prepared as a part of contract document with proper labelling and dimensioning techniques.

Working drawing to be made of one building in a complex chosen from earlier design projects carried out in the 4th semester.

COURSE CONTENT

Topics	A1 size sheet
• Layout plan of the whole complex and excavation plan of one building	2
• Foundation plan	1
• Ground floor plan along with schedule of internal finishes	1
• Upper floor plans along with schedule of internal finishes	Minimum 1 [*as required]
• Terrace/ roof plan including roof drainage	1
• All 2 side elevation with labelling of one building	1
• External finishes of all types included in the complex; the drawings shall include all details required	1
• Minimum 3 sections including one through staircase and toilets and one skin section showing required detailing	2
• Door window schedule to be prepared for the undertaken building	2

Minimum of 11 sheets to be done in the semester.

REFERENCES

1. Building and Construction Authority. (2005). CONQUAS-21. Singapore : The BCA Construction Quality Assessment System.
2. Jefferis, A. and Madsen, D.A. (2005). Architectural Drafting and Design. 5th Ed. New York : Thomson Delmar Learning.
3. Joe, B. (Ed). (2002). Details in Architecture: Vol. I-V. Victoria : The Images Publishing group.
4. Osamu, A. W., Linde, R. M. and Bakhoun, N. R. (2011). The professional practice of architectural working drawings. 4th Ed. Hoboken : John Wiley & Sons.
5. Weston, R. (2004). Plans Sections Elevations – Key buildings of the twentieth century. London : Laurence King Publishing.

SUBJECT TITLE	Interior Design Studio	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR503	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	
OBJECTIVE					
<ul style="list-style-type: none"> • The subject Interior Design is a specialized course offered in architecture which deals with functionality, safety and provides an aesthetically pleasing space for users. This semester will deal with minute details and construction techniques involved in interior design. • The subject may have product design aspects related to interior design. The subject is integrated to subjects like Design, Graphics, Art Appreciation, BMC and CAD. • The subject will also be integrated with a small component of design exercise with the current or any of the previous semester design works. • The course will include one or several exercises in relation to site visits, market surveys, presentations, reports, etc. 					
COURSE CONTENT					
Module 1: Principles Of Interior Design					
Learning Objectives					
<ul style="list-style-type: none"> • To understand the elements and principles of design. • To learn its application in interior design • To identify the design principles in case studies 					
Learning Resources / References & Learning Strategy					
<ul style="list-style-type: none"> • Inside Today's Home, by Faulkner, S. and Faulkne. R, (1987), Rinehart publishing company, New York. • The complete Home Decorator by Caroline Clifton et. al., - Portland House New York. • Warm up exercises in sheets, group discussion, comparison of case studies 					
Module Contents					
<ul style="list-style-type: none"> • Development of interior design concepts - a historic review. • Design –Definition, meaning, purpose, Types - Structural and decorative characteristics, • classification of decorative design - Naturalistic, conventional, geometric, abstract, historic, • biomorphic • Elements of design - Line and direction, form and shape, size, colour, light, pattern, texture • and space - application of elements to form designs. 					
Module 2: Ergonomics					
Learning Objectives					
<ul style="list-style-type: none"> • To enable the students to gain knowledge on importance of ergonomics in work • Effectiveness. • Design work areas using ergonomic principles. 					
Learning Resources / References & Learning Strategy					
<ul style="list-style-type: none"> • Motion and Time Study, Design and Measurement of work by R.M Barnes- John Wiley (1980), New York. • Housecraft – Principles and Practices by Borgert, E. (1982), Issac Pitman, London. • Occupational Biomechanics by Chaffin, D.B. and Anderson, G.B.J. (1984), John Wiley, New York. 					

- Biomedical Instrumentation and Measurements by Cromwell, L. Weibell, F.J. and Pfeirffer, E.A. (1991), Prentice Hall, New Delhi.
- Project work

Module 3: Materials and Construction Techniques

Learning Objectives

- Know the various materials used in construction.
- Understand the methods of interior construction techniques.

Learning Resources / References & Learning Strategy

- Water supply and sanitary Engineering by S.C Rangawala - Charter publishing house, Roorkee.
- Interior Design Principles and practice by Pratap R.M (1988)- Standard publishers distribution, Delhi.
- Market survey, presentations, site visits, reports

Module Contents

- Building materials and finishes
- An introduction to various construction techniques in interiors
- Details of doors, windows, cupboards, partitions and joineries
- Soft furnishings – Meaning, Importance – relationship of furnishings with space, selection and use of furnishings – functional and decorative.

Module 4: Colour and lighting

Learning Objectives

- To enable the students to
- Learn the concepts of color
- Learn the concept of lighting.

Learning Resources / References & Learning Strategy

- Inside Today 's Home by LuAnn Nissen, Ray Faulkner, Sarah Faulkner(1987),- Rine hart publishing company, New York.
- Colour:How to see, how to paint it by Judy,M.,(1994)
- Lighting for a beautiful Home by Jan Orcharchd (1993)- Dunestyle publishing Ltd.,U.S.A.
- Interior Design and Decoration by Seetharam, P and Pannu, P- CBS publishers and distributors, New Delhi.
- The Complete Home Decorator by Stewart and Sally .W., (1997)- Annes publishers Ltd. ,New York.
- Specific case studies in restaurants, shopping malls, museums, cultural centres and theatres

Module Contents

- Concept of colour - significance of colour in the interiors and exteriors-Dimensions of colour
- Hue, value, intensity, Effects of Hue, value and Intensity.
- Application of colour harmonies in the interiors and exteriors –Effects of light on colour,
- Illusion of colour, psychology of colour, effect of colour on each other.
- Importance of lighting – Lighting in interiors – importance, classification based on sources, uses, illumination, factors to be considered in lighting for different areas of house. Artificial lighting - light sources, types and uses of light, specific factors in lighting – measurements of lighting and economy in lighting, Psychological aspects of light, Avoidance of glare – Glare its types and prevention.
- Lighting accessories – Selection of lamps and lighting fixtures, lighting for various areas and specific activities, modern features in lighting design.

Module 5: Services in Interiors

Learning Objectives

- To enable the students to
- Understand the importance of environment control in interiors.

- To acquire knowledge on heating and cooling system.

Learning Resources / References & Learning Strategy

- Building construction by S.C. Rangawala- Charter publishing house, Anand 1963.
- Interior design principles and practice by R.M Pratap - Standard publisher's distribution, Delhi.1988
- Theory, site visits, application in exercises

Module Contents

- Mechanical and sanitary services – Mechanical systems - Lifts and Escalators. Sanitary services - Water supply within buildings, drainage system for residence, sanitary apparatus.
- Acoustics- Definition, requirements of good acoustics, Sound absorption- sound absorbent materials, qualities of acoustic materials, guidelines for good acoustical design.
- Air conditioning - Principles of air conditioning system, types of air Conditioning, application in building like apartments and guest rooms, libraries, museums and hospitals, estimation of air conditioning
- Electrical services – Electrical system, symbols used, three phase and single phase system, simple electrical layouts, how electrical fixtures are used to enhance interiors
- Ventilation- definition, importance, types of ventilation-natural and mechanical, guidelines for natural ventilation.
- Ducting and Panelling, False ceiling
- Estimating – Definition of estimates, types, unit and mode of measurement, quantity surveying – systems adopted, analysis of rates, schedule of items, schedule of rates, schedule of quantities.

Module 6: Furniture in interiors

Learning Objectives

- Sketch using freehand techniques
- Draw views demonstrating the play of light and shadows.
- Demonstrate use of various presentation mediums

Learning Resources / References & Learning Strategy

- Introduction to Home furnishings, Stepat, D.D, (1971)- The Mac Millan Co, New York.
- Contemporary decorating by Wilhide, E and Cope stick, I. (2000)- Conran Octopus Ltd. London.
- Living rooms by Levine M (1998)- Rockport publishers, USA.
- Inside Today's Home by LuAnn Nissen, Ray Faulkner, Sarah Faulkner (1987),- Rine hart publishing company, New York.
- Textbook of Home science, by Mullick.P, (2000) - Kalyani publishers, New Delhi.
- Theory, site visits, application in exercises

Module Contents

- Techniques Colouring of architectural presentation drawings in various medium
- Monochromatic shades, Shades and shadows in multi-coloured drawings

REFERENCES

1. Ching, F. D. K. (1987). Interior Design Illustrated. New York : V.N.R. Publications.
2. Doshi, S. (Ed.) (1982). The Impulse to adorn - Studies in traditional Indian Architecture. Marg Publications.
3. Kathryn, B. H. and Marcus, G. H. (1993). Landmarks of twentieth Century Design. Abbey Ville Press.
4. Pendero, J. and Zelnik, M. (1979). Human Dimension and Interior space: A Source Book of Design Reference Standards. Newyork : Whitney Library of Design.
5. Slesin, S. and Ceiff, S. (1990). Indian Style. New York: Clarkson N. Potter.
6. Dorothy, S-D., Kness, D. M., Logan, K. C. and Laura, S. (1983). Introduction to Interior Design. Michigan : Macmillan Publishing.

6th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR601	Vernacular Architecture	3	0	0	3	30	70		100
2	PC	UPCAR602	Landscape Design and Site Planning	3	0	0	3	30	70		100
3	ES	UESAR603	Building services – IV : HVAC	3	0	0	3	30	70		100
4	ES	UESAR604	Specification, Cost Estimation & Budgeting	3	0	0	3	30	70		100
5	PC	UPCAR605	Principles of Town Planning	3	0	0	3	30	70		100
6	LC	ULCAR601	Architectural Design Studio – V	0	0	9	6	50		50	100
7	LC	ULCAR602	Working Drawing – II	0	0	6	4	50		50	100
8	LC	ULCAR603	Landscape Design Studio	0	0	3	2	50		50	100
Total				15	0	18	27				800

SUBJECT TITLE	Vernacular Architecture	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR601	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	
OBJECTIVE					
<p>Efforts and activities related to promotion of Sustainable Architecture are underway, and this can be reinforced with the knowledge of Vernacular Architecture. Odisha has a rich treasure of vernacular architecture. The objective is to instill sensitivity towards the less explored field that is concerned with Architectural building traditions/practices that are cost effective, ecologically sensible and culturally relevant. Students acquire a working vocabulary that can help them describe vernacular architecture in meaningful ways. The course introduces grass root principles of indigenous architecture that has evolved over time in response to environment, climate, culture, economy and basic human needs. The course covers variations in built forms and their environmental performance across different climatic and geographical regions of India with more emphasis to Odisha. Cases studies of adaptations of vernacular architecture in contemporary buildings are also covered in the syllabus.</p>					
COURSE CONTENT					
<p>Module 1 INTRODUCTION TO VERNACULAR:ARCHITECTURE Definitions and theories, Categories, Contextual responsiveness: Climatic, Geographical, Anthropological and Cultural influences</p>					

Module 2 ENVIRONMENT AND MATERIALS: Typical building materials, Built form and elements, Construction technique and Environmental performance

Module 3 REGIONAL VARIATIONS IN BUILT FORM: TRIBAL ARCHITECTURE

AR443 Vernacular Architecture HRS 3-0-0 CR-3

Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Construction materials and techniques Andhra Pradesh, Madhya Pradesh, Odisha (Kondha and Santals)

Module 4 REGIONAL VARIATIONS IN BUILT FORM: RURAL ARCHITECTURE Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Construction materials and techniques Eastern Region Odisha – Rural houses of the coastal and inland areas; Bengal –Rural house form- AatChala houses, Thakur Bari (Mansions in North Kolkata). Western Region Rajasthan- Rural Jat houses for farming caste and Bhungas (Circular Huts) and Havelis; Gujarat- Deserts of Kutch, Pol houses of Ahmedabad, Wooden Havelis; Southern Region Kerala – Nalukettu, Houses of Nair & Namboothri community, Koothambalam; TamilNadu – Toda Huts, Chettinad Houses (Chettiars); Andhra Pradesh –Rural Kaccha house Northern Region Kashmir – Typical Kutcha houses, Dhoongas(Boathouses), Ladakhi houses, bridges; Himachal Pradesh – Kinnaur houses

Module 5 EXMPLES OF ADAPTATIONS IN CONTEMPORARY ARCHITECTURE: (To be decided by subject teacher) Examples - Works of Laurie Baker, Hasan Fathy, Anil Lal, Gerard Da Cunha, Building Centres- Auroville, Anangpur, Nizamuddin Building Centre Basics of Architectural Heritage Conservation

REFERENCES

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.
4. Ilay Cooper and Barry Dawson. Traditional buildings of India, Thames and Hudson Ltd., London. 1998.
5. Frampton, Kenneth. Towards a Critical Regionalism: Six points for an architecture of resistance, In The Anti-Aesthetic: Essays on Postmodern Culture. Edited by Hal Foster. Seattle, WA: Bay Press. 1983.
6. V.S. Pramar. Haveli- Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad. 1989.
7. Kulbushanshan Jain and Minakshi Jain. Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad. 1992.
8. G.H.R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi. 1989.
9. Carmen Kagal, VISTARA – The Architecture of India, Pub: The Festival of India, 1986.
10. S. Muthiah and others: The Chettiar Heritage. 2000
11. House, Form & Culture, Amos Rappoport, Prentice Hall Inc, 1969.

SUBJECT TITLE	Landscape Design and Site Planning	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR602	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	
OBJECTIVE					
<ul style="list-style-type: none"> • To define site planning process and identify basic principles and list them. To classify historical gardens and identify their characteristics. 					

- To illustrate the different processes of site study and its application.
- To classify natural and man-made elements, list them, identify their use and infer their application.
- To design, develop and prepare landscape plan.

COURSE CONTENT

Module 1: Introduction to Site Planning Process: Need, Definition, scope and relationship in between Site planning & Landscape Arch. Basic principles of landscape design.

Module 2: Evolution of Garden Design: Origin of the concept of garden. A brief study of different garden types: Egyptian, Mesopotatmian, Persian, Mughal gardens, Indian Vedic Gardens, Japanese gardens, Chinese Gardens, French Gardens, Renaissance Gardens, English Gardens.

Module 3: Site Analysis: Site study and analysis of all natural and man-made factors of site like site-topography and slope, soil, hydrology and drainage, vegetation, climate and visual analysis.

Module 4: Natural Elements of Landscape: Landforms- soil dynamics, rock, water, vegetation. Plant types, characteristics, structure and colour. Climate and their role in landscape design.

Module 5: Manmade Elements of Landscape: Hard and soft landscaping, garden furniture, lighting fixtures, signage and sign boards, fences, garden hardware and surface treatment, paving materials, surface drainage, artworks, planters, garden shelters, artificial rocks, plants and waterfalls.

Module6: Modern gardens: Rock garden, terrace garden, Indoor garden and other Contemporary thoughts of landscape.

Module 7: Guidelines for different landscape situations: The interconnection of areas, nodes, circulation, passive and active recreation spaces, and aesthetics in Residential parks, Industrial zones, Commercial areas and tot lots.

REFERENCES

1. Charles W. Harris & Nicholas T. Dines; Time Saver Standards for Landscape Architecture
2. Kevin Lynch ;Site planning ;MIT Press, Cambridge, MA – 1967
3. J. O. Simonds; Landscape Architecture; McGraw Hill.
4. J. E. Ingels; Landscaping – Principles and Practice.
5. P. Walker, Theodre D; Planting Design.

SUBJECT TITLE	Building Services – IV : HVAC	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR603	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	

OBJECTIVE

- To differentiate between Natural Ventilation and Mechanical Ventilation.
- To identify the factors responsible for comfort conditions.
- To define the different Psychrometric Processes.
- To identify the factors responsible for cooling load calculation.
- To classify different types of Air Conditioning systems and their suitability for different psychrometric conditions.

- To identify different Air Conditioning equipment and their suitable location in buildings.

COURSE CONTENT

Module 1 Introduction & Mechanical Ventilation –

- Mechanical Services required in Buildings, - Role of an Architect regarding mechanical Services. - The scope and impact of Mechanical system- Impact of space planning, - Impact on Architectural Design - Impact on High rise Bldg. - Impact on construction cost - Impact on Global environment. - Standard requirements of ventilation for different conditions of living and works. - Conditions for comfort, - Control of quality, quantity, temperature and humidity of air.

Module 2 Psychrometric-

Introduction, meaning of air conditioning, - Different psychrometric properties, - Psychrometric processes, - Psychrometric chart & its application, - Summer air conditioning system, - Winter air conditioning system,
- Year round air conditioning system, - Cooling load Calculation

Module 3 Air –Conditioning: Cooling Systems

Air Distribution Systems – Natural & Mechanical ventilation systems, Supply, Return and Recirculation Ducts.

Indoor air quality and Air Filters.

Thermostats and Humidistat. Centrifugal blowers and Exhausters.

Different types of air-conditioning systems. Window, split, duct able AC, etc.

Introduction to central air conditioning systems.

Understanding 2 pipe & 4 Pipe CV and VAV systems. Chilled Air and Water systems, Spatial requirement of HVAC plants and duct layout.

Module 4 Air –Conditioning: Heating Systems

Space Heating: Conventional & Unconventional Heating systems, Radiant panel and Hydronic Heating systems. Passive heating and cooling techniques, Green heating systems.

Air Conditioning Equipment -

-Major equipment used in Air conditioning - their characteristics & suitable place for location, consideration for reduction of heat gain and economic layout of supply and return air ducts. - Schematic drawings showing the Air conditioning system of an office building, hotel, auditorium etc.

REFERENCES

Arora & Duinkand,; “Text book of Refrigeration & Air conditioning”

Bovay, H. E. (1981). Handbook of Mechanical & Electrical systems for Buildings. McGraw-Hill Higher Education.

Architectural Graphic Standard (HVAC System)

National Building code.

William.K.Y.Tao; “Mechanical and electrical Systems in Buildings”

V.P.Lang, “ Principles of air conditioning”

Ambrose, E.R. (1968). Heat pumps and Electric Heating, John and Wiley and Sons Inc, New York.

Handbook for Building Engineers in Metric systems (1968), NBC, New Delhi.

William H. Severns and Julian R. Fellows. Air conditioning and refrigeration. John Wiley and sons, London
Khurmi, Gupta & Arora. Refrigeration and Air Conditioning, S Chand & Co.

SUBJECT TITLE	Specification, cost estimation & budgeting.	CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR604	L	T	P	3
SUBJECT CATEGORY	ES	3	0	0	
OBJECTIVE					
<ul style="list-style-type: none"> • To differentiate between the general specification and detailed specification. • To write the detailed specification of different items of work • To define different types of estimates and their suitability to different types of works. • To distinguish between the approximate estimates and the detailed estimate • To identify the different units of measurement for different items of work. • To calculate the quantity of different items of work using various methods of estimating. • To calculate the rate for different items of work • To classify different types of tenders/contracts • To prepare BOQ for item rate contract 					
COURSE CONTENT					
Module: 1					
General Specification					
Definition of specification, need of the specification. General specification and Detailed Specification Types of Tender / contract and the reflection in BOQ. Writing Items for BOQ for Item rate contract. Definition of "Building estimate". Purpose of Estimating.					
Module: 2					
Different Types of Estimate.					
APPROXIMATE ESTIMATE: Importance & purpose of Approximate / Rough estimation. Different methods of approximate estimate. DETAILED ESTIMATE: Preparation of Detailed estimate. Function of "Measurement form" & "Abstract of estimate form". Description & significance of Item in BOQ.					
Module: 3					
METHODS OF MEASUREMENT OF WORKS. Different methods of estimating building works. Estimation of a simple building at different stages: Foundation up to plinth, Superstructure, Finishing works. REINFORCEMENT QUANTITIES FOR RC WORKS. Calculation of quantity for Reinforced concrete (RC) for: Column, Lintel, Slab & Beam.					
Module: 4					
ANALYSIS OF RATE & QUANTITY OF MATERIALS: Purpose of Rate analysis. Quantity of Materials. Different components of rate					
REFERENCES					

- M. Chakraborty; Estimating, Costing, Specification & Valuation
- B.N. Dutta; Estimating & Costing
- D.D.Kohli & R.C.Kohli ; A Text Book of Estimating and Costing

SUBJECT TITLE	Principles of Town Planning	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR605	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

The subject is designed to have an overview on the vocabulary of Human settlements. To understand the various elements, classifications and typology of Human Settlements. To familiarize the students with Planning concepts and process in Urban and Regional Planning. To familiarize the students with the process of evolution of cities, concepts related to humanitarian planning processes and skill development to identify planning issues in existing areas and develop solutions at basic levels. The subject will be taught in congruence with the Design studio and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

COURSE CONTENT

Module 1: Introduction to Settlement Planning

Module Contents

- Evolution of human settlements- man, environment and built structure. Community and settlement patterns. Characteristics of settlements. Growth patterns
- Ancient rural and urban settlements
- Settlement patterns and birth of early and medieval cities.
- Renaissance and High Baroque cities
- Factory and Company towns.

Module 2 : Settlement Planning and Design of Cities in Ancient and Medieval India

Module Contents

- Town planning as per Vastu-shashtra.
- Landscaping and measurement practises as per Manasara.
- India during Medieval period.

Module 3 : Introduction to Town Planning and Design of Cities

Module Contents

- Definitions related to Planning, levels of planning, scope and components.
- Types of planning, elements and scope.
- Characters of a town, census definition of urban area, densities of town.
- Constituents of town/city.

Module 4 : Town and Urban Planning Concepts

Module Contents

- Evolution of Planning concepts : City beautiful movement, Garden cities, Radburn city and neighborhood concept

- Theories related to growth and decay of settlements- Luis Mumford, Geddesian triad, Ekistics.
- Utopian Planning theories-Linear city- Tony Garnier, Soriya Y Mata. Planning concepts by Le Corbusier and FLW.

Module 5: Planning Framework and Process for Various Development Plans

Module Contents

- Planning process, components and techniques- survey techniques and data collection methods
- Concept of master plan, its elements, preparation and implementation
- Perspective plans, structure plans, advocacy plans, zonal plans
- Participatory and inclusive planning

Module 6: Problems and Issues of Towns and Settlements

Module Contents

- Identification of planning problems of land use distribution and change, communication system, overcrowding.
- Informal growth- slums, blighted areas.
- Sporadic growth and conurbation, primacy, traffic.
- UDPFRI Guidelines, MoUD laws, Zoning and developmental controls.

Module 7: Case Study of Existing Settlement

Module Contents

- Case studies of planned cities of the world-New Delhi, Chandigarh, Jaipur, Bhubaneshwar, Bhilai, Bokaro, port town, Brasilia, Islamabad
- Hands-on Exercise on local area planning. (Survey, Documentation , Interpretation, Proposal development)

REFERENCES

- An Introduction to the Science of Human Settlements by C.L.Doxiadis; Ekistics Hutchinson, London, 1968.
- Housing and Urban Renewal by Andrew D.Thomas, George Allen and Unwin; Sydney, 1986.
- Ministry of Urban Affairs and Employment; Government of India, New Delhi,1999
- Urban Development Plans: Formulation & Implementation; Guidelines, 1996.
- Master Plan for Madras Metropolitan Area; Madras Metropolitan Development Authority, Second Master Plan, 2007.
- Report of the National Commission on Urbanisation; Government of India 1988.
- Regional Policy and Regional Integration by N. Hansen; Edward Elgar, UK, 1996.
- Sustainable Human Settlements by R. S. Sandhu; Asian Experience, Rawat publications, 2001.
- Living Plans: New concepts for advanced housing by P. Gastek; Brikhauser publications, 2005
- URDPFI Guidelines Vol I-2014
- URDPFI Guidelines II A-II B-2014

SUBJECT TITLE	Architectural design studio – V	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR601	L	T	P	6
SUBJECT CATEGORY	LC	0	0	9	
OBJECTIVE					
The studio emphasis shall be on creative and rational skills for problem solving, preferably on a					

contoured site. Design-problem may focus but not limited to a multi-functional, service (advanced services) oriented building like housing, convention hall, shopping complex, resort, habitat centre, office building, mixed use occupancy buildings etc. in an urban setting including application of urban development, controls, codes and bye-laws.

Emphasis may also be laid on site planning as well as on advanced services at building and at site level. The focus would be on understanding how to design for an urban setting.

There would be minimum one major and one minor exercise/project based on the module contents. The modules may be taken up by the faculty in order of preference. The order should be common in both sections of same year. The faculty may achieve stated minimum outcomes using various strategies and approaches.

There may be integration of design with structural and construction details, for this, the project should be integrated with the structures and building construction classes. One set of detailed working drawings must also be generated at the end of the design process. Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work.

COURSE CONTENT

Module 1:

- Value various indigenous and latest building materials. (LO-1)
- Demonstrates architectural and structural vocabulary through verbal and written communication (LO-2)
- Questions conventional technology, structural system and materials.(LO-3)

Module Contents

- This module can be started with a warm-up exercise/ literature review (group or individual). Students could be sensitized (social-cultural sensitization) through documentary/ movies/ photos etc.
- Students may visit site for collecting context specific data for getting better understanding of real- life project details. The collected data may be analyzed and presented for evaluation.
- The above mentioned module teaching methods are suggestive. Faculty may choose other pedagogical approaches for design thinking process.

Module 2,3:

- Develop sensitivity towards building bye laws.(LO-4)
- Apply services learnt in previous semester to design project at building and site level. (LO-5)
- Build with precision block models, study models, site models (LO-6)

Module Contents

- Design Problem may be introduced by the faculty using linear design approach or hidden-curriculum or other design teaching models can be adopted for defining the design problem. • Readings/ short movies/ Discussion on designers' philosophies could be initiated for idea generation. Further approaches for design iterations may involve more common techniques like Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, try and re-create for analysing spaces in all dimensions through Block Models and single line graphics and study models for choosing the right option.

Module 4,5:

- Apply services learnt in previous semester to design project at building and site level. (LO-5)
- Build with precision block models, study models, site models (LO-6)
- Participating in team activities (LO-7)
- Forms correlation between design and other subjects studied in previous semesters and till present (LO-8)

- Communicate through drawings or models methods developed to meet various requirements (LO-9)

Module Contents

- Students may integrate the knowledge gained from previous theory based subjects (like building services mathematics for architecture, building materials and construction, structures etc.) and apply in their design during design development/ detail stage.
- It is preferable if the students communicate the application of all services in their design.
- Students must make enlarged drawings showing all working details for superstructure.
- Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc.
- Summative assessment of the studio work could be achieved through panel discussion, presentation, peer review, public review, criteria based evaluation etc.

REFERENCES

- National Building Code 2005
- Madhya Pradesh Bhumi Vikas Rules 2012
- Time Saver Standards for Architectural Design
- Architectural Standard- Ernst & Peter Neufert- Architect's Data

SUBJECT TITLE	Working drawing – II	CONTACT HOURS			CREDITS
		L	T	P	
SUBJECT CODE	ULCAR602	0	0	6	4
SUBJECT CATEGORY	LC				
OBJECTIVE					
Building construction drawings to be prepared as a part of contract document with proper labeling and dimensioning techniques.					
Working drawings to be made in continuation of Working Drawing I for the building complex chosen earlier in Working Drawing I.					
Prerequisites: Working Drawing I, Architectural Detailing.					
COURSE CONTENT					
Topics					A1 size
sheet					
• Details of toilets including plan, elevation, sections of it					2
• Details of kitchen including plan, elevation, sections of it					2
• Layout of sanitary and plumbing lines on site and connection with the main sewer/ septic tank					1
• Designing and detailing of septic tank and soak pit and a typical G.T., I. Chamber etc.					1
• Electrical layout of a typical floor including specification of fixtures					1
• Detail Flooring Plan and internal Finishing Plan					1
• Specific details required in the building complex, eg, Special carpentry detail, Metal finish detail, etc					1
• Municipal submission drawings					2
Minimum of 11 sheets to be done in the semester.					
REFERENCES					
1. Building and Construction Authority. (2005). CONQUAS-21. Singapore : The BCA Construction Quality Assessment System.					

2. Jefferis, A. and Madsen, D.A. (2005). Architectural Drafting and Design. 5th Ed. New York : Thomson Delmar Learning.
3. Joe, B. (Ed). (2002). Details in Architecture: Vol. I-V. Victoria: The Images Publishing group.
4. Osamu, A. W., Linde, R. M. and Bakhoun, N. R. (2011). The professional practice of Architectural working drawings. 4th Ed. Hoboken: John Wiley & Sons.
5. Weston, R. (2004). Plans Sections Elevations – Key buildings of the twentieth century. London : Laurence King Publishing.

SUBJECT TITLE	Landscape design studio	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR603	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	
OBJECTIVE					
<ul style="list-style-type: none"> • To identify and infer challenges from existing landscape • To interpret the functional aspects. To design, develop and prepare landscape plan. • To develop written communication skills. 					
COURSE CONTENT					
<ol style="list-style-type: none"> 1. Introductory exercises in Art, Architecture & Landscape-using basic principles of landscape. 2. Critical –Appraisal of Urban and Rural Landscape. 3. Site Planning & Landscape Analysis for medium sized sites (up to 2 Ha) 4. Landscape Design of small recreational or civic spaces. 5. Preparation of Project report. 					
REFERENCES					
<ol style="list-style-type: none"> 1. Charles W. Harris & Nicholas T. Dines; Time Saver Standards for Landscape Architecture 2. Kevin Lynch ;Site planning ;MIT Press, Cambridge, MA – 1967 3. J. O. Simonds; Landscape Architecture; McGraw Hill. 4. J. E. Ingels; Landscaping – Principles and Practice. 10. P. Walker, Theodore D; Planting Design 					

7th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR701	Housing and Community Planning	3	0	0	3	30	70		100
2	PC	UPCAR702	Urban Design	3	0	0	3	30			100
3	PC	UPCAR703	Disaster Resistant Architecture	3	0	0	3	30			100
4	PC	UPCAR704	Energy Efficient Architecture	3	0	0	3	30			100
5. ELECTIVE – I				3	0	0	3	30	70		100
	PE	UPEAR701	Inclusive Design								
	PE	UPEAR702	Industrial Architecture								
	PE	UPEAR703	Pre-fabrication and Modular Coordination								
6	LC	ULCAR701	Architectural Design Studio – VI	0	0	9	6	50		50	100
7	LC	ULCAR702	Architectural Details	0	0	3	2	50		50	100
8	LC	ULCAR703	Structural Drawing and Details	0	0	3	2	50		50	100
Total				15	0	15					800

SUBJECT TITLE	Housing and Community Planning	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR701	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

- To select different types of housing and methods of delivery for housing schemes
- To explain the issues involved with changing contextual policies for housing and generalise the new directions of opportunities
- To analyse the different factors affecting the housing market
- To assess housing shortage and decide criteria for selection of land for development in order to bridge the gap in a settlement/ part of a settlement
- To analyse the nature and causes of growth of deficient housing / slums and identify differentiated needs across income categories
- To explain the significance of current slum related contextual programmes, identify scope of improvement and formulate slum improvement schemes

- To evaluate and apply the settlement plan provisions affecting the housing delivery and development
- To apply the standards, norms and statutory regulations affecting the housing development and design of housing neighbourhoods
- Parametric assessment of housing quality.

COURSE CONTENT

Module 1: Introduction to Housing

- 1.1 Definition & concept of Housing
- 1.2 Types of Housing: Detached, semi-detached, row, town house, apartment, Farmhouses etc.
- 1.3 Form of Housing provision: Plotted, Group Housing, Cooperative, Self Help, Leasehold, Freehold / Condominium, Rental Housing etc.
- 1.4 Special Housing types: Barrier free, Mobile homes, congregate housing for assisted living, disaster housing, Student & public housing, Guest house, Night shelters, Incremental Housing etc.

Module 2: Housing Scenario & Housing Finance

- 2.1 Housing situation in India: an overview
- 2.2 Census classification of houses, Computation of Housing Shortage
- 2.3 Housing Finance: Formal & Informal Housing Finance Markets, Mobilization of Savings, Sources of Capital & Institutional Finance
- 2.4 Housing Micro-finance for Poor: Issues & Constraints
- 2.5 Housing Need vis-à-vis Demand, Public vis-à-vis Private Sector

Module 3: Housing & Urban slums

- 3.1 Understanding the causes of growth of Slums, Squatter settlements & Urban sprawl
- 3.2 Types and generic characteristics of slums
- 3.3 An overview of measures & approaches to slums & squatter settlements
- 3.4 Objectives of National Slum Policy (2002)
- 3.5 Concept of few schemes e.g.: Site & Services, EIUS, BSUP, VAMBAY, IHSDP

Module 4: Affordable Housing, new trends & Housing Policy

- 4.1 Components of Housing Cost & approach for affordable housing
- 4.2 Characteristics of Urban housing vis-à-vis Rural housing
- 4.3 Goals, Objectives & contents of National Housing & Habitat Policy (2007)
- 4.4 Examples of housing schemes & programmes e.g., IAY, IHSDP etc.
- 4.5 Trends in Housing Design

Module 5: Urban Settlement Planning System & Processes

- 5.1 Recommended Planning system & inter-related plans
- 5.2 Scope, purpose & inter-relationship of various plans
- 5.3 Plan formulation process
- 5.4 Public sector & private sector actions & concept of joint venture
- 5.5 Contents of a Development plan

Module 6: Norms & Standards for Urban & Housing Development

- 6.1 Town & Residential density, FAR, Different types of codes/ norms affecting settlement development planning,
- 6.2 Land –use Classification & compatibility of uses (e.g., compatible uses in residential zone)
- 6.3 Factors affecting space standards / land requirements for facilities
- 6.4 Land area requirement for different uses in a town & for community facilities in a sector/ residential planning area

6.5 Design Considerations based on subdivision norms / regulations

Module 7: Concept of Neighborhood & Housing Quality Indicators

7.1 Concepts of cluster, Blocks & Neighborhood

7.2 Neighborhood planning principles & examples

7.3 Indicators and checklist for safe communities or neighborhoods

7.4 Housing Quality Indicators

REFERENCES

1. J.D.Chicara et al; Time Saver Standards For Housing & Residential Development.
2. Bawa R. L., Fernandes B. G.; Design for Living: A Guide for Planning of Residential Neighborhoods; Galgotia Publishing Company; N. Delhi
3. Ilay Cooper, Barry Dawson, Traditional Buildings of India
4. Modak& Ambedkar; Town & Country Planning & Housing
5. Poulouse K T(compiled); Reading Material on Housing; Institute of Town Planners, India; New Delhi; 2002
6. ITPI; Urban Development Plan Formulation & Implementation Guidelines; Ministry of Urban Development & Poverty Alleviation; Govt. of India
7. Charles Abrams; Housing in the third world

SUBJECT TITLE	Urban design	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR702	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

- Introducing Urban Design is important to understand the city as a context to architecture.
- Any building impacts the street and public space and is, in turn, constrained by the framework of urban building regulations.
- Designing the transition of the private space into the public realm and its articulation, determining the overall volume of built space and its form require an understanding of the complex urban fabric.
- The course is designed to explain the complex urban fabric through different dimensions.
- The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

COURSE CONTENT

Module 1: Introduction To Urban Design

Module Contents

- Importance of Urban Design
- Elements of Urban Design
- The Dimensions of Urban Design

Module 2: The Morphological Dimension

Module Contents

- Key Concepts – Land use , Building Structures, Plot Pattern, The Street Pattern
- The Public Space Network
- Buildings *In* Space and Buildings *Defining* Space
- Traditional Urban Space
- Urban block Patterns and Road Networks

- Pod Development
- The return to streets

Module 3: The Perceptual Dimension

Module Contents

- Human sensory perception of environment
- Meaning and symbolism in urban form
- Sense of Place and Placeless-nests
- Territoriality and personalization
- Place Identity
- Key Attributes of Successful places
- Invented places and Superficiality

Module 4: The Social Dimension

Module Contents

- Relationship between people (Society) and (Urban) space
- Necessary, Optional and Social activities
- The function of the Public Realm and its Decline
- The Physical and Socio Cultural Public Realm
- Neighborhood Unit- Size , Boundaries, Social relevance and Meaning, Social mixed and Balanced Communities
- Safety and Security
- Accessibility and Exclusion
- Equitable Environments

Module 5: The Visual Dimension

Module Contents

- Aesthetics Preferences
- Patterns and Aesthetic Order
- The Kinesthetic Experience
- Positive and Negative Space
- Streets and Squares
- Townscape and Urban Architecture
- Criteria for Harmonious Integration
- Hard and soft Landscaping
- Street Furniture

Module 6: The Functional Dimension

Module Contents

- Public Private Interface – Comfort, Relaxation, Passive & Active Engagement, Discovery
- Social use of Space
- Movement
- Privacy- Visual and Oral
- Land use, Density and Urban Form
- Environmental Design- Microclimate, Wind shading, Designing for Sun and Shade, Natural lighting, Parking, Servicing and Infrastructure
- Growth of Car free Streets and Squares

REFERENCES

1. Public Places-Urban Spaces: The Dimensions of Urban Design by Carmona, Matthew; Heath, Tim; Oc, Taner; Tiesdell, Steven; 2003; Architectural Press, Amsterdam, Boston,
2. Place and Placelessness by Relph, Edward; 1976;; Pion Ltd. , Brondesbury Park, London, NW2 5JN

SUBJECT TITLE	Disaster Resistant Architecture	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR703	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

In the face of climate change, occurrence of natural disaster has become more frequent, influencing livelihoods and existence of human civilization. In this context, this course is designed to provide an overview of the occurrence, causes and consequences of disaster and understanding of fundamental concepts and application of disaster resilient design. The first module introduces the scenario of hazards caused due to natural disaster and provides a brief insight to disaster mitigation and management. Two modules cover the causes, impact and performance of structures, retrofitting and strengthening of existing structures both for cyclone and earthquake exclusively. The other two modules deals with basic principles, simulation techniques, design considerations, adaptable building construction techniques, codes and practices separately for cyclone and earthquake resilient buildings.

COURSE CONTENT

Unit-I

Brief introduction to different types of natural disaster, Occurrence of disaster in different climatic and geographical regions, hazard (earthquake and cyclone) map of the world and India, Regulations for disaster risk reduction, Post disaster recovery and rehabilitation (socio economic consequences) - case studies.

Unit-II

Climate change and its impact on tropical cyclone, Nature of cyclonic wind, velocities and pressure, Cyclone effects, Storm surge, Floods, Landslides. Behaviour of structures in past cyclones and wind storms, case studies. Cyclonic retrofitting, strengthening of structures and adaptive sustainable reconstruction. Life-line structures such as temporary cyclone shelter.

Unit-III

Basic wind engineering, aerodynamics of bluff bodies, vortex shedding and associated unsteadiness along and across wind forces. Lab: Wind tunnel testing, its salient features. Introduction to Computational fluid dynamics. General planning/design considerations under wind storms & cyclones; Wind effects on buildings, towers, glass panels etc, & wind resistant features in design. Codal Provisions, design wind speed, pressure coefficients; Coastal zoning regulation for construction & reconstruction phase in the coastal areas, innovative construction material & techniques, traditional construction techniques in coastal areas.

Unit-IV

Causes of earthquake, plate tectonics, faults, seismic waves; magnitude, intensity, epicenter ,energy release and ground motions. Earthquake effects – On ground, soil rupture, liquefaction, landslides. Performance of ground and building in past earthquakes: Behavior of various types of buildings, structures, and collapse patterns; Behavior of Non-structural elements like services, fixtures, mountings- case studies. Seismic retrofitting- Weakness in existing buildings, aging, concepts in repair, restoration and seismic strengthening.

Unit-V

General Planning and design consideration; Building forms, horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration. Plan and vertical irregularities, redundancy and setbacks. Various Types and Construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, under-ground – overhead tanks, staircases and isolation of structures; innovative construction material and techniques; Local practices: traditional regional responses; Computational investigation techniques.

REFERENCES

1. Abbott, L. P. (2013). *Natural disasters*. 9th Ed. McGraw-Hill.
2. Aga Khan Award for Architecture. Ed. Shelter. (1996). *The Access to Hope*. AKDN, Istanbul and Geneva.
3. Agarwal, P. and Shrikhande, M. (2009). *Earthquake Resistant Design of Structures*. New Delhi: PHI Learning.
4. Alcantara, A. I. and Goudie, A. (2010). *Geomorphological Hazards and Disaster Prevention*. Cambridge : CUP.
5. Bankoff, G., Frerks, G. and Hilhorst, D. (2004). *Mapping Vulnerability: Disasters, Development and People*. London : Earthscan.
6. Burby, R. J. (1998). *Cooperating with Nature. Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*. Washington : Joseph Henry Press.
7. Christopher, A. and Reitherman, R. (1982). *Building configuration and Seismic Design*. JohnWiley & Sons Inc.
8. Dutta, S. C. and Mukhopadhyay, P. (2012). *Improving Earthquakes and Cyclone Resistance of Structures: Guidelines for the Indian Subcontinent*. TERI.
9. Dyrbye, C. D., Dyrbye, C. and Dyrbye, C. (1997). *Wind Loads on Structures*. John Wiley.
10. Foote, K. (2003). *Shadowed Ground: How Americans deal with Places of Tragedy*. Austin :University of Texas Press.
11. Holmes, J. D. (2007). *Wind Loading of Structures*. 2nd Ed. Taylor & Francis.
12. ICIMOD. (2007). *Disaster Preparedness for Natural Hazards: Current Status in India*. Kathmandu : ICIMOD.
13. Judy, L. B. (2012). *Climate change, Disaster Risk and the urban poor – cities building resilience for a changing World*. Washington DC : The World Bank.
14. Lee, B. Ed. (2008). *Hazards and the Built Environment: Attaining Built-In Resilience*. Oxon: Taylor and Francis.
15. McDonald, R. (2003). *Introduction to Natural and Man-made Disasters and their Effects on Buildings*. Burlington : Architectural Press.
16. Oxford University Press. (2000). *Confronting Catastrophe: New Perspectives on Natural Disasters*. London : OUP.
17. Singh, P. P. and Sharma, S. (2006). *Modern dictionary of natural disaster*. Deep & Deep Publications.
18. Smith, B. S. and Coull, A. (2001). *Tall Building Structures: Analysis and Design*. Willey–Inderscience.
19. Simiu E. and Scanlan R. H. (1996). *Wind Effects on Structures-Fundamentals and Applications to Design*. 3rd Edn., John Wiley.
20. Sinha, P. C. (2006). *Disaster Mitigation, preparedness, recovery and Response*. New Delhi : SBS Publishers.
21. Talwar, A. K. and Juneja, S. (2009). *Cyclone Disaster Management*. Commonwealth Publishers.
22. Taranath, B. S. (2004). *Wind and Earthquake Resistant Buildings: Structural Analysis and Design*. CRC Press.
23. Thomas, F. (2013). *Designing to avoid disaster: The Nature of Fracture-Critical Design*. London:

Routledge.

24. Pelling, M. (2003). *The Vulnerability of Cities: Social Resilience & Natural Disaster*. London :Earthscan.

25. U.N.D.P. (2004). *Reducing Disaster Risk: A Challenge for Development*. New York : UNDP.

26. World Bank. (2009). *Handbook for Reconstructing after Natural Disasters*.

SUBJECT TITLE	Energy Efficient Architecture	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR704	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

- The objectives include creating awareness and understanding of the concept of energy efficiency in buildings that respond to the climate, material and natural resources. Developing analytical skills to understand the energy consumption and hence cater to reduction. To create awareness about tools and practices to calculate energy consumption
- The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

COURSE CONTENT

Module 1: Introduction of Energy In Buildings and Parameters Affecting Energy Consumption in Buildings Learning Objectives

- To be able to discuss the concept of energy in buildings
- Enumerate the manner by which energy is consumed in building materials, building construction and building energy use

Module Contents

- Energy in building construction
- Building energy use
- Embodied energy and operational energy, Life cycle assessment
- Parameters affecting energy consumption in buildings, Demonstrate his/her capacity to understand the building as a whole with its integrated systems

Module 2: The concept of Energy audit

Learning Objectives

- To analyse the energy consumption in buildings
- Demonstrate the capacity to critically and systematically integrate his/her knowledge about energy-efficient buildings and sustainable development as well as analyse and assess complex systems and design processes

Module Contents

- Phases of energy audit
- Energy conserving opportunities
- Energy audit instruments and measurements
- Energy audit checklist
- ECBC manual application

Module 3: Building Integrated Renewable and alternate energy systems

Learning Objectives

- To be able to illustrate methods to reduce energy consumption of buildings

- To be able to understand embodied energy of various materials of construction

Module Contents

- Passive building design concepts
- Solar thermal option, energy efficient lighting, HVAC design
- An introduction to various construction materials used in common (and uncommon) structures.
- After receiving an introduction into fundamental principles of structural, physical and long-term performance, students learn about material and product manufacturing techniques and how they relate to mechanical and non-mechanical properties of the various materials

Module 4: Building automation and control and Best management practices

Learning Objectives

- To understand application of building automation for energy reduction in buildings
- To be able to appraise the case studies or examples of energy efficient architecture

Module Contents

- Fundamentals of control systems
- Types of control systems
- The impact of automation
- Application and components of building automation systems
- Methods to reduce energy consumption of buildings
- Case studies from various climatic zones of energy efficient architecture.

Module 5: Rating systems

Learning Objectives

- To be able to understand and apply present day rating systems in a context
- Introduction to rating systems
- Application of a rating system into a design studio project

Module 6: Energy efficient design

Module Contents

- Site planning and design methods to reduce energy consumption
- Energy management in vernacular building
- Techniques to manage energy post occupancy
- Case studies of best management practices

REFERENCES

- Practical handbook on Energy conservation in buildings Edited by: Indian Buildings congress
- ECBC Manual

SUBJECT TITLE	Inclusive design	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR701	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE					
Inclusive design is an introduction to the concepts of accessibility and universal design with a particular focus on the implications of ability and dis-ability on usability of the built environment; spaces, buildings, infrastructure and interfaces. The student will learn how to apply this knowledge in architecture, landscape architecture, interior design and planning. The interdisciplinary collaboration with disability					

studies, rehabilitation studies and social science research will provide students with an opportunity to learn and develop wider understanding about the subject.

COURSE CONTENT

Module 1: BASIC CONCEPTS

Module Contents

Knowledge of human ability relevant to design problems in home, workplace, infrastructure and community environments.

Module 2: EVOLUTION OF CONCEPTS OF ACCESSIBILITY AND UNIVERSAL DESIGN

Module Contents

An understanding of the evolution and limitations of Accessible Design, and differences between Accessible and Universal Design.

Module 3: ACCESSIBILITY STANDARDS IN EXTERNAL AND INTERNAL ENVIRONMENTS

Module Contents

Types of disability, Devices and Controls, Defining Architectural design requirements, Classification of Buildings and Access provisions. Design Elements within the buildings; Site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, ramps, stairways, lifts, toilets, signage, guiding and warning systems, floor finishes and materials. Design Elements Outside the building; kerb at footpath, road crossing, public toilet, bus stop, telephone booth, signage.

Module 4: INTERNATIONAL THEORIES OF UNIVERSAL DESIGN

Module Contents

Understanding Principles of Universal Design that enable usability and inclusion across the spectrum of age, size, gender, ability and conditions, and contextual derivation of Universal Design Principles in India.

Module 5: ACCESSIBILITY CONSIDERATIONS IN BUILDING TYPOLOGY

Module Contents

Provisions in residential buildings, auditorium, parks, restaurants, railway stations etc. Best examples and case studies in Universal Design practice.

Module 6: ACCESS AUDIT

Module Contents

Access Audit; definition, purpose and method, retrofitting techniques for barrier free environment.

Module 7: ACCESSIBILITY LEGISLATION

Module Contents

Understanding legislative framework for practice in India; Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995, Amendments and United Nations Convention for Rights of Persons with Disabilities (UNCRPD).

Module 7: CASE STUDY AND HANDS-ON

Module Contents

Hands-on practicum in assessing needs and developing design solutions; a project based on, field research and design to learn how to design for all individuals, regardless of ability.

REFERENCES

1. Mullick, A., Ostroff, E., Sanford, J., Steinfeld, E., Story, M. And Vanderheiden, G., Center for Universal Design. North Carolina State University, Raleigh,
2. Universal Design by Goldsmith, S. -(2000) Architectural Press.
3. Guidelines and Space Standards for Barrier Free Built Environment for Disabled and Elderly (1998),

CPWD, Ministry of Urban Affairs and Employment, India.

4. Persons with Disabilities Act. (1995). Government of India
5. Universal Design Handbook by Preiser, Wolfgang, Editor in Chief; Elaine Ostroff, Senior Editor – McGraw Hill, 2000.
6. Enabling Environments by Steinfeld, E., Danford, G. Scott. (1999). Plenum Press, New York.
7. Creating Universal Environment by Steinfeld, E., Maisel, J. (2012).. John Wiley and Sons INC, Hoboken, New Jersey.
8. The universal design file: Designing for people of all ages and abilities by Story, M. F. (1998).
9. UDIP. (2011). The Universal Design Principles, AbirMullick, Anjee Agarwal, Balaram S., Debkumar Chakrabarti, Gaurav Raheja, Haimanti Banerjee, Rachna Khare, Ravi Shankar and Shivani Gupta, National Institute of Design, Ahmadabad, India.
10. UNCRPD. (2006). Convention on the Rights of Persons with Disabilities at the United Nations and the Optional Protocol.
11. UN-ENABLE. (1982). UN’s World Program of Action concerning Disabled persons in 1982,
- 12.UNESCAP. (2003). Biwako Millennium Framework for Action by the United Nations Economic and Social Council.
13. UN-ESD. (1995). World Summit for Social Development held at the Copenhagen in 1995.
14. WHO. (1980). International Classification of Impairments, Disabilities, and Handicaps: ICDH World Health Organization, Geneva.
15. WHO. (2001). Towards a Common Language for Functioning, Disability and Health: ICF The International Classification of Functioning, Disability and Health. World Health Organization, Geneva.
16. Inquiry by Design by Ziesel, J. (2006). W. W.Norton and Company, New York.

SUBJECT TITLE	Industrial Architecture	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR702	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE	Aims to focus on the study of design considerations, environmental factors, structural considerations and safety controls for industrial buildings.				
COURSE CONTENT	<p>Module-1 Role of architects in the design of modern industrial buildings. A basic knowledge of industries in respect of type and category. Planning considerations in the development of master plan including site selection and site layout. Design for loading / unloading area.</p> <p>Module-2 Design considerations in development of industrial buildings considering: Flexibility; Adaptability; Structural selection; Integration of structure and services; Industrial lighting, Internal circulation and material handling.</p> <p>Module-3 Working environment for industrial workers - Work space and ergonomics; Use of color; Illumination; Light and Glare; Noise and vibration; Temperature, Humidity and Ventilation; Visual environment and landscaping. Health, welfare and childcare in Industrial Premises. Safety security and warning controls.</p> <p>Module-4</p>				

Consideration facilities like Rest room, Locker room, Sanitary, Changing room, Cafeteria, Recreational etc.

REFERENCES

1. Adam J., Hausmann K., and Juttner F., A Design Manual – Industrial Buildings.
2. Blum M. L., and Naylor J. C., Industrial Psychology, CBS, Delhi.
3. Drury J., Factories – Planning, Design and Modernization.
4. Hansen D., Indoor Air Quality Issues.
5. Munce, J. F., Industrial Architecture – an Analysis of International Building Practice, F. W. Dodge Corporation, New York.
6. Philips A., The Best in Industrial Architecture.
7. Reid K., Industrial Buildings; The Architectural Record of a Decade; F. W. Dodge Corporation, New York.
8. Sinha, R. K. and Heart, S., Cleaner Production – Greening of Industries for Sustainable Development.

SUBJECT TITLE	Pre-fabrication and Modular Coordination	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR703	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	

OBJECTIVE

- Application of provisions of National Building Code [India] or any other such case example with respect to modular coordination in building design and standardisation of building units & components
- Application of prefabrication principles and processes as may be followed in small scale in a project site ☐ Application of principles of specifying tolerances for building units & components
- Application of construction techniques for different types of cost effective & environment friendly Technologies of building construction [partial prefabrication/pre-casting]

COURSE CONTENT

Module 1:

Introduction to the concepts of Standardization Need, Importance and aim Evolution of practice of standardization Classification, Requirements & Validity of standards Terms and definitions Process of standardization & Actions for establishment of standards

Module 2:

Introduction to concepts of Modular Coordination Objectives of Modular coordination & Definition of Basic Module Modular controlling dimensions, Planning Modules and preferred Multi-modules, Nominal size vis-à-vis Actual size Planning & placing of components Annotations for Modular Drafting practice IMG recommendations on choice of multi-modules & BIS (NBC) recommendation on choice of modules for various building components

Module 3:

Concepts of System Building & Number Patterns Definition and classification of systems buildings Concept of open system and closed system Preferred sizes & need of Number Patterns Number Series and preferred sizes Ehrenkratz’s Modular Number Pattern

Module 4:

Introduction to concepts of prefabrication Factors affecting the growth of prefabrication industry Advantages & disadvantages of on site& off-site prefabrication with respect to Indian scenario Terms & Definitions as in IS (NBC) Methods of prefabrication & Examples of prefabricated components Process of prefabrication Various issues related to prefabrication industry & Examples of early prefabrication concepts

Module 5:

Concepts of Standardization of Joints and Tolerances Importance of standardization of Joints & classification of joints Considerations for corner connections & examples of various joints Concept of Tolerance for Deviations in component sizes Tolerance equalization at joints

Module 6:

Cost Effective & environment Friendly Technologies Innovative Building materials:- Sand-lime, Flyash lime, clay- fly ash bricks, pre-cast concrete blocks, precast concrete stone masonry blocks Cost Effective Foundation & walling techniques: arch foundation. Rat trap bond etc. Cost effective roofing techniques: Ferro-cement vaults, Wardha technique, Pyramidal roof

Module 7:

Cost Effective Pre-cast Roofing & Flooring Components RCC Planks & Joists, Pre-cast Channel units, Thin RC ribbed slab, Pre-cast Waffle slabs, Pre-cast RC/ Pre-stressed cored slabs, Pre-cast Brick panels Pre-cast RC Door & window frames, Pre-cast manhole covers, Ferro-cement door shutters, Ferro-cement water tanks

REFERENCES

1. Kelly; The Prefabrication of Houses
2. Nagarajan R.; Standards in Building;
3. Standards & Specifications for Cost-Effective, Innovative Building Materials and Techniques; BMTPC; New Delhi
4. Nissen H.; Industrialized Building and Modular Design; Cement & Concrete Association; London; 1972
5. Time Saver Standards: Design Data;
6. National Building Code; Bureau of Indian Standards; New Delhi; 1983

SUBJECT TITLE	Architectural design studio – VI	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR701	L	T	P	6
SUBJECT CATEGORY	LC	0	0	9	

OBJECTIVE

- The studio emphasis shall be on creative and rational skills for problem solving in architectural buildings on real site. Design-problem may focus on multifunctional, multi storied structure and services with application at site and building level like multi star hotels, multi specialist hospitals, high rise mall etc. in an urban setting including application of urban development controls, codes and bye-laws. The design proposal will be taken up with byelaws, master plan or any other restriction on large site.
- There should be integration of design proposal, structural system, energy efficient approaches and construction detail. One set of detailed working drawings of any one of services must also be generated at the end of the design process. Emphasis may also be laid on site planning as is learnt in previous semester. The focus would be on understanding of designing a complex building with all aspect of site planning and services in urban setting.
- There would be minimum one major and one minor exercise/project based on the module contents.

The modules may be taken up by the faculty in order of preference. The order should be common in both sections of same year. The faculty may achieve stated minimum outcomes using various strategies and approaches

- Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work.

COURSE CONTENT

Module 1: Introduction

Learning Strategy

- Demonstrates architectural and composite structural system and services through their design.
- Value appropriate technology, structural system and materials.
- Develop sensitivity towards non conventional technologies, energy efficiency and interior design.

Module Contents

- This module can be started with a warm-up Exercise/ Literature review (Group or Individual). Students could be sensitized (complex users, high rise issues and services) through Documentary/ movies/ Photos/ Presentation etc.
- Design Problem may be introduced by the faculty using linear design approach or hidden-curriculum or other design teaching models can be adopted for defining the design problem.
- Students may visit site for collecting context specific data for getting better understanding of real- life project details. The collected data may be analyzed and presented for evaluation.
- The above mentioned module teaching methods are suggestive. Faculty may choose other pedagogical approaches for design thinking process.

Module 2 : Development Of Concept

Module Contents

- Readings/ short movies/ Discussion on designers' philosophies could be initiated for idea generation.
- Further approaches for design iterations may involve more common techniques like
- Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, try and re-create for analyzing spaces in all dimensions through Block Models and single line graphics and study models for choosing the right option.

Module 3,4: Design Development

Learning Strategy

- Apply services learnt in previous semester to design project at building and site level.
- Build with precision block models, study models, site models.

Module Contents

- Students may integrate the knowledge gained from previous theory based subjects (like building services, building materials and construction, structures etc.) and apply to detail out their design proposal.
- The theories of urban design may be applied for co relating the urban setting during the design development stage.

Module 5:Final Design Proposal

Learning Strategy • Participating in team activities.

- Forms correlation between design and other subjects studied in previous semesters and till present. Communicate through drawings or models methods developed to meet various requirements.

Module Contents

- The final design proposal is prepared after conducting various informal and formal reviews at

individual and at group level. The drawings and detail physical model explaining the approach and consideration of urban setting to achieve the requirements with various other restrictions may be the submittals. It is preferable if the students communicate the application of all services in their design and must prepare a set of working drawings of one of the services showing all details for execution.

- Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc.
- Summative assessment of the studio work could be achieved through Panel discussion, presentation, peer review, public review, Criteria based evaluation etc.

REFERENCES

1. Baiche, B. and Walliman, N. (2012). Neufert Architects Data, 4th Ed. Oxford: Wiley-Blackwell.
2. Chiara, J. D. and Michael, J. C. 2001. Time Savers Standards for Building Types. Singapore: McGraw Hill Professional.
3. Gauzin-Muller, D. (2002). Sustainable Architecture and Urbanism: Concepts, Technologies, Examples. 1st Ed. Basel: Birkhauser Verlag AG.
- B. Arch Detail Syllabus For Admission Batch 2016-17
4. Krishan, A. and Nick Baker, Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, McGraw Hill Education Private Limited, India, 1999.
5. Huxtable, A-L. (1984). Tall Buildings Artistically Reconsidered.
6. Kloft, E. and Johann, E. (2003). High-rise Manual: Typology and Design, Construction And Technology, 1st Ed. Basel: Birkhauser Verlag AG.
7. Wood, A. and Ruba, S. (2012). Guide to Natural Ventilation in High Rise Office Buildings. New York: Rutledge.
8. Parker, D. And Wood, A. (2013). The Tall Buildings Reference Book. New York: Rutledge.

SUBJECT TITLE	Architectural details	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR702	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	

OBJECTIVE

This course focuses on creative architectural detailing of building components and use of different materials and technologies involved for implementation. It intends to equip the students with knowledge and skill for handling modern building exteriors/interiors works.

COURSE CONTENT

Module1

Latest trend in external finishing materials, it's implementing technology and hardware i.e. stone, metal, glass, tiles,
 – Entrance doors/special doors and windows (sliding, folding, revolving)

Module 2

Latest trend in internal finishing materials, it's implementing technology and hardware i.e. gypsum, plywood, metal, glass, stone, tiles etc.
 – Staircase and balcony details with finishing and railing designs, – parapet design, coping, cornices – Kitchen and wardrobe details.

Module 3

Worked out/creative details of walls, partitions, floorings, suspended ceilings of different materials with electrical wiring, lighting, ventilation and air conditioning, Acoustic design and finishing for interiors

Module 4

Structural layout, detailing and schedule of a RCC framed building.

Module 5

Innovative and sustainable Architectural detailing as decided by the faculty

NOTE Frequent site visits to be arranged as a part of the curriculum and contact hours. Site visits should be in line with the studio work. It is mandatory for students to submit a site observation report, either periodically or at the end of the semester.

REFERENCES

1. Barry, R. (1999). The Construction of Buildings Vol. 1 - 5. 5th Ed. New Delhi: East-West Press.
2. McKay, W. B. (2005). Building Construction Metric Vol. 1–IV, 4th Ed. Mumbai: Orient Longman.
3. Allen, E. and Rand, P., Architectural Detailing.
4. Emmitt, S., Principles of Architectural Detailing.
5. Joe, B. (Ed). (2002). Details in Architecture: Vol. I-V. Victoria: The Images Publishing group.
6. Osamu, A. W., Linde, R. M. and Bakhoum, N. R. (2011). The professional practice of architectural working drawings. 4th Ed. Hoboken: John Wiley & Sons.
7. Rangwala, S. (2004). Building Construction. 22nd Ed. Anand.: Charotar Pub. House.

SUBJECT TITLE	Structural drawing and details	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR703	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	

OBJECTIVE

- To identify the concept of various structural elements and system.
- To illustrate the use of different structural systems in building industry.
- To analyse the structural geometry based on strength and stability criteria.
- To outline the development of structural forms during the passage of architectural time line.
- To design the effective use of structural systems for complex architectural need.
- To apply the fundamentals of temporary systems to design the shelters for disaster mitigation.
- To create an integrated systems based on structural models and new material for modern sky scrapers.
- To critically appraise the built environment based on specific structural system

COURSE CONTENT

Module: 1

Introduction to Structures:

Introduction to structure as architecture: concepts, elements, structural grids, loads

Arches, Shells and Domes

Arch Action, Structural Concept of Arch, Shell, Vaults and Domes and Application in Architecture

Module: 2

Tensile Structures

Concept of Tensile Structures, Formation, Classification, Use and Examples of various cable structures,

Plate Structures

Plate Structures: Definition, Classification and Application, Concept and Application of Folded plates, Flat slab and Coffered Slab

Module: 3

Trusses and Space frames

Truss Components, Classification and application in Architecture, Long Span Trusses: Advantages and Use, Space Frame: its Formation and Applications in Buildings

Special Structures

Concept, Classification and Application of Pneumatic Structures, Kinetic Structures and Mobile Structures

Module: 4

Structural Systems for Modern Sky scrapers

High Rise Buildings: Structural Systems, Sky Scrapers: Structural Concept and Modern Methods of Construction Application, Studies on Structural Systems of Sky Scrapers.

REFERENCES

1. P.Dayaratnam, *Prestressed Concrete Structures*; Oxford and IBM Publishing Co.; New Delhi,1982
2. Wolfgang Schuller- *High Rise Building Structures*, John Wiley & Sons; New York1976.
3. Frei Otto; *Tensile Structures; Vol-II, Pneumatic Structures, Cable Structures*: The MIT Press London.
4. N.Subramaniam; *Principles of Space Structures*: Wheeler& Co.; Allahabad 1983.

8th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	PC	UPCAR801	Professional Practice	3	0	0	3	30	70		100
2	PC	UPCAR802	Research Methodology	3	0	0	3	30	70		100
3	PC	UPCAR803	Advanced Building Systems And Services	3	0	0	3	30	70		100
4. ELECTIVE – II				3	0	0	3	30	70		100
	PE	UPEAR801	Product Design and Ergonomics								
	PE	UPEAR802	Transportation Planning								
	PE	UPEAR803	Building Repair and Maintenance								
5. ELECTIVE – III				3	0	0	3	30	70		100
	PE	UPEAR804	Building Performance and Compliances								
	PE	UPEAR805	Aesthetics & Art Appreciation								
	PE	UPEAR806	Medical Architecture								
6	LC	ULCAR801	Architectural Design Studio – VII	0	0	12	8	50		50	100
7	LC	ULCAR802	Pre Thesis Seminar	0	0	3	2	50		50	100
Total				15	0	15	25				700

SUBJECT TITLE	Professional Practice	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR801	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	
OBJECTIVE	To enable the students to understand the logistics of state & central govt. in enhancing better living conditions to all without losing the interest of self. It lays down the criteria for constructing built up spaces in cities & sub-urban; good ph& sanitation; safety & security, etc. and familiarize the students about current professional practice guidelines, codes, ethics as well as norms of professional fees & charges. It will expose them to skills and techniques for organizing a particular project, its preparation and execution etc. The same course will also contribute in getting acquainted with project management, contractual implication as well as legal formalities.				
COURSE CONTENT					

Module 1 PRACTICING ARCHITECTURE

Introduction to Architects duties and liabilities, salient features of architect's act 1972, the council of architecture Understanding office management and project awarding; organization structure, responsibility towards employees, consultants & associates; maintenance of accounts; filing of records; balance sheet, Income tax; Service tax; Professional tax. Various architectural services, additional services and scale of professional fees. Building regulations related to submission of approval drawings to concerned public bodies.

Module 2 ARCHITECTURAL COMPETITIONS & LEGISLATIONS

Regulations governing the conduct of competitions, open & closed competitions Role of development authorities & urban arts commissions, Environmental acts & laws, special rules governing hill area development & coastal area management, heritage act of India etc. Pre-requisite for Indians to work in other countries & vice versa, emerging trends in architectural collaborations.

Module 3 TENDER & CONTRACT

Types of tenders, invitation of tender and conditions of tender documents, submission, scrutiny, recommendations & award of contract. Definitions and general principles of Indian Contract Act and building, contract documents, conditions of contract, Execution of contract, various certifications, defects liability.

Module 4 ARBITRATION

Need for Arbitration, Principles of Indian Arbitration Act-1974, role of arbitrators, umpire etc, excepted matters, arbitral award. Municipal Acts, Fire prevention, safety and security measures in buildings.

REFERENCES

1. COA. (1989). Architects (Professional conduct) Regulations, Architectural Competition guidelines. Council of Architecture Publications.
2. COA. (2005). Handbook of Professional Documents. Council of Architecture.
3. R H..Namavati, Professional practice, 7th ed, lakshmi book depot, mumbai,1997.
4. Environmental Acts of the Ministry of Environment & forests, Govt. of India
5. Architects Practice, J.J.Scott.
6. Handbook of Professional Practice, Madhav Deobhakta.

SUBJECT TITLE	Research Methodology	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR802	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

- Application of literature review / study and/or case - study methodology for a preparation of a minor research / dissertation on any topic in architecture (relevant to any chosen objective or any aspect of the Thesis Project)
- Application of scientific methods / tools and techniques for conducting post – occupancy evaluation of buildings / built complexes / built-environment [case studies] and drawing inferences [for application as design guidelines in the next phase: Thesis project]
- Application of Presentation techniques [for presenting dissertation / outcome of the study] and techniques of Thesis / Dissertation / Project Report writing ☑ Preparation of the initial synopsis for the

selected thesis project

COURSE CONTENT

Module 1

Minor Dissertation: Each student shall prepare a a minor research / dissertation on any topic in architecture relevant to any chosen objective or any aspect of the Thesis Project. The minor dissertation shall be a research –based conceptual study directly associated with the thesis topic. It shall be submitted in the form of a report with appropriate referencing, bibliography etc. and the highlights shall be also presented as a seminar.

Module 2

Thesis Project Proposal Each student shall submit three proposals for the project, he/she wants to undertake in order of preference from which the final topic may be selected. The project shall be LIVE as far as possible. Each of the proposals should be furnished with the following information: (a) Title of Project (b) Authority Proposing the project with address (c) Site area, location (d) Brief about the project giving broad requirement, cost etc.

Module 3

Thesis Project Introduction and Case Studies After the thesis topic is finalized, the student has to present a seminar on his/her topic. (Stage I) The introductory seminar will include presentation of the topic furnishing the above mentioned information along with selection of case studies of the buildings, structures that are directly associated with the thesis topic [minimum 2], format / questionnaire for case studies, literature review / study [also minimum 1 case study from secondary sources], requirements, current design trends/ philosophies etc.

[The case study activities are expected to be done during the vacation available after completion of the semester]

REFERENCES

1. Sanoff, H. (1991). Visual Research Methods in Design. New York: John Wiley & Sons.
2. Kothari, C.R. and Garg, G., Research Methodology: Methods and Techniques, New Age International Publishers.
3. Anderson, J. and Poole, M. (1998). Thesis and assignment writing. Brisbane: John Wiley.
4. Borden, I. and Ray, K. R. (2006). The dissertation: an architecture student's handbook. 2nd Ed.Oxford: Architectural Press.
5. Fink, A. (1998). Conducting research literature reviews: from paper to the Internet. Thousand Oaks: Sage.
6. Murray, R. (2005). Writing for academic journals. Berkshire: Maidenhead, Open University Press.

SUBJECT TITLE	Advanced Building Systems and Services	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR803	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	
OBJECTIVE					
To develop know-how and understanding of important advanced systems and services in buildings, their definitions and terms used, functioning and their applications in building.					
COURSE CONTENT					
Module 1 FIRE SAFETY					
Classification of Fires & Extinguishers, Dry Riser, Wet Riser & Down Comer systems, Sprinkler & Drencher systems, Fire detection systems, Fire Lifts & Fire Escape Plan, Fire prevention, safety and security measures and regulations. Firefighting layout, Reflected ceiling plan of smoke detectors / sprinklers, etc.					
Module 2 PARKING AND CIRCULATION SYSTEMS					
Multilevel Parking Systems, Semi-automatic and automatic parking systems, Elevator types and spatial requirements with respect to Passenger, Service & Fire lifts, Escalators and Travelators, Applications of Raised Floor systems.					
Module 3 BUILDING UTILITIES					
Building Automation – Objectives & advantages, Smart devices used in Illumination, Climate control, Building Security systems etc., Laundry & Garbage chutes, Understanding Bio Medical Waste and their disposal, Chemical and Biological Toilets, Hot water systems for apartments and hotels, Cooking gas distribution system for residences. Communication systems: space and connection facilities for LAN, computer server, PABX and telephone.					
Module 4 STANDARDS AND REGULATIONS					
Study of building services with reference to NBC (National Building Code), ECBC (Energy Conservation and Building Code) and BIS regulations (Bureau of Indian Standards).					
Module 5					
Case studies and assignments for students on applications of building systems and services.					
REFERENCES					
1. Stein Reynolds Mc Guinness – Mechanical and Electrical equipment for buildings, Vols 1 & 2, John Wiley & sons.					
2. Francisco Asensio Cerver – The architecture of Skyscrapers, Hearst Book International, New York, 1997					
3. Bennetts Ian & others – Tall building structural systems					
4. William, J. McG. (1971). Mechanical & Electrical Equipment for Buildings					
5. Bovay, H. E. (1981). Handbook of Mechanical & Electrical systems for Buildings. McGraw-Hill Higher Education.					
6. Bureau of Indian Standards. (2005). Code of Practice for Electrical Wiring Installations IS732.					
7. Kloft, E. and Johann, E. (2003). High-rise Manual: Typology and Design, Construction and Technology, 1st Ed. Basel: Birkhauser Verlag AG.					
8. National Building Code					
9. Energy Conservation and Building Code					

SUBJECT TITLE	Product Design and Ergonomics	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR801	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE	To expose the students to the requirements of designing for the human comfort in accordance with anthropometry. The students will have knowledge of ergonomics and its applications in Product design including designing for the physically challenged and the elderly.				
COURSE CONTENT	<p>Module 1 INTRODUCTION Human being in the manmade world and importance of ergonomics, Gross human anatomy, Ergonomics for children and old people, Definitions related to Ergonomics and Product design, Historical development in the concept of ergonomics and product design, Role of Product designer.</p> <p>Module 2 ERGONOMICS AND DESIGN Application of human factors data. Human activities, their nature and effects, Man-machine interaction and physical environment - Environmental Condition including, thermal, illumination and noise. Applied anthropometry – Human response to climate, Human performance and system reliability, designer's priorities.</p> <p>Module 3 ASPECTS OF PRODUCT DESIGN Visual, Auditory, Tactual, Olfactory human mechanisms, Physical space and arrangement. Product display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays, Visual codes and symbols. Processes of product designing, manufacturing and testing Form, Colour, Symbols, User specific criteria, Material selections, Technology and recyclability, Packaging. Multiple Utility oriented approach to Product Design.</p> <p>Module 4 UNIVERSAL DESIGN Design of special elements in buildings for physically challenged and old aged</p> <p>Module 5 DESIGN EXERCISES - Design of Household elements, tools and devices. - Design of furniture. - Design of Industrial Product – Automobiles and Electrical - Element design for differently abled, old and children.</p>				
REFERENCES	<ol style="list-style-type: none"> 1. Time Saver Standards for Interior Design 2. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGraw-Hill Co., USA, 1982. 3. Francis D. K. Ching, Interior Design Illustrated, VNR Publications, New York, 1987. 4. Helen Marie Evans, An invitation to Design. 5. Crosbie, M. J. and Watson, D. (2005). Time Savers Standards for Architectural Design: Technical data for Professional Practice. 8th Ed. The McGraw-Hill Company. 				

SUBJECT TITLE	Transportation Planning	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR802	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE					
To enable the students to understand the operation, need and management of transportation systems.					
COURSE CONTENT					
Module-1					
Study of the movement of human and goods at the intercity and inter-city levels. The need for various kinds of transportation system with their qualitative analysis.					
Module-2					
Inter city transport system and the problems on countered in trafficking it with special reference to road Transport.					
Module-3					
A study of methods used for resolving traffic problems such as decentralization of work centre, various traffic controls over the over passes etc.					
REFERENCES					
1. Khisty, C. J. and Lal, B. K., Transportation Engineering: An Introduction. 2. Papacostas, C. S., Fundamentals of Transportation Engineering. 3. Bruton, M. J., Introduction to Transportation Planning. 4. Khanna, S. K., and Justo, C. E. G., Highway Engineering.					

SUBJECT TITLE	Building Repair and Maintenance	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR803	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE					
Building construction industry is energy intensive and therefore knowledge of maintenance, restoration and retrofitting of buildings are important in the context of sustainable development. Need for building repair and maintenance, cause and effect of building deterioration and defects, and material, methods and techniques of maintenance, repair and restoration are covered in the course.					
COURSE CONTENT					
Unit-I. Introduction					
Life expectancy of different types of buildings, influence of environmental elements: heat ,moisture, precipitation & frost on buildings, effect of biological agents like fungus, moss, plants, trees, algae, termite control & prevention, chemical attack on building materials &components, aspects of fire & fire prevention on buildings, impact of pollution on buildings.					
Unit-II. Building defects					
Common defects in buildings - Building failures- Causes and effects, Non-destructive testing methods, Cracks in buildings: types, classification, investigation.					

Unit-III. Preventive & Strengthening

Measures to prevent & control common defects in buildings, Maintenance philosophy, phases of maintenance: routine preventive and curative maintenance, Fundamental Strengthening measures: beam strengthening, column strengthening, shoring, under pinning and jacketing.

Unit-IV. Building Repairs

Materials for repair: special mortar & concrete, chemicals, special cements & high grade concrete, admixtures, techniques for repair, Surface repair: material selection, surface preparation, rust eliminators & polymers coating, Repair of cracks in concrete & masonry: methods of repair, epoxy injection, mortar repair for cracks: guniting & shotcreting, Waterproofing of concrete roofs.

Unit-V. Introduction to Conservation

Introduction to conservation, Materials and methods for conservation & restoration work with specific case studies, Adaptive reuse of buildings, advantages. Retrofitting, case studies, Recycling of building components and materials with case studies.

REFERENCES

1. Chandler, I. (1992). *Repair and Renovation of Modern Buildings*. McGraw-Hill.
2. Danish Standards Association. (2004). *Repair of Concrete Structure to En 1504: A guide for renovation of concrete structures repair materials and systems according to the EN 1504 series*. Boston: Elsevier.
3. Guha, P. K. (2011). *Maintenance and Repairs of Buildings*. New Delhi: New Central Book Agency
4. Nayak, B. S. (2013). *A Manual of Maintenance Engineering*. New Delhi: Khanna Publishers.
5. Roger, G. and Hall, F. (2013). *Building Services Handbook*. New York : Routledge.

SUBJECT TITLE	Building Performance and Compliances	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR804	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE	To comprehensively understand how the actual performance of various buildings can be studied and analyzed.				
COURSE CONTENT	UNIT 1 PERFORMANCE OF BUILDINGS 8 Hrs. Need for performance analysis of buildings - Investigation and assessment, energy audit procedures - Design investigations - Energy conservation measure calculations - Modelling systems: cognitive, empirical and analytical assessment of buildings. UNIT 2 WHOLE BUILDING ENERGY SIMULATION 16 Hrs. Modelling the Building form - Parametric and empirical building simulation - Factors affecting accuracy of energy model - Thermal performance criteria of buildings - Envelope considerations, climatic analysis, weather data-Heating and cooling systems modelling, ventilation systems modelling - Energy use analysis through open source software such as EQUEST				

UNIT 3 DAYLIGHTING AND SHADING SIMULATIONS 14 Hrs.

Day lighting simulation models - Day lighting simulation criteria - Factors affecting accuracy of day lighting model - Day lighting simulation exercises using daylight modelling tools - Shading simulations - Principles of shading design - Tools for shading analysis - Tools for shading design - Shading design exercises using open source shading software - BIM Integration.

UNIT 4 ANALYSIS OF BUILDING PERFORMANCE 10 Hrs.

Metering systems - Analysis of collected data from existing buildings - Economic aspects of energy simulation results: LCA, payback analysis, break even analysis, benefit cost analysis, present worth analysis, etc. - Selection of appropriate ECM from modelling results - Recalibration of the model from actual performance data.

REFERENCES

1. Teaming for Efficiency: technologies, design, performance analysis and building industry trends, American Council for an Energy-Efficient Economy, 2002
2. James P. Waltz, Computerized Building Energy Simulation Handbook, Fairmont PR, 1997
3. Joseph Clarke, Energy Simulation in Building Design, Routledge, 2007
4. Giuliano Dall'O', Green Energy Audit of Buildings: A guide for a sustainable energy audit of buildings, Springer, 2013
5. ASHRAE Press, The ASHRAE Green Guide, Butterworth- Heinemann, 2006
6. Energy Conservation Building Code of India - User manual, 2007

SUBJECT TITLE	Aesthetics & Art Appreciation	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR805	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	

OBJECTIVE

- To develop an appreciation for varied art forms and bring the knowledge to the domain of the built environment.
- To develop a body of knowledge through study of historical evolution of artistic productions.
- To develop artistic capacity to enhance design skill.
- Summarize/synthesize an appreciation framework of the arts and put in various social, cultural and environmental contexts.
- The learning from this subject will help in developing analytical approach towards design projects.

COURSE CONTENT**Module 1: Philosophical Approach to Art Appreciation****Learning Objectives**

To recognize various philosophical positions in art and aesthetics

Module Contents

- Historical review of aesthetic theories and concepts.
- Study of seminal texts in aesthetic theoretical works.

Module 2: Classification of the Arts and Art Forms**Learning Objectives**

To define and classify different art forms

Module Contents

- Understanding and classification of various art forms.
- Comparative analysis and interfaces.
- Study of visual art forms and comprehending the essence in design thinking.

Module 3: Historical Survey and Analysis of the Arts**Learning Objectives**

Study of art forms in various historical periods and contexts from the antiquities to the contemporary

Module Contents

- Survey and comparative analysis of Western high art.
- Survey and comparative analysis of Indian high art.
- Survey and comparative analysis of folk traditions of indigenous communities.
- Survey of contemporary art and influences.

Module 4: Skill Development Based on Study of Art/Master's Work**Learning Objectives**

Material and technical exploration based on study of master artists

Module Contents

- Study of master's work.
- Representation in various mediums.

Module 5: Art Appreciation as a Tool In Design Thinking**Learning Objectives**

- To develop design thinking processes through discussion and debate in the form of presentation.
- Align understanding with running design studio.

Module Contents

- Exploring relationship of art and design.
- Developing/creating design methodology with aesthetic sensitivity in the context of the running design studio.

REFERENCES

1. History Of Art by Janson and Janson
2. Humanities Through The Arts by F. David Martin and Lee A Jacobus
3. Indian Art by ParthaMitter
4. Introduction To Indian Art by Ananda k Coomaraswamy
5. Ways Of Seeing by John Berger
6. History of Beauty by Umberto Eco et al
7. The Story of Art by E.H.Gombrich

SUBJECT TITLE	Medical Architecture	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR806	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE					
Exposing the students the parameters of hospital design with relation to types of spaces, services, finishes and standards.					
COURSE CONTENT					
Module -1					
Introduction to hospital planning, types of hospitals, guiding principles in planning and designing efficient hospitals; aesthetic and emotional needs of patients, space norms and requirements of hospital, interdepartmental relationship.					
Module – 2					
<ul style="list-style-type: none"> • Main public entrance and lobby area; reception and informative lounge, waiting area, circulation: other facilities. • Planning and designing of outpatient departments: multi-pod and concourse clinics. • Planning of emergency departments. • Design of surgical suits, flow charts, surgical suits for small/ medium hospitals. • Design of labour- delivery suits. 					
Module – 3					
<ul style="list-style-type: none"> • Nursing units, speciality nursing units, ICUs, new born nurseries. • Design of supportive services: CSSD, food and services department, hospital laundry, equipment planning and control. 					
Module – 4					
<ul style="list-style-type: none"> • Mechanical standards, HVAC systems, hospital acoustics, sanitary and plumbing systems, electrical standards, medical gas systems. • Bio-medical waste handling and management: incinerator, bio-medical waste management. • General standard for hospital details and finishes. 					
REFERENCES					
<ol style="list-style-type: none"> 1. Designing for total quality in health care: G. D. Kunders, Prism books pvt. Ltd. 2. A DESIGN DEALS FOR HEALTH: Making the most of interior design’ Healing potential C Leibrock 3. HOSPITAL PLANNING DESIGN &MANAGEMENT- Kunder 4. MEDICAL FACILITIES: New concepts in Architecture & Design 					

SUBJECT TITLE	Architectural design studio – VII	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR801	L	T	P	8
SUBJECT CATEGORY	LC	0	0	12	
OBJECTIVE					
<ul style="list-style-type: none"> • The objective of the design studio is to expose the students to Urban scale problems and to enable them to visualize the contextual part of a built form. They need to understand, as to what goes beyond the premise of a single building or an area and where its boundaries merge into surrounding built form with different land uses and activities. • The studio problem therefore will focus on study and intervention within areas that have the context of design issues like, pedestrian and traffic movement, mixed activities etc. and have the scope of redevelopment. • The design problem of Urban design scale is to be introduced, example; Redesigning of existing Urban area by studying and identifying the problems associated with it. The project would be a medium sized urban design intervention. • The design solution would address issues like demography, market value, land use patterns etc. Other design issues are the detailing of open and built areas after studying human and movement patterns. • The project should be substantiated by detailed site surveys and reading about urban design principles. • Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work 					
COURSE CONTENT					
Module 1: identify an Area with the Given Objectives					
Module Contents					
<ul style="list-style-type: none"> • Pilot survey of an area to identify the project. • Survey the existing urban environment. • Visualize with objectives 					
Module 2: Carving the study area					
Learning Resources / References & Learning Strategy					
<ul style="list-style-type: none"> • Local Master Plans or Development Plans. • Development control regulations. 					
Module Contents					
<ul style="list-style-type: none"> • Delineate the study area. • Collect initial data. • Prepare brief questions for responses. • Reading the area for commonalities. • Take response from the users. 					
Module 3: Presenting the collected data					
Module Contents					
<ul style="list-style-type: none"> • Mapping of collected data using techniques and methods. • Explain images relevant to the objectives. • Use of both qualitative and quantitative data. • Filter data for relevance and use. 					
Module 4: Analyzing the collected information					

Module Contents

- Co-relating the various data for interrelationship.
- Analyzing interrelationships of various identified factors.
- Examining the data for overall understanding of the information.
- Using different methods for analyses.
- Micro-level assessment of the study areas.
- Prepare activity wise layers.

Module 5: Drawing inferences for interventions**Module Contents**

- Picking up issues for addressing.
- Thinking about developing sensitive responses to the identified issues.
- Take case examples for better understanding (Readings through books or studying similar projects undertaken elsewhere)
- Prepare models for spatial analysis.
- Prepare quantitative data for existing and future proposals.

Module 6: Formulation of the design programme and strategies for intervention**Module Contents**

- Prepare the vision statement.
- Phasing of the project.
- Before and after images.
- Public private participation.
- Implementation of the design solutions.

REFERENCES

1. Graphics in Urban design by BalllyMeeda, Neil Parkyn and David Stuart Walton.
2. Responsive Environments by Ian Bentley.
3. Local Master Plans or Development Plans.
4. Development Control Regulations- as per requirements.
5. Relevant case examples of Designed or executed projects

SUBJECT TITLE	Pre Thesis Seminar	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR802	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	

OBJECTIVE

The studio emphasizes on the integrated approach. The students are required to integrate the learning of the previous two Seminars to establish the research component that leads to thesis. Emphasis of the studio is to enable students to;-

- Raise clear and precise questions, Use abstract ideas to interpret information gathered. Able to conclude with good justification. Test the conclusions against relevant criteria and standards.
- Gather, assess, record and apply relevant information and incorporate relevant study in to document form as a report.
- Make precise power point presentation of the study and conclusions and gain the ability to criticize and analyze the case studies to reach conclusion.
- Students will apply the learning from the previous semesters to research a subject area through

readings; learn description, analysis and synthesis of readings; citation of authors in their writing; and plan a study and write a paper based on literature review.

- Through the course, the students will be capable of identifying the research area that will enable them to undertake a Thesis project in the forthcoming semester.

COURSE CONTENT

Module 1: Introduction to the course and discussion on the objectives.

Module Contents

- Recapitulation and discussion of methods of research :Discussion of research methods, understanding the applicability of various techniques of architectural research
- Learning from examples and group Presentation.

Module 2: IDENTIFICATION OF RESEARCH AREA AND GAP

Module Contents

- Identify the broad study area for thesis based on literature review and case study, and its oral and visual presentation.
- Interpretation drawings, visual presentation techniques with info-graphics.
- Literature review and identification of research area and stating the research question.
- Time-work schedule
- Presentation on-Selection of topic, reason for selection, justification, synopsis

Module 3: DEVELOPING A STRUCTURAL FRAMEWORK FOR THE SEMINAR

Module Contents

- Discussion on the methodology-The types of data collection- primary and secondary
- Site/ case studies to be conducted
- Literature Case study and documentation, review of case study; usefulness of case study to the selected topic; conclusion from case study.
- Probable study/ research outcome
- Draft chapterization

Module 4: CONTENT DEVELOPMENT

Module Contents

- Detailed study and finalization of research parameters.
- Conduction of research- comparative study/ field study/qualitative data collection/ questionnaire survey.
- Live case study/survey/ direct observation etc; and documentation, review of case study, usefulness of case study to the selected topic; conclusion from case study
- Discussion on the raw data and final chapterization
- Report writing.
- Identifying Live/ hypothetical architectural Thesis scopes within the study area.
- Exercise on synopsis writing based on the same research area.

Module 5: DATA PROCESSING AND OUTCOME OF RESEARCH

Module Contents

- Results and discussion – completion of the report writing with proper citation and referencing.
- Discussion on IPR.
- Power point presentation on the actual topic based on conclusions from case studies and research; preparation of report based on research conducted under various heads
- Preparation and presentation of Synopsis for Architectural thesis to be taken in the next semester.

REFERENCES	
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| <ol style="list-style-type: none">1. Warm-up exercise/ literature review (group or individual)2. Discussion on reading material- hardcopy/ online materials, articles, papers, journals and writing individual review.3. Group discussion and debates4. Visual and oral presentation. | |
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9th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
			Architectural Office Training								
1	PR	UPRAR901	Office Training	0	0	6	4	50		50	100
2	PR	UPRAR902	Site Supervision Work and Documentation	0	0	4.5	3	50		50	100
3	PR	UPRAR903	Field Documentation and Architectural Details	0	0	4.5	3	50		50	100
4	PR	UPRAR904	Critical Appraisal of Buildings	0	0	3	2	50		50	100
5	PR	UPRAR905	Field Observation Studies	0	0	3	2	50		50	100
			Total	0	0	21	14				500

SUBJECT TITLE	Office Training	CONTACT HOURS			CREDITS
SUBJECT CODE	UPRAR901	L	T	P	4
SUBJECT CATEGORY	PR	0	0	6	
OBJECTIVE					
<ul style="list-style-type: none"> • The aim of the 'Professional Training' is to enable the students to gain the kind and range of practical experience which will prepare them for their likely responsibilities, immediately after qualifying B. Arch. Course. • The trainee student has the responsibility to use his/her own initiative in making the best use of the opportunities which he gets during training period and prepare himself/herself for profession. The core of the professional training is architectural one. Student is expected to get well worse with the realm of architectural discipline ranging from generation of idea, preparation of drawings to the final execution of design on site. • A Training Manual shall provide the details of the expected outline of work and other procedures. • Mandatory Requirements: Student shall have to undergo Professional Training for a period of at least 24 Weeks in an establishment approved by the Training & Placement Cell to become eligible to appear for final viva-voce. 					
COURSE CONTENT					
Students are required to be involved in all aspects of office works-conceptual design; presentation drawings and detail working drawings; 3 D modelling; estimation and specification of small buildings; interaction with clients, structural consultant and other building services consultants.					

SUBJECT TITLE	Site supervision work and Documentation	CONTACT HOURS			CREDITS
SUBJECT CODE	UPRAR902	L	P	T	3
SUBJECT CATEGORY	PR	0	0	4.5	

COURSE CONTENT

The aim of this training is to give exposure to the students on different stages of construction on the site and to learn how drawings are executed at the construction site. The student is required to prepare and submit a report comprising a set of working drawings, sketches, photographs etc. to supplement his/her observation.

SUBJECT TITLE	Field Documentation and Architectural Details	CONTACT HOURS			CREDITS
SUBJECT CODE	UPRAR903	L	P	T	3
SUBJECT CATEGORY	PR	0	0	4.5	

COURSE CONTENT

Documentation of at least 20 details of innovative construction practices from personal observation, office record or field studies. These may include historical as well as contemporary details. The selection of details should be based on their special nature due to a practical need/ situation.

SUBJECT TITLE	Critical Appraisal of Buildings	CONTACT HOURS			CREDITS
SUBJECT CODE	UPRAR904	L	T	P	2
SUBJECT CATEGORY	PR	0	0	3	

OBJECTIVE

An exercise in critical observation of an existing project.

COURSE CONTENT

A student may select any small project and trace down its development from early conceptual design stage to procedure adopted in decision making at inception level to series of changes in the process of approval with due consideration to constraints such as financial, human and building bye-laws. Design changes during the execution and changes done by the client after occupation also need to be identified along with reasons thereof. Users' reaction on different physical planning aspects also need to be critically evaluated with respect to their performance, usefulness etc. The study is to be presented in the form of a report comprising series of sketches, photographs supported by brief analysis and observation etc.

SUBJECT TITLE	Field observation studies	CONTACT HOURS			CREDITS
SUBJECT CODE	UPRAR905	L	T	P	2
SUBJECT CATEGORY	PR	0	0	3	
OBJECTIVE	An exercise in critical observation of an existing project.				
COURSE CONTENT	<p>A student may select any small project and trace down its development from early conceptual design stage to procedure adopted in decision making at inception level to series of changes in the process of approval with due consideration to constraints such as financial, human and building bye-laws. Design changes during the execution and changes done by the client after occupation also need to be identified along with reasons thereof. Users' reaction on different physical planning aspects also need to be critically evaluated with respect to their performance, usefulness etc. The study is to be presented in the form of a report comprising series of sketches, photographs supported by brief analysis and observation etc.</p>				

10th SEMESTER

Sl. No.	Subject Type	Subject Code	Subject Name	Teaching Hours			Credit	Maximum Marks			
				L	T	P		IA	SE	EA	Total
1	ES	UESAR001	Construction and Project Management	3	0	0	3	30	70		100
2	PC	UPCAR002	Building Economics & Real-Estate Management	3	0	0	3	30	70		100
3 ELECTIVE – IV				3	0	0	3	30	70		100
	PE	UPEAR001	Architectural Conservation								
	PE	UPEAR002	Architectural Journalism								
	PE	UPEAR003	Geometry of Forms								
4	PR	UPRAR001	Thesis	0	0	18	12	50		50	100
5	LC	ULCAR001	Comprehensive Viva Voce	0	0	3	2	50		50	100
Total				9	0	21	23				500

SUBJECT TITLE	Construction and Project Management			CONTACT HOURS			CREDITS
SUBJECT CODE	UESAR001			L	T	P	3
SUBJECT CATEGORY	ES			3	0	0	
OBJECTIVE							
To equip students with a practical approach to implement building projects, basic knowledge about construction industry, project management techniques needed for managing and coordinating building projects in a professional manner.							
COURSE CONTENT							
Unit-I. Introduction							
Introduction to project management, construction industry, stakeholders, roles, responsibilities and functional relationships, Construction projects – objectives and lifecycle, existing construction practices & project management systems, Project Team, organization, roles, responsibilities. Concepts of project planning, scheduling & controlling. Project scale and construction technology, human aspects in managing projects.							
Unit-II. Project Planning and Scheduling							
Inputs for project planning, defining activities and their interdependency, time and resource estimation. Work breakdown structures. Linear Scheduling methods - bar charts, LOB, their limitations. Principles, definitions of network based scheduling methods: CPM, PERT. Network representation, Network analysis – forward and backward passes.							
Unit-III. Project Monitoring and Control							
Site layout and organization, Site investigations. Quality tests for construction material and processes. Quality control inspections. Project progress tracking. Crashing Project Schedules, its impact on time, cost							

and quality. Project direct and indirect costs. Safety in Construction Projects.

Unit-IV. Resources Management and Value Engineering

Methods of material/resource estimation and management, Resources scheduling and levelling. Labour welfare, applicable labour Legislations. Construction equipment types, characteristics & applications. Value engineering, its application in building design and construction.

Unit-V. Contracts and Tenders

Types of building contracts, their merits and de-merits. Types of building tenders, contents of tender documents, tendering process. General conditions of contract, security deposits, interim certificates, defect liability periods, retention amounts, mobilization money and virtual completion.

REFERENCES

1. Callahan, M. T., Quackenbush, D. G., & Rowings, J. E. (1992). *Construction Project Scheduling*. McGraw-Hill.
2. Chitkara, K. K. (2004). *Construction Project Management: Planning, Scheduling and Controlling*. Tata McGraw–Hill Education.
3. O'Brien, J. J., and Plotnick, F. L. (2009). *CPM in Construction Management*. McGraw-Hill Professional.

SUBJECT TITLE	Building Economics & Real-estate Management	CONTACT HOURS			CREDITS
SUBJECT CODE	UPCAR002	L	T	P	3
SUBJECT CATEGORY	PC	3	0	0	

OBJECTIVE

To understand basic principles of economics, various methods, applied in building and real estate management.

COURSE CONTENT

Module-I. General Economics

Micro Economics: The market, demand and supply, choice, budget, consumer satisfaction, monopoly and oligopoly, choice of production technology and returns, profit maximization and cost minimization, production welfare and public good. Macro Economics: GNP, NNP, demand and supply, inflation, interest rate, employment, saving and investment, monetary and fiscal systems and policies.

Land Economics

Economic concepts of land, objectives, and scope of land economics; relevance for special planning; economic principles of land uses; economic rent, land use and land values; market mechanism and land use pattern.

Module-II. Development of land and real property

Process, cost of development, source of finance and financial calculation for real estate developer.

Module-III. Project Economics

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

Module-IV. Capital, Interest and Profits

Basic concepts of Interest and Capital, prices and rentals on investment, Capital v/s Financial assets

Factors influencing locational decisions

Analysis of location of specific uses like residential, industrial, commercial and institutional in the light of location theories in intra-regional and inter-regional context; Techniques of cost benefit analysis of urban development programme; housing affordability as a function of real estate market's interaction with the regulatory environment.

REFERENCES

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

SUBJECT TITLE	Architectural Conservation	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR001	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	

OBJECTIVE

This course gives a brief introduction to the subject of Architectural Conservation. It discusses the history, theory and best practices in Architectural conservation. Moving from basic theories, the course touches upon the technical aspects and ethics of conservation. The course culminates with a module on sensitising the students of architecture towards designing in historic environments.

Course Objectives:

- Explore the history, philosophy and science of architectural conservation through lectures and seminar discussions.
- Encourage appropriate methodologies and tools for recording, documentation and inventorying of heritage structures.
- Develop sensitivity to design in heritage environment.

COURSE CONTENT

Module 1: INTRODUCTION TO ARCHITECTURAL CONSERVATION

Module Contents

- Definition of Conservation and its socially accepted Meanings.
- Why Conservation? Justification for conservation.
- Development of Theory of conservation and various charters of International importance like Venice charter, Burra charter, Bombay Heritage Act, etc.
- Concepts of Values, Significance, Authenticity and Integrity.
- Ethics in Conservation.

Module 2: RESEARCH IN CONSERVATION

Module Contents

- Importance of Research in conservation.
- Sources of information like books, archival photographs and maps, folklores, mythology, oral tradition and memories.
- Structuring and interpretation of collected information.

Module 3: CRITICAL ANALYSIS OF HERITAGE COMPONENTS**Module Contents**

- Understanding the concepts of Stylistic Analysis
- Understanding the Scales of various heritage components: Buildings, Areas, Towns, Region (Local, National, International)

Module 4: DOCUMENTATION**Module Contents**

- Introduction to Heritage Database and Surveys for conservation
- Listing and Inventories
- Measured Drawing: Techniques of Measurement, Drawing and Presentation
- Photographic Documentation

Module 5: DEGREES OF INTERVENTION IN HISTORIC BUILDINGS AND MONUMENTS**Module Contents**

- Prevention of deterioration
- Preservation of the existing state
- Consolidation of the fabric
- Restoration
- Rehabilitation
- Reproduction
- Reconstruction

Module 6: DECAY AND REMEDIES**Module Contents**

- Introduction to Decay in Cultural property, Materials and Structural failures
- Internal and External environment of historic buildings
- Climatic causes of decay
- Botanical, biological and microbiological causes of decay
- Insects and other pests as causes of decay
- Man-made causes of decay

Module 6: DESIGNING IN HISTORIC CONTEXT**Module Contents**

Concepts of:-Imitation, Inspiration, Innovation, Influence, Evolution, New Design.

REFERENCES

- Conservation of Historic Buildings by Fielden ,Bernard, 2003, Architectural Press.
- Guidelines for Conservation by Fielden, Bernard, 1989, INTACH, New Delhi.
- Historic England, Practical Building Conservation: Conservation Basics, 2013, Routledge.
- Contemporary Theory of Conservation by Salvador Munoz-Vinas, 2005, Elsevier.
- Recording, Documentation, and Information Management for the Conservation of Heritage Places-Guiding Principles by Letellier, Robin, , 2007, Getty Conservation Institute. Los Angeles.

SUBJECT TITLE	Architectural Journalism	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR002	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE					
This course is intended to help those, who have inclination for writing to develop their skills to enable them to record, analyse and evaluate architecture both in its theoretical and practical forms. The following forms of architectural journalism should be studied and developed.					
COURSE CONTENT					
Module-1					
Paraphrasing and summarizing given reports, Editing given materials. Writing or original reports on design projects / buildings/complexes.					
Module-2					
Writing editorials for magazines and journals. Reporting activities like seminar, panel discussions, and conferences.					
Writing captions for pictures, programmes and events. Organizing materials for publication in newspapers, magazines etc.					
Module-3					
Thesis or research report writing.					
REFERENCES					
The teacher shall develop his reference from various sources.					
NB: The students should be exposed to the work of professional art and architecture. Various forms of architecture Review/record, progressive architecture, Japan architecture etc. and journals of RIBA, American Institute of Architects, IIA, etc. Report writing should be presented to a panel to be chaired by the teachers for discussions. Criticism and consequential changes. Students other than the author should be asked to write a report/review of the discussions.					

SUBJECT TITLE	Geometry of forms	CONTACT HOURS			CREDITS
SUBJECT CODE	UPEAR003	L	T	P	3
SUBJECT CATEGORY	PE	3	0	0	
OBJECTIVE					
To make the student understand the geometry of complex forms and to generate ideas towards structural solutions.					
COURSE CONTENT					
Module-1					
Education of solid with special properties, pairs of related tetrahedral, prism and its specializations-right, equilateral, parallelepiped, antiprism, di-pyramid and trapezoidal as duals of prism and anti-prism.					
Module-2					
Archimedean solids and their duals intersections and compounds of reciprocal solids,					
Module-3					

Regular compounds Srella Ted, truncations and directions solids spaces filters and honey combs. Close spacing of spheres and cylinders. Tensile structures. Ellipsoid hyperboloids and parabolic intersections etc.

REFERENCES

Geometry of spatial forms; Gasson Peter C.ELLIS HORWOOD, New York

SUBJECT TITLE	THESIS	CONTACT HOURS			CREDITS
SUBJECT CODE	UPRAR001	L	T	P	12
SUBJECT CATEGORY	PR	0	0	18	

OBJECTIVE

Bachelor of Architecture Thesis is the final stage of learning Architectural Design. With the help of a thesis project, students are expected to demonstrate the understanding of a systematic design process which includes identification of project requirements, site study and analysis, case studies, programming, schematic design and Design Development. It provides the students with an opportunity to culminate the nine semesters of architectural education by demonstrating the body of knowledge and skills gained during their education and the professional training. The main objective of this exercise is to provide an opportunity to the students to handle a complete design project of their own choice in a practicable manner using their creative ability. This will prepare them for the challenges of the practical world once they graduate.

COURSE CONTENT

Module 1: SYNOPSIS

Module Contents

The synopsis will be a brief introduction of the proposed thesis / project and has to be submitted by the student at the end of the previous semester.

Module 2: CASE STUDY, SITE ANALYSIS AND AREA PROGRAMMING

Module Contents

- Case Study: The students have to conduct literature study and case studies – live & literature, to form a basis for their own design.
 - o Literature Review: It includes gathering the relevant standards and other information from all the available sources related to their thesis topics that will help them during the later stages of their thesis programme.
 - o Case Studies: The students have to conduct live and literature studies of similar projects. Instead of mere documentation of these projects, information must be collected about the requirements; salient design features clearly stating the positive and negative aspects of the design. Idea of the case study is to form a base for candidates own design.
- Site Analysis: The purpose of the site analysis is to record and evaluate information on the site and its surroundings, and to use this evaluation in the design response. The site analysis should identify issues that will influence the design of a development in order to make a considered response to both site opportunities and constraints, to provide a good quality living environment, and respect, acknowledge and improve the character of the area.
- Area Analysis and Programme: The students are required to prepare a comparative statement of the various available design standards, areas provided in the various case studies and the area requirements stated in the project brief, so that the area requirements for the various functions / spaces for the

proposed building can be finalized. This area programme should be an exhaustive list and will form the basis of the design process to be undertaken in upcoming stages.

Module 3: SCHEMATIC DESIGN

Module Contents

• The students have to express their ideas generated on the basis of the studies (case studies / literature studies / area analysis) conducted so far in the form of conceptual drawings, sketches and models. • The emphasis during this stage should be on the basic concept explaining the principal ideas / thought process / dream of the student for the project in terms of planning / built form / massing of different components, leading to the design, through sketches / 3D images / block models etc.

Module 4: DESIGN FINALIZATION

Module Contents

• The schematic drawings presented in the previous module needs to be detailed out as per the comments/ suggestions received from the guides and the reviewers. • The detailed drawings as per the final area programme with due consideration to structural and service requirements of the building needs to be presented at this stage.

Module 5: PRE-FINAL DESIGN

Module Contents

• The students are required to submit the final drawings, views, models, etc. incorporating the comments received in the previous reviews, to be presented before a panel of internal / external reviewers. • All the submittals should be complete in all respects except their final renderings

Module 7: FINAL THESIS SUBMISSION

Module Contents

The students are supposed to present all the submittals (drawings, model, report, etc.) complete in all respects as per the comments and suggestions received from thesis guide and various review members before the final review panel for B. Arch. Thesis.

SUBJECT TITLE	Comprehensive Viva Voice	CONTACT HOURS			CREDITS
SUBJECT CODE	ULCAR001	L	T	P	2
SUBJECT CATEGORY	LC	0	0	3	

OBJECTIVE

Examine at the end-of-course student’s knowledge about building and site services. Evaluate a student’s development in Architectural Design over the last three years.

COURSE CONTENT

1. Time Test of 3 hours duration on aspects of Water supply, Electrical, Sanitation and Sewage, Structures will be conducted on any given building.
2. Grand Viva in the Institute on the portfolio of student’s work of all five years. It will be important here to see the progressive development of the student since the time he joined the architecture course. It will be conducted by minimum three internal examiners and one external examiner.