

BACHELOR OF ARCHITECTURE

Course Structure & Syllabus

(Effective from A.Y 2015-16)

As approved by

BOS Meeting held on 11.04.2015

4th Academic Council held on 25.04.2015

Special General Meeting held on 25.04.2015

And

Amendments made in 5th Academic Council held on 28.12.2015



योजना तथा वास्तुकला विद्यालय, विजयवाडा
School of Planning and Architecture, Vijayawada
An Institute of National Importance, MHRD, Govt. of INDIA.



Amendments made in 5th Academic Council held on 28.12.2015 :

The mode of End Evaluation of the following subjects of Semester I & II are changed from written exam to Jury (from EE to EJ).

1. Model Making Workshop - I - 10110103 (Sem I)
2. Landforms Survey & Analysis - 10110104 (Sem I)
3. Model Making Workshop - II - 10110203 (Sem II)

Hence the end examination of these subjects are to be considered as EJ where ever applicable in the Course Structure and Detailed Syllabus.

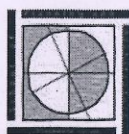


BACHELOR OF ARCHITECTURE

Revised Course Structure

(To be Effective from A.Y 2015-16)

*(As approved and recommended by the Board of Studies in Architecture
in the meeting held on 11 April 2015)*



Department of Architecture
School of Planning and Architecture: Vijayawada
(An Autonomous Institute under the Ministry of Human Resource Development, Govt. of India)
S.No. 71/1, NH-5, Nidamanuru, Vijayawada – 521 104, Andhra Pradesh, India

School of Planning and Architecture : Vijayawada

Revised Course Structure

Effective from A.Y 2012-13

It is approved and recommended by the Board of Studies in Architecture
on the meeting held on 11 April 2012



Department of Architecture
School of Planning and Architecture, Vijayawada
Plot No. 1, Phase II, Vijayawada - 520 017
Andhra Pradesh, India

FIRST SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP	
1	10110101	Fundamental Architecture Studio - I	200	--	200	400	3	6	9	6
2	10110102	Visual Representation	50	50*	--	100	2	3	5	4
3	10110103	Model Making Workshop - I	50	50	--	100	--	3	3	2
4	10110104	Landforms Survey & Analysis	50	50	--	100	1	3	4	3
5	10110105	Applied Mathematics	50	50	--	100	2	--	2	2
6	10110106	Building Materials and Construction-I	50	50	--	100	2	3	5	4
7	10110107	Environmental Sciences	50	50	--	100	4	--	4	4
8	10110108	Guided Study	100	--	--	100	--	--	--	3
9	10110109	Attendance	100	--	--	100	--	--	--	2
TOTAL			700	300	200	1200	14	18	32	30

* Viva-Voce

IA L	Internal Assessment Lecture Periods	EE S	End Examination Studio/Lab/Practicals/Workshop Periods	EJ T	External Jury Tutorial Periods	TM TP	Total Marks Total Periods

SECOND SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks					Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP		
1	10110201	Fundamental Architecture Studio - II	200	--	200	400	3	6	9	6	
2	10110202	Advanced Visual Representation	50	50*	--	100	2	3	5	4	
3	10110203	Model Making Workshop - II	50	50	--	100	--	3	3	2	
4	10110204	History of Architecture & Human Settlements - Ancient Civilizations	50	50	--	100	3	--	3	3	
5	10110205	Introduction to Structures	50	50	--	100	2	3	5	4	
6	10110206	Building Materials and Construction - II	50	50	--	100	2	3	5	4	
7	10110207	Applied Climatology	50	50	--	100	2	--	2	2	
8	10110208	Guided Study	100	--	--	100	--	--	--	3	
9	10110209	Attendance	100	--	--	100	--	--	--	2	
TOTAL			700	300	200	1200	14	18	32	30	

* Viva-Voce

IA	Internal Assessment	EE	End Examination	EJ	External Jury	TM	Total Marks
L	Lecture Periods	S	Studio/Lab/Practicals/Workshop Periods	T	Tutorial Periods	TP	Total Periods

THIRD SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks					Distribution of Periods per week				Credits
			IA	EE	EJ	TM	L	S	TP			
1	10110301	Architectural Design Studio: Residential	200	--	200	400	3	6	9		6	
2	10110302	Design Communication - I	50	50*	--	100	3	--	3		3	
3	10110303	Elective – I (Skill-based)	50	50	--	100	3	--	3		3	
4	10110304	History of Architecture & Human Settlements - Classical & early Medieval period	50	50	--	100	3	--	3		3	
5	10110305	Structural Mechanics	50	50	--	100	2	3	5		4	
6	10110306	Building Materials and Construction-III	50	50	--	100	2	3	5		4	
7	10110307	Lighting, Ventilation & Acoustics	50	50	--	100	1	2	3		2	
8	10110308	Guided Study	100	--	--	100	--	--	--		3	
9	10110309	Attendance	100	--	--	100	--	--	--		2	
TOTAL			700	300	200	1200	17	14	31		30	

* Viva-Voce

Elective - I: Basic Computers, Vernacular Architecture, Applied Ergonomics etc.

IA	Internal Assessment	EE	End Examination	EJ	External Jury	TM	Total Marks
L	Lecture Periods	S	Studio/Lab/Practicals/Workshop Periods	T	Tutorial Periods	TP	Total Periods

FOURTH SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks					Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP		
1	10110401	Architectural Design Studio: Rural Context	200	--	200	400	3	6	9	6	
2	10110402	Computer Simulation & Modelling	50	50*	--	100	1	3	4	3	
3	10110403	Art Appreciation	50	50	--	100	3	--	3	3	
4	10110404	History of Architecture & Human Settlements - High and Late medieval period	50	50	--	100	3	--	3	3	
5	10110405	Structural Analysis	50	50	--	100	2	3	5	4	
6	10110406	Building Materials and Construction -IV	50	50	--	100	2	3	5	4	
7	10110407	Water Supply & Sanitation	50	50	--	100	2	--	2	2	
8	10110408	Guided Study	100	--	--	100	--	--	--	3	
9	10110409	Attendance	100	--	--	100	--	--	--	2	
TOTAL			700	300	200	1200	16	15	31	30	

* Viva-Voce

IA Internal Assessment
 L Lecture Periods
 EE End Examination
 S Studio/Lab/Practicals/Workshop Periods
 EJ External Jury
 T Tutorial Periods
 TM Total Marks
 TP Total Periods

FIFTH SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks					Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP		
1	10110501	Architectural Design Studio: Heritage Context	200	--	200	400	3	6	9	6	
2	10110502	Interior Architecture & Space Programming	50	50	--	100	3	--	3	3	
3	10110503	Behavioural Architecture	50	50	--	100	3	--	3	3	
4	10110504	History of Architecture & Human Settlements - Late medieval & early modern architecture	50	50	--	100	3	--	3	3	
5	10110505	RCC Structures	50	50	--	100	2	3	5	4	
6	10110506	Working Drawings - I	50	50*	--	100	2	3	5	4	
7	10110507	Electrical, HVAC, Fire Safety and Building Automation	50	50	--	100	2	--	2	2	
8	10110508	Guided Study	100	--	--	100	--	--	--	3	
9	10110509	Attendance	100	--	--	100	--	--	--	2	
TOTAL			700	300	200	1200	18	12	30	30	

* Viva-Voce

IA	Internal Assessment	EE	End Examination	EJ	External Jury	TM	Total Marks
L	Lecture Periods	S	Studio/Lab/Practicals/Workshop Periods	T	Tutorial Periods	TP	Total Periods

SIXTH SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks				Distribution of Periods per week				Credits
			IA	EE	EJ	TM	L	S	TP		
1	10110601	Architectural Design Studio: Functionally Complex Buildings	200	--	200	400	3	6	9	6	
2	10110602	Design Communication - II	50	50*	--	100	3	--	3	3	
3	10110603	Theory of Architecture	50	50	--	100	2	--	2	2	
4	10110604	History of Architecture & Human Settlements - Modern and Post-Modern Era	50	50	--	100	3	--	3	3	
5	10110605	Steel Structures	50	50	--	100	2	3	5	4	
6	10110606	Working Drawings - II	50	50*	--	100	2	3	5	4	
7	10110607	Disaster Resilient Buildings	50	50	--	100	3	--	3	3	
8	10110608	Guided Study	100	--	--	100	--	--	--	3	
9	10110609	Attendance	100	--	--	100	--	--	--	2	
TOTAL			700	300	200	1200	18	12	30	30	

* Viva-Voce

IA	Internal Assessment	EE	End Examination	EJ	External Jury	TM	Total Marks
L	Lecture Periods	S	Studio/Lab/Practicals/Workshop Periods	T	Tutorial Periods	TP	Total Periods

SEVENTH SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks					Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP		
1	10110701	Architectural Design Studio: Housing	250	--	250	500	3	9	12	9	
2	10110702	Introduction to Landscape Design	50	50	--	100	2	2	4	3	
3	10110703	Seminar	100	100*	--	200	1	3	4	6	
4	10110704	Elective – II (Theory-based)	50	50	--	100	3	--	3	3	
5	10110705	Estimation, Costing & Specifications	50	50	--	100	4	--	4	4	
6	10110706	Construction Project Management	50	50	--	100	3	1	4	3	
7	10110707	Attendance	100	--	--	100	--	--	--	2	
TOTAL			650	300	250	1200	16	15	31	30	

* Viva-Voce

Elective-II: Building Repairs and Restoration, Environmental Impact Assessment, Set Design, Advanced Architectural Acoustics, Adv. Building Technology etc.

IA	Internal Assessment	EE	End Examination	EJ	External Jury	TM	Total Marks
L	Lecture Periods	S	Studio/Lab/Practicals/Workshop Periods	T	Tutorial Periods	TP	Total Periods

EIGHTH SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP	
1	10110801	Professional Training	--	--	1200	1200	--	--	--	30
TOTAL			--	--	1200	1200	--	--	--	30

NINTH SEMESTER

Sl. No.	Subject Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP	
1	10110901	Architectural Design Studio: Urban Context	250	--	250	500	3	9	12	9
2	10110902	Introduction to Urban Design	50	50	--	100	2	2	4	3
3	10110903	Architecture and Urbanism in Asia	50	50	--	100	3	--	3	3
4	10110904	Elective – III (Theory-based)	50	50	--	100	3	--	3	3
5	10110905	Dissertation	100	100*	--	200	3	2	5	7
6	10110906	Building Economics	50	50	--	100	3	--	3	3
7	10110907	Attendance	100	--	--	100	--	--	--	2
TOTAL			650	300	250	1200	17	13	30	30

* Viva Voce

Elective-III: Project Formulation & Appraisal, Traffic and Transport Planning, Planning and Management of Informal Sector, Real Estate Planning and Management, Utilities and Network Planning, Bio-Climatic Architecture etc.

IA	Internal Assessment	EE	End Examination	EJ	External Jury	TM	Total Marks
L	Lecture Periods	S	Studio/Lab/Practicals/Workshop Periods	T	Tutorial Periods	TP	Total Periods

TENTH SEMESTER

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	S	TP	
1	10111001	Architectural Design Thesis	500	--	500	1000	7	21	28	24
2	10111002	Professional Practice	50	50	--	100	4	--	4	4
3	10111003	Attendance	100	--	--	100	--	--	--	2
TOTAL			650	50	500	1200	11	21	32	30

IA Internal Assessment
L Lecture Periods

EE End Examination
S Studio/Lab/Practicals/Workshop Periods

EJ External Jury
T Tutorial Periods

TM Total Marks
TP Total Periods

SUMMARY OF MARKS AND CREDIT DISTRIBUTION

Semester No.	IA	EE	EJ	Total Marks	Total Periods	Credits
Semester I	700	300	200	1200	32	30
Semester II	700	300	200	1200	32	30
Semester III	700	300	200	1200	31	30
Semester IV	700	300	200	1200	31	30
Semester V	700	300	200	1200	30	30
Semester VI	700	300	200	1200	30	30
Semester VII	650	300	250	1200	31	30
Semester VIII	--	--	1200	1200	--	30
Semester IX	650	300	250	1200	30	30
Semester X	650	50	500	1200	32	30
TOTAL	6150	2450	3400	12000	278	300
	6150	5850				

IA Internal Assessment

EE End Examination

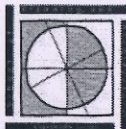
EJ External Jury

BACHELOR OF ARCHITECTURE

REVISED DETAILED SYLLABUS

(To be effective from A.Y 2015-16)

*(As approved and recommended by the Board of Studies in Architecture
in the meeting held on 11 April 2015)*



Department of Architecture
School of Planning and Architecture: Vijayawada
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I – SEMESTER**10110101 Fundamental Architecture Studio - I**

Number of Credits	6	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	200
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	6	External Jury	200
Total Periods per Week	9	Total Marks	400

Subject Objective: To introduce to the students the fundamentals of design and development of design vocabulary, to nurture design thinking and to enable them to apply the same thought process in developing three-dimensional compositions. The studio also introduces drawings and models as tools for conceptualisation, organisation and furthering of design thought process. This studio teaches the students to learn the basics of graphic design and three-dimensional composition. The studio also has a direct interface with the Graphic Design Studio and Architectural Workshop.

Course Content

Introduction to elements of design like point, line, plane, solid and void. Understanding the importance of design principles like balance, harmony, rhythm, contrast, symmetry, scale, proportions, colours, tones, textures etc.

Study of solids & voids to evolve sculptural forms & spaces; explore play of light & shade and application of colour. Introduction to external & internal forms, analytical appraisal of forms, their quality; Concept of space, interrelationship between space, volume and order; Variations in forms with planer juxtapositions.

Anthropometric study and ergonomics of human figure (including physically handicapped persons), dimensions of furniture - relationship with human anthropometrics (like in kitchens, toilets, bedrooms, staircases etc.) with freehand drawing of human figures, vehicles, trees, buildings etc. to have a better understanding of proportion.

Studio Project

Exercises in Point, line and shapes; Exploring colour schemes and their application in a visual composition and in architectural forms and spaces; Collage with a given theme; To achieve focus and centre of interest in design using different textural elements; Development of geometric pattern by division, subtraction, and addition, and express them with the use of colours; Two & Three dimensional Design Exercises involving real and imaginary objects, drawing compositions and models, to form an appropriate base for subsequent Architectural design and theory. Study models of different materials viz. paper, clay, wax, soap, wires etc. made by themselves. Understanding of scale and proportions through measurement of spaces using only human body elements.

Exercises in order to experiment basic proportions, body relations and spatial concepts. Layout of furniture based on anthropometrics. Anthropometrics for physically challenged persons. Exercises in order to experiment basic proportions, body relations and spatial concepts. Designing of basic building components (like kitchens, bedrooms, toilets etc.) Design exercise on threshold conditions and small-scale domestic space. Students will learn skills in problem solving, visualization, oral, and graphic communication. Field trips to relevant architectural sites.

References:

1. Broadbent, G. (1973). *Design in Architecture - Architecture and Human Science*. New York : John Wiley and Sons.
2. Chauhan, P. (2005). *Learning Basic Design*. Mumbai : Rizvi College of Architecture.
3. Ching, F. D. K. (1997). *Design Drawing*. Hoboken : John Wiley & Sons.
4. Ching, F. D. K. (2012). *Architecture: Form, Space and Order*. 3rd Ed. Hoboken: John Wiley & Sons.
5. Roger, K. L. (1998). *Architect? A Candid Guide to the Profession*. Cambridge : The MIT Press.
6. Rasmussen, S. (1962). *Experiencing Architecture*. 2nd Rev. Ed. Cambridge : MIT Press.

10110102 Visual Representation

Number of Credits	4	Subject Category	S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination (Viva-Voce)	50
Studio/Lab/Workshop/Practical's	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective:

- Introducing students to fundamental techniques of Visual representation and to equip with the basic principles of representation.
- Enhancing the skills in developing a graphical language of architecture.

Unit-I. Learning Sketching, Drawing, and visual thinking

Free-hand drawing appropriate to visual & architectural representation, indoor & outdoor sketching, drawing from observation, terminology & abbreviations used in visual representation, Sheet layouts, line & shape, tone & texture, figure & ground, Color & value, lettering & art lettering, dimensioning, shading, symbols & scale.

Unit-II. Design principles and representation techniques

Representation techniques focusing on rhythm, harmony, character, balance, emphasis, ideograms, Interpretation of scale and proportion.

Unit-III. Understanding the complexity of forms

Metaphor in visual representation through natural objects, understanding complexity of forms using graphics and models.

Unit-IV. Geometric Drawings and Projections

Construction of lines, angles, Constructions of planes- circles, tangent, curves, conic, sections and regular polygons. Introductions to projections, methods of orthographic projections - Points, lines, planes and solids.

Unit-V. Section of solids and development of surfaces

Section of solids such as prisms, pyramids, cylinders, cones and spheres etc., Development of surfaces of solids, Intersection of surfaces.

References:

1. Ching, F. D. K. (2011). *A Visual Dictionary of Architecture*. 2nd Ed. John Wiley & Sons.
2. Martin, L. C. (1970). *Architectural Graphics*. 2nd Ed. Macmillan Pub Co.
3. Morris, I. H. (1902). *Geometrical Drawing for Art Students*. Longmans.
4. Lockard, W. K. (1992). *Drawing as a Means to Architecture*. 6th Ed. New York : Van Nostrand Reinhold Company.
5. Zell, Mo. (2008). *The Architectural Drawing Course*. 1st Ed. Thames and Hudson.

10110103 Model Making Workshop - I

Number of Credits	2	Subject Category	L
Lecture Periods per Week	0	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	3	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: To equip students with the basic skills necessary to represent their ideas in simple models format using simple materials. To make students practice with various tools essential for making architectural models.

Unit-I. Architectural Model making

Need for architectural models. Role of scale-models in design. General practices in model making. Types of models: block, detailed, construction & interior models.

Unit-II. Joinery - I

Simple exercises in cutting, finishing and joinery with simple blocks, composition of basic geometrical forms etc.

Unit-III. Joinery - II

Simple joinery details in wood. Pipes and sleeve joints. Metal-welded joints, nut-bolt joints.

Unit-IV. Tools and Materials - I

Various materials and tools to be used in model making. Use of materials, viz. paper, mount board, cardboard in architectural models.

Unit-V. Tools and Materials - II

Use of materials viz. Clay, Plaster of Paris (POP) in architectural models.

References:

1. Ching, F. D. K. (2009). *Architectural Graphics*. 5th Ed. New Jersey : John Wiley & Sons.
2. Criss, B. M. (2011). *Designing with models: A Studio guide to Architectural Process Models*. 3rd Ed. Hoboken :John Wiley & Sons.
3. Kieran, S. and Timberlake, J. (2008). *Lobolly House : Elements of a New Architecture*. New York : Princeton Architectural Press.
4. Morgan, C. L. and Nouvel, J. (2002). *The Elements of Architecture*. London : Thames & Hudson.
5. Werner, M. (2011). *Model Making*. New York : Princeton Architectural Press.

10110104 Landforms Survey and Analysis

Number of Credits	3	Subject Category	T+L
Lectures periods per week	1	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals per week	3	External Jury	--
Total Periods per week	4	Total Marks	100

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

Unit-I. Introduction

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

Unit-II. Linear Measurements

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

Unit-III. Contours in Landforms

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

Unit-IV. Sloping Landforms and Levelling

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

Unit-V. Precision methods in Landforms Survey & Measurement

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

Practicals:

Chaining station points, offsets, field-book entry, single & double line entry, Triangulation, Traversing, Plotting, Calculation of Areas. **Compass Surveying** Traversing, balancing, closing errors, plotting, calculating areas. Plane Table Surveying, Two & Three Point Problems. **Theodolite**, measuring angles, Theodolite Traversing and Plotting, balancing closing errors. Demonstration of Surveying with Total Station equipment. **Levelling** Level book entry, Preparation of contour Map.

References:

1. Miller, V. C. and Westerback, M. E. (1989). *Interpretation of Topographic Maps*. Columbus : Merrill.
2. Lynch, K. and Hack. G. (1984). *Site Planning*. 3rd Ed. Cambridge : Maple-Vail Inc.
3. Easterbrook, D.J. (1999). *Surface Processes and Landforms*. 2nd Ed. New York : McMillan.
4. Carson, M. A. and Kirkby, M. J. (1972). *Hill slope Form and Process*. London and New York : Cambridge University Press.
5. Aror, K.R. (2004). *Surveying Vol. 1-3*. Delhi : Standard Book House.
6. Chandra, A. M. (2002). *Plane Surveying*. New Delhi : New Age International.
7. Duggal, S. K. (2004). *Surveying Vol. 1-2*. New Delhi : Tata McGraw Hill.
8. Punmia, B. C., Jain, A. K. and Jain, A. K. (2005). *Surveying Vol. I-III*. New Delhi : Laxmi Publications.
9. Shahani, P. B. (1980). *Text of Surveying Vol. I*. Oxford and IBH Publishing.
10. Subramanian, R. (2012). *Surveying and levelling*. New Delhi : Oxford University Press.

10110105 Applied Mathematics

Number of Credits	2	Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical per Week	0	External Jury	--
Total Periods per Week	2	Total Marks	100

Subject Objective: To equip the students with necessary mathematical background to comprehend the aspects of design elements and structural stability. To recap students about the mathematical concepts of statistics and probability, matrices, differential and integral calculus and partial differentiation and enable them to understand the application of these mathematical concepts related to architecture.

Unit-I. Mathematics in Design

Proportion, Golden ratio and Beauty, Scale, fractal design, Euclidean geometry, Understanding non-parallel surfaces, Symmetry and Anti-symmetry.

Unit-II. Statistics & Probability

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

Unit-III. Matrices

Adjoint, transpose and inverse of matrices, orthogonal matrix, Rank of matrix, Consistency and inconsistency of a linear equations.

Unit-IV. Differential and Integral Calculus

Tangent and Normal, Curvature (Cartesian and parametric forms), Taylor's and McLaurin's expansion for one variable. Indeterminate forms, Maxima, Minima for a function of one variable. Reduction Formulae, Use of double and triple integrals, Calculation of areas using multiple integrals.

Unit-V: Mathematics and Measurements

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

References:

1. Ching, F. D. K. (2001). *Architecture: Form, Space, and Order*. 3rd Ed. New York : John Wiley & Sons.
2. Grewal, B. S. (1998). *Higher Engineering Mathematics*. Delhi : Khanna Publishers.
3. Kandasamy, P., Thilagavathy, K. and Gunavathy, K. (1998). *Engineering Mathematics Vol – I & II*. New Delhi : S. Chand Publishers.
4. Kreyszig, E. (2007). *Advanced Engineering Mathematics*. Hoboken : John Wiley & Sons.
5. Ramana, B.V. (2006). *Higher Engineering Mathematics*. New Delhi : Tata McGraw-Hill.
6. Reenberg, M. D. (1998). *Advanced Engineering Mathematics*. 2nd Ed. New Jersey : Prentice-Hall.
7. Salinas, N. A. (2006). *A Theory of Architecture*. Solingen : Umbau-Verlag.
8. BIPM. (2014). *The International System of Units (SI)*. 8th Ed. Bureau International des Poids et Mesures.

10110106 Building Materials and Construction - I

Number of Credits	4	Subject Category	T+S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	3	External Jury	-
Total Periods per Week	5	Total Marks	100

Subject Objective: To understand fundamental building material in the context of various construction methods. Focus on various building materials would be emphasised based on the performing standards and codes, wherein application of each material would be discussed in detail, both in the context of historical and contemporary methodology. With time, each topic can also focus on latest trends in practice and usage of new technology/materials.

Each material would be taught in a manner such that its application would be discussed in a sequential manner, starting from foundation level, followed by plinth & others (*sill, lintel, sunshades, window/door openings, walling material, as a floor & flooring*) and culminating at roof and parapet wall.

Unit-I. Introduction to fundamental components of a building

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.

Unit-II. Introduction to Building Materials (Sand, Clay, Stone, Lime, Metal and Glass)

Source of the material, classification, tests and various grades available and their uses, physical and chemical properties. Introduction to ferrous and non-ferrous metals-their properties, types and application in building components. Composition of glass, brief study on manufacture, properties, treatment, and uses of glass. Types of glass.

Unit-III. Timber

Types of timber, defects, seasoning and preservation of timber. Ecological impact due to use of wood, deforestation etc. Study of engineered wood used in buildings, i.e., plywood, block boards, particleboards, and other types. Application of timber in building components with Joinery details. Terms defined; mitring, ploughing, grooving, rebating, veneering. Types of joints in wood work: lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon etc.

Unit-IV. Cement

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

Site study and Report:

The student has to visit a site and study the building with respect to the above-discussed topics and give a brief report with sketches and photographs at the end of the semester.

Note:

- a) Site visits and Market studies shall be conducted to facilitate understanding of latest materials and construction techniques on-site.
- b) Pedagogy should establish the linkage of the relevant material and construction techniques from past to present.

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. Hailey and Hancork, D. W. (1979). *Brick Work and Associated Studies Vol. II*. London : MacMillan.
4. McKay, W. B. (2005). *Building Construction Metric Vol. I-IV*. 4th Ed. Mumbai : Orient Longman.
5. Moxley, R. (1961). *Mitchell's Elementary Building Construction*. London : B. T. Batsford.
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.

10110107 Environmental Sciences

Number of Credits	4	Subject Category	T
Lectures periods per week	4	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals per week	0	External Jury	--
Total Periods per week	4	Total Marks	100

Subject 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.

Unit-I. 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.

Unit-II. 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.

Unit-III. 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.

Unit-IV. Social issues and Environment

Social issues and the environment, from 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.

Unit-V. 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.

10110108 Guided Study

Number of Credits	3	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To inculcate the habit of reading books related to architecture and allied subjects in a structured manner.

Course Content

This course involves library based study and report writing. The students are expected to read two or more books in a given subject area or by a particular author, as assigned by the faculty. They are expected to write critical essays, book reviews or a research report based on their readings.

10110109 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks

SEMESTER II**10110201 Fundamental Architecture Studio - II**

Number of Credits	6	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	200
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	6	External Jury	200
Total Periods per Week	9	Total Marks	400

Subject Objective: To introduce architectural design as a process and as a final product; to understand fundamentals of space, form and order as basic architectural skills. To involve students in a design project that will involve simple space planning and the understanding of the functional aspects of good design; to enable the students apply theoretical knowledge learnt in the previous semester in architectural design exercise.

Course Content:

This foundational architecture studio orients the students towards learn the fundamentals of architectural design. They learn application of form, space, proportion, scale, order, including golden sections and modular concepts through examples from architectural theory and history taught in the previous semester.

The studio introduces the students to elements of architecture; understanding measured drawing of existing small human habitat. Importance of physical factors in Architectural design e.g. orientation, ventilation, adequate protection from rain, dust, insects etc., and human dimensions in various postures (applied form), their relation to everyday utilities.

Indoor space, outdoor space, the concept of space in buildings. The relationship between man and space. Defining spaces and the degree of enclosure. Organization of spaces, fenestration, and character of facade, enclosure and internal spaces. Introduction to site planning, and landscaping. Interpretation of site information as a decision making aid.

Studio project:

Measured drawing of a small building, such as a small residential building or office, etc. Simple circulation/flow diagrams for a small house, a small school, hostel, office etc. to understand the functional interrelationships of various spaces in building. Design of small-scale human habitat and introduces the idea that a successful proposition manifests the complex and imaginative inter-relationships between physical, environmental, social and cultural factors.

The Students are expected to develop a series of abstract models that demonstrate some of the essential spatial/ programmatic characteristics of the project. Activities of the graphic design studio and architectural workshop are to be synchronised with the studio exercise.

References:

1. Ching, F. D. K. (2012). *Architecture: Form, Space and Order*, 3rd Ed. Hoboken : John Wiley & Sons.
2. Roth, L. M. (2013). *Understanding Architecture: Its Experience History and Meaning*, 3rd Ed. Philadelphia : West-view press.
3. Rudolf, A. (1977). *The dynamics of architectural form*. Berkeley and Los Angeles: University of California Press.
4. Prak, N. L. (1968). *The Language of Architecture: A contribution to architectural theory*. Hague :

Mouton & Co.

5. Paul, A. J. (1994). *The Theory of Architecture—Concepts & themes*. New York : Van Nostrand Reinhold. New York.
6. Pandya, Y. (2007). *Elements of Space making*. Ahmedabad : Mapin.
7. Peter, V. M. (1998). *Elements of architecture – from form to place*. 1st Ed. New York : Routledge.
8. Unwin, S. (2003). *Analysing Architecture*. London : Rouledge.

10110202 Advanced Visual Representation

Number of Credits	4	Subject Category	S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination (Viva-Voce)	50
Studio/Lab/Workshop/Practical's/Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective:

- Introducing students to fundamental techniques of architectural representation and to equip with the basic principles of representation.
- Enhancing the skills in developing a graphical language of architecture.

Unit-I. Isometric and Axonometric Views

Introduction to views, types and advantages. Isometric, Axonometric and Oblique view of objects, building components and Interior of the room.

Unit-II. Fundamentals of Perspectives-I

Introduction to perspectives, difference between views & perspectives, Types of perspectives: one point, two point & three point, Anatomy of Perspectives - Objects, study of picture plane, station point, vanishing point, Eye level, Ground level etc., its variation & effects.

Unit-III. Fundamentals of Perspectives-II

Perspective drawing of simple and complex objects, one point and two point perspective of interiors and exteriors, sectional perspectives.

Unit-IV. Sciography

Introduction to Sciography, Principles of shade & shadow, Shadows of lines, planes & simple solids due to near & distant sources of light, shadows of architectural elements, Construction of sciography on building, Application of sciography on pictorial views.

Unit-V. Rendering Techniques

Representation technique of plan, elevation & section in architectural drawing. Kinetics & Optics, Monochromatic & different themes of rendering, architectural rendering techniques using pen & ink, color, values, tones, and general approach to rendering. Architectural representation of trees, hedges, foliage, human figures, cars, symbols etc., exposure to various mediums of presentation

References:

1. Atkins, B. (1986). *Architectural Rendering*. California : Walter Foster Art Books.
2. Batley, C. (1973). *Indian Architecture*. Bombay : D. B. Taraporevale Sons.
3. Bhatt, N. D. (2003). *Engineering Drawing*. Anand : Charotar Publishing House.
4. Ching, F. D. K. (2009). *Architectural Graphics*. 5th Ed. Hoboken : John Wiley & Sons.
5. Ching, F. D. K. (2011). *A Visual Dictionary of Architecture*. 2nd Ed. Hoboken: John Wiley & Sons.
6. Dinsmore, G. A. (1968). *Analytical Graphics*. Canada : D. Van Nostrand, Company Inc.
7. Halse, A. O. (1972). *Architectural rendering; the techniques of contemporary presentation*. 2nd Ed. New York : McGraw-Hill.
8. Holmes, J. M. (1954). *Applied Perspective*. London : Sir Isaac, Piotman and Sons Ltd.
9. Narayana, K. L. and Kannaiah, P. (1988). *Engineering Graphics*. New Delhi : Tata McGraw-Hill.
10. Norling, E. (1969). *Perspective drawing*. California : Walter Foster Art Books.
11. Robert, W. G. (2006). *Perspective: From Basic to Creative*. 1st Ed. London : Thames and Hudson.

10110203 Model Making Workshop - II

Number of Credits	2	Subject Category	L
Lecture Periods per Week	0	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	3	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: To equip students with the basic skills necessary to represent their ideas in simple models format using simple materials. To make students practice with various tools essential for making architectural models.

Unit-I. Development of Surfaces

Methods of surface development by Parallel-line, Radial-line, Triangulation methods, approximate methods, development of lateral surfaces of right solids, viz. Cubes, prisms, cylinders, pyramids, cones. Development of transition pieces, for spheres etc.

Unit-II. Scale modelling

Use of different scales; templates; measuring aids; conventions followed.

Unit-III. Use of advanced Tools and Materials - I

Use of materials, viz. Acrylic, Polystyrene (thermocole), softwood, plastics, glass fiber, metals in architectural models.

Unit-IV. Use of advanced Tools and Materials - II

Painting model surfaces with various finishes, development of topography and landscape elements, use of materials like cork, polyurethane foam, use of laser, acid etching, stereolithography for development of building envelopes.

Unit-V. Presentation modelling

Skills to use the tools with precision, Techniques for preparation of presentation models. General information and practice with different finishing material.

References:

1. Bhatt, N. D. (2003). Engineering Drawing. Anand : Charotar Publishing House.
2. Ching, F. D. K. (2009). *Architectural Graphics*. 5th Ed. Hoboken : John Wiley & Sons.
3. Criss, B. M. (2011). *Designing with models: A Studio guide to Architectural Process Models*. 3rd Ed. Hoboken : John Wiley & Sons.
4. Kieran, S. and Timberlake, J. (2008). *Loblolly House : Elements of a New Architecture*. New York : Princeton Architectural Press.
5. Morgan, C. L. and Nouvel, J. (1998). *The Elements of Architecture*. London : Thames and Hudson.
6. Werner, M. (2011). *Model Making*. New York : Princeton Architectural Press.

10110204 History of Architecture and Human Settlements – Ancient Civilizations

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: To provide an insight in to the architecture of prehistoric period and early civilizations. 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 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.

Unit-I. Prehistoric / Primitive Architecture

Primitive people, shelters, settlements, burial systems, megaliths and memorials. Eg: Oval huts near Nice, Dolmen tomb, Gallery grave, Passage grave, Cairns, Tumulus, Houses at Catal Huyuk, Stonehenge etc.

Unit-II. Nile Valley Civilisation

Study of socio-cultural, religious and political systems, people's beliefs, climate and other factors influencing Architecture, character of human settlements, typology of Shelters and buildings, Religious burial systems and Cult temples of Egypt, construction methods and materials used.

Unit-III. Indus Valley Civilisation

Contributions of Archaeologists, Timeline, socio-cultural, religious and political systems, settlement planning pattern, typology of Shelters and civic buildings, Citadel-Grannary-Great baths, civic utility systems.

Unit-IV. Aryan / Vedic Civilisation

Timeline with reference to Indus Valley Civilisation, settlement planning pattern and Town forms by planning pattern (Dandaka, Nandyavartha etc.), typical Vedic village, shelter types by shape and material used, Torana and Sacred railings.

Unit-V. Euphrates and Tigris Valley Civilisations

Architectural character as a reflection of climate and geology, planning of Palaces of Assyria and Persia, Ziggurats and corbelled drains of Assyria, Staircases of Persepolis, physical planning of Babylonia, Ur-Sumar.

Chinese Civilisation: Architectural character, building typologies, settlement pattern, Settlement layout and planning principles adopted.

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. Dutt, B. B. (2009). *Town Planning in Ancient India*. Delhi : Isha Books.
6. Kimball, F. and Edgell, G. H. (2012). *A History of Architecture*. Amazon : Ulan Press.
7. Faulkner, H. T. (1953). *Architecture through the Ages*. New York : Putnam Adult.
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. Harris, M. C. (1977). *Illustrated Dictionary of Historic Architecture*. New York : M. Courier Dover Publications.
11. Ingersoll, R. And Kostof, S. (2013). *World architecture: a cross-cultural history*. Oxford : Oxford University Press.
12. Prammar, V. S. (2005). *A social history of Indian architecture*. New Delhi : Oxford University Press India.
13. Roth, M. L. (2006). *Understanding Architecture: Its Elements, History, and Meaning*. Columbia : West-view Press.
14. SenGupta, B. K. (2006). *Reading material on History of Human Settlements*. New Delhi : ITPI.
15. Singh, U. (2009). *A history of ancient and early medieval India: from the Stone age to the 12th century*. Delhi : Pearson India.
16. Watkin, D. (2005). *A History of Western Architecture*. 4th Ed. London :Laurence King Publishing.

10110205 Introduction to Structures

Number of Credits	4	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective: To make students the student will be familiar with the basic theorems and mechanical properties of engineering materials, elastic constants, different types of stresses and strains, the deformation of elastic bodies under simple stresses, the use and principles of composite sections, analysis of perfect frames for vertical loads by analytical as well as graphical methods.

Unit-I. History of structural design in the pre and post industrial era

Development of monolithic, rock-cut structures, trabeated construction, arcuate construction, vaults, flying buttresses, tents, masted structures & bridges through ancient & medieval history. Post Industrial modular construction of large span & suspension structures in steel and concrete- examples of iconic projects.

Unit-II. Physical properties of basic building materials

Characteristics and strength of natural and manmade building materials like stone, clay, brick, terracotta, cement and aggregate.

Unit-III. Introduction to forces and moments

Introduction of forces, composition, resolution, moments and couples, Resultant of forces, Lami's theorem, principle of moments, Varignon's theorem. Principle of equilibrium. Simple problems. Concurrent and non-concurrent co-planar force systems, resultant and equilibrate analytical and graphical solutions.

Unit-IV. Mechanical properties of building materials

Simple stresses and strains, elasticity. Stress, strain, types of stresses, elastic limit, modulus of elasticity, composite sections. Stresses due to change in temperature. Elastic constants, linear strain, lateral strain, Poisson's ratio, volumetric strain, relation between E, N, and K.

Unit-V. Analysis of trusses and frames

Introduction to trusses, Elements of truss, Assumptions for truss analysis, structural Determinacy, methods of analysis of trusses.

Material testing laboratory-I

1. Compression test on Bricks and Solid Blocks.
2. Water absorption test on Bricks and pressed tiles.
3. Flexure test on Tiles.
4. Fineness test of cement and other mineral admixtures
5. Determination of bulking characteristics of the given sand sample.
6. Study of models of truss and brick bonds.
7. Study of UTM, Torsion testing machine, Hardness testing Machine, Compression testing Machine etc. understanding operation and application.
8. Demonstration of Strain gauges and Strain indicators
9. Study of Strain Recording Instruments.

References:

1. Ferdinand, L. S. (1975). *Engineering Mechanics: Statics and Dynamics*. 3rd Ed. New York : Harper Collins Publishers.
2. Junnarkar, S. B. (1991). *Mechanics of Structures. Vol. 1*. 21st Ed. Delhi : Charotar.
3. Kumar, K. L. (2003). *Engineering Mechanics*. Delhi : Tata McGraw-Hill Education.
4. Ramamrutham, S. (2008). *Engineering Mechanics: A Textbook of Applied Mechanics*. New Delhi : Dhanpat Rai Publishing Company.
5. Timoshenko, S., Young, D. H. and Rao, J. V. (2007). *Engineering Mechanics*. 4th Ed. New Delhi : Tata McGraw-Hill Education.

10110206 Building Materials and Construction – II

Number of Credits	4	Subject Category	T+S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective: Focus on various building materials and construction techniques would be based on the performing standards and codes, wherein application of each material would be discussed in detail, both in the context of historical and contemporary methodology. With time, each topic can also focus on latest trends in practice and usage of new technology/materials. Emphasis is given on load bearing building construction.

Each material would be taught in a manner such that, its application would be discussed starting from foundation, lintel, sunshades, window/door openings, walling material, and floor & flooring and culminating at roof and parapet wall.

Unit-I. Brick Masonry

About material: Manufacturing process, physical and chemical properties Applications: Foundation, walling material, types of brick walls, brick masonry (English, Flemish, rat trap bond) detailed brick layout at corners, junctions and brick piers, style of construction viz., exposed brick work, madras terrace roof, jack arch roof, brick paving, brick arches and domes, reinforced brick roofs and walls, brick piers etc.

Unit-II. Stone Masonry

Geological Classification of rocks – stones (granite, laterite, quartzite, marble, slates), uses of stone, deterioration & preservation of stone, availability, properties and application of stones for construction in India. Stone for finishing, cutting & polishing. Granite & Marble. Types of stone masonry.

Sets of drawings: types of bricks, header and stretcher, English, Flemish bonds, stone masonry, types of material indications, t- junctions and cross-junctions.

Unit-III. Foundations

Definitions, Purpose of foundation, types of foundation, selection criteria for foundation based on soil conditions, physical properties and behaviour of various types of soil, bearing capacity, methods of site exploration and testing of soil, introduction to shallow and deep foundation.

Set of drawings (Units I & II): Load bearing Foundation (brick and stone)

Unit-IV. Cement concrete

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

Unit-V. Roofs and Roof coverings

Introduction, characteristics of roof, types of roofs (flat- madras terrace roof, RCC slab, classification of roofs by the method of geometry and methods of construction – pitched, lean-to, coupled, couple-closed, collar, scissor, king post and queen post), and by materials (GI sheets, Fibre, Glass, Aluminium, asphaltic, polycarbonate, clay tiles, coir-based corrugated sheets, etc). Roof fixing details along with gutter.

Set of drawings: Types of trusses (joinery and fixing details of different types of roofing materials).

Site study and Report: The student has to visit a site and study the building with respect to the above-discussed topics and give a brief report with sketches and photographs at the end of the semester.

Note:

- a) Lecture classes shall be supplemented with adequate studio hours where students are required to prepare construction drawings.
- b) Site visits and Market studies shall be conducted to facilitate understanding of latest materials and construction techniques on-site.
- c) Pedagogy should establish the linkage of the relevant material and construction techniques from past to present.
- d) Alternative construction techniques for respective topics needs to be discussed in detail.

References:

1. Barry, R. (1999). *The Construction of Buildings Vol. 2*. 5th Ed. New Delhi : East-West Press.
2. Bindra, S.P. and Arora, S.P. (2000). *Building Construction: Planning Techniques and Methods of Construction*, 19th Ed. New Delhi : Dhanpat Rai Publications.
3. Ching, F. D. K. (2000). *Building Construction Illustrated*. 3rd Ed. New York : Wiley.
4. Edward, A. and Piano, J. (2009). *Fundamentals of Building Construction: Materials and Methods*. 5th Ed. Hoboken : John Wiley & Sons.
5. Foster, J. S. (1963). *Mitchell Building Construction: Elementary and Advanced*. 17th Ed. London : B.T. Batsford Ltd.
6. Hailey and Hancork, D. W. (1979). *Brick Work and Associated Studies Vol.II*. London : MacMillan.
7. McKay, W. B. (2005). *Building Construction Metric Vol. 1-IV*, 4th Ed. Mumbai :Orient Longman.
8. Moxley, R. (1961). *Mitchell's Elementary Building Construction*. London : B. T. Batsford.
9. Rangwala, S. C. (1963). *Building Construction: Materials and types of Construction*, 3rd Ed. New York : John Wiley and Sons.
10. Rangwala, S. (2004). *Building Construction*. 22nd Ed. Anand.: Charotar Pub. House.
11. Sushil-Kumar, T. B. (2003). *Building Construction*, 19th Ed. Delhi : Standard Publishers.

10110207 Applied Climatology

Number of Credits	2	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's	0	External Jury	--
Total Periods per Week	2	Total Marks	100

Subject Objective: Equip the students with scientific background required to design climate responsive buildings, by offering a clear understanding of the various climatic zones and its climate responsive considerations in architectural design of building and built up areas.

Unit-I.

Global climate factors, elements of climate, classification of climatic zones, desirable conditions, principals of thermal conditions and STI, body heat exchange, thermal balance, psychometric chart, sun path, sun angles, SAP, sunshine hours, solar noon, declination, extraterrestrial radiation, solar constant, radiation on different of different directions with different inclination of walls. Effect of climate on habitat, shelter and environment. Human comfort conditions – comfort chart, comfort zone, effective temperature, humidity, radiation, wind, precipitation and its considerations at Macroclimate and Microclimate. Effect of landscape elements on Climate and Architecture. Impact of climate and building on Ecological balance.

Unit-II.

Radiation spectrum, spectral sensitivity of eye, visual cone and comfort, daylight assessment, types of reflection, glare and quality and spread of light in buildings. Sound waves, audible range of sounds, equal loudness controls, noise reduction systems, sound transmission path. Thermal conductivity, emissivity, radiation, Reflectivity and convection. Density, specific heat, latent heat, thermal bridging, diffusivity, thermal insulation. Heat loss through common building elements due to transmission, R-values and U-values - imperial and SI units.

Unit-III. Fundamentals of Thermo-dynamics

Basic concepts of thermo-dynamics, state and path functions, thermodynamic equilibrium, concept of perfect gas, specific heat, energy, temperature, pressure, Laws of thermodynamics.

Unit-IV.

Reduction Heat Transfer or Enhancement, insulation properties of materials and built forms. Radiation versus other Heat Transfer Methods, Evaluating various built form and its components / or materials for comfort conditions with respect to thermal, visual and air movement.

Unit-V.

Brief introduction of rating systems for climate responsive buildings such as LEED, GRIHA and others. Broad understanding of models, strategies and codes related to energy efficient and climate responsive considerations in buildings and built up areas.

References:

1. Chand, I. and Bhargava, P. K. (1999). *The Climatic Hand Book*. New Delhi : Tata McGraw-Hill.
2. Duffie, J. A. and Beckman, W. A. (1980). *Solar Engineering of thermal process*. New York : John Wiley & Sons.
3. Kaushik, S. C. (1989). *Solar Refrigeration and Space Conditioning*, Jodhpur : Divya-jyoti Prakashan.
4. Koenigsberger, O. H., Ingersoll, T. G., Mayhew, A. and Szokolay, S. V. (1980). *Manual of Tropical Housing and Building: Climatic design*. Hyderabad : Orient Longman.
5. Kukreja, C. P. (1982). *Tropical Architecture*. New Delhi : McGraw-Hill.
6. Lam, W. M. C. (1986). *Sun-lighting as Form-giver for Architecture*. New York : Van Nostrand Reinhold.
7. Olgyay, A. and Olgyay, V. (1976). *Solar Control and Shading Devices*. New Jersey : Princeton University Press.
8. Sudha, M. S., Bansal, N. K., Kumar, A. and Bansal, P. K. (1986). *Solar passive buildings, science and design*. London : Pergamon Press.
9. USGBC. (1996). *Sustainable Building Technical Manual*. Public Technology Inc.
10. Wright, D. (1984). *Natural Solar Architecture*. New York : Van Nostrand Reinhold Company.

10110208 Guided Study

Number of Credits	3	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To inculcate the habit of reading books related to architecture and allied subjects in a structured manner.

Course Content

This course involves library based study and report writing. The students are expected to read two or more books in a given subject area or by a particular author, as assigned by the faculty. They are expected to write critical essays, book reviews or a research report based on their readings.

10110209 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks

III SEMESTER

10110301 Architectural Design Studio : Residential

Number of Credits	6	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	200
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	6	External Jury	200
Total Periods per Week	9	Total Marks	400

Subject Objective: To explore the interrelationship between human behavior and space in a small residential environment, including, volume of space, shape, form, function, climate and materials

Course Content:

Through site visits and studio exercises, students are encouraged to understand the interrelationship between human behavior and space in a detached residential building for a small joint family. They are expected to explore through their design exercise, volume of space, shape, form, function, climatic consideration and material sensitivity.

Focus Areas:

- Building Materials and Construction - II
- **History of Architecture**
- Introduction to structures
- **Environmental Sciences**
- **Architectural representation**
- Architectural Workshop

Architectural Design Studio :
Residential

Studio Project:

The students are expected to design a residential building in a specific site, for a small Indian joint family in urban, peri-urban or rural setting. The projects investigate the study of built form, function, activity, and its relationship to the site and surroundings.

References:

1. Chaira, J. D. and Crosbie, M. J. (2001). *Time Saver Standards for Building Types*. 4th Ed. New York : McGraw-Hill.
2. Hareguchi, H. (1988). *A Comparative analysis of 20th C. houses*. London: Academy Editions.
3. Miller, S. F. (1995). *Design Process: A Primer for Architectural and Interior Design*. New York : Van Nostrand Reinhold.
4. Robson, D. (2002). *Geoffrey Bawa: The Complete Works*. New York : Thames & Hudson.
5. Schulz, N. C. (1985). *The concept of dwelling*. New York : Rizzoli International Publications.
6. Unwin S. (2010). *Twenty Buildings every Architect should understand*. New York : Routledge.

10110302 Design Communication - I

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination (Viva-Voce)	50
Studio/Lab/Workshop/Practical's per Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: to equip the students with good spoken and written skills in English, awareness and skills about various intellectual gatherings and business presentation skills, advertising, journalism for media and architectural journalism.

Unit-I. Introduction to Communication skills

Introduction to types of communication, methods, use & application. Verbal Communication. Developing group discussions and elocution skills. Academic writing & referencing, avoiding Plagiarism.

Unit-II. Communication Techniques-I

Business presentation, Illustration techniques - preparing flow charts, tables & diagrams, Books and magazines, film and television posters, coverage etc., reprographic techniques.

Unit-III. Communication Techniques-II

Advertising - Typography, artwork, Multimedia - 2D digital graphic design techniques, 3D digital modeling techniques, Packaging – surface decoration such as print, Printmaking – photo screen-printing and etching, scanning and laser printing.

Unit-IV. Digital Presentation

Advanced business presentation, Multi-media presentation, Audio-visual projection and Computer based presentations. Creating graphics using Adobe Photoshop.

Unit-V. 3D Presentations

Movie making Flash movies, animation graphics, and walkthroughs.

References:

1. Adrian, D. and Christopher J. (2000). *Language in Use – Upper intermediate. Self-study Workbook and Classroom Book*. Cambridge : Cambridge University Press.
2. Dinsmore, G. A. (1968). *Analytical Graphics*. Canada : D. VanNostrand, Company Inc.
3. Edward, J. F. and Lee, J. (2000). *Feature Writing for Newspapers and Magazines*. 4th Ed. Longman.
4. Freeman, S. (1978). *Written Communication*. New Delhi : Orient Longman.

10110303 Elective – IA (Basic Computers)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical/ Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Course Objective: to familiarize students with basic understanding of development of computers, operating systems, documentation and presentation software. Customization and Templates for repetitive function.

Unit-I. Introduction to Computers

General Historical background of computer development. Brief description of various Hardware and Software. Basic knowledge of operating systems: Windows, Unix, Linux etc.

Unit-II. Basic Operations

Introduction to various software for documentation, presentation & drawing purposes. Simple operations such as creating, editing, formatting, saving and printing documents. Familiarizing the use of scanners, printers plotters etc.

Unit-III. Word processing

Introduction to Applications of MS Office in presentation: Microsoft Word, Microsoft Power Point, Microsoft Excel, Adobe Page Maker.

Unit-IV. Spreadsheets

Use of spreadsheet and for various architectural calculations-estimation, area calculations, project reports. Preparations of templates for regular repetitive functions.

Unit-V. Presentations

Introduction of various software available for Architectural presentation such as Photoshop & Coral. Image doctoring and manipulation using computer software for graphics and animation (Photoshop and Flash).

References:

1. Bark, S. (2012). *An Introduction to Adobe Photoshop*. Sheffield : Ventus Publishing ApS.

10110303 Elective – IB (Vernacular Architecture)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: Efforts and activities related to promotion of Sustainable Architecture are underway, and this can be reinforced with the knowledge 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 and cases studies of adaptations of vernacular architecture in contemporary buildings.

Unit-I. Introduction to Vernacular Architecture

Definitions and theories, Categories, Contextual responsiveness: Climatic, Geographical, Anthropological and Cultural influences

Unit-II. Environment and Materials

Typical building materials, Built form & elements, Construction techniques & environmental performance.

Unit-III. Regional Variations in Built Form: Tribal Architecture

Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Construction materials and techniques. Andhra Pradesh, Madhya Pradesh, Odisha (Kondha and Santals) and North-east (Naga and Khasi tribes).

Unit-IV. Regional Variations in Built Form: Traditional Architecture

Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Construction materials and techniques.

Southern Region: Kerala – Nalukettu, Houses of Nair & Namboothri's, Koothambalam, Tarawads, Kerala Muslim houses (Mappilah houses) Tamil Nadu – Toda Huts, Chettinad Houses (Chettiars). Karnataka – Gutthu houses (land owning community), Kodava ancestral home (Aynmane), Andhra Pradesh –Rural Kaccha houses.

Western Region: Rajasthan- Rural Jat /Bhunga houses and Havelis. Gujarat- Deserts of Kutch, Pol houses of Ahmedabad, Wooden Havelis. Goa – Traditional Goan houses. (Portugese influence)

Northern and Eastern Region: Kashmir – Typical Kutcha houses, Dhoongas (Boathouses), Ladakhi houses, bridges. Himachal Pradesh – Kinnaur houses, Punjab – Rural Houses, Bengal –Rural house form- Aat Chala houses, Thakur Bari (Mansions), Odisha – Rural houses of coastal areas.

Unit-V. Adaptations in Contemporary Architecture

Sustainable building materials and construction techniques, Works of Laurie Baker, Hasan Fathy, Anil Laul, Gerard Da Cunha, Building Centres- Auroville, Anangpur, Nizamuddin Building Centre.

References:

1. Brunskill, R. W. (1987). *Illustrated Handbook of Vernacular Architecture*. Castle Rock : Faber & Faber.
2. Carmen, K. (1986). *VISTARA – The Architecture of India*. The Festival of India Publications.
3. Cooper, I. and Dawson, B. (1998). *Traditional buildings of India*. London : Thames & Hudson.
4. Jain, K. and Jain, M. (1992). *Mud Architecture of the Indian Desert*. Ahmadabad : Aadi Centre.
5. Kenneth, F. (1983). *Towards a Critical Regionalism: Six points for an architecture of resistance*, In *The Anti-Aesthetic: Essays on Postmodern Culture*. (Ed.) Hal, F. Seattle : Bay Press.
6. Muthiah, S., Meyappan, M., Ramswamy, V. and Muthuraman, V. (2000). *The Chettiar Heritage*. Chennai : Chettiar Heritage.
7. Oliver, P. (1997). *Encyclopedia of Vernacular Architecture of the World*. Cambridge : Cambridge University Press.
8. Pramari, V. S. (1989). *Haveli-Wooden Houses and Mansions of Gujarat*, Ahmadabad : Mapin Publishing.
9. Rapoport, A. (1969). *House, Form & Culture*. Eaglewood : Prentice Hall Inc.
10. Tillotsum, G. H. R. (1989). *The tradition of Indian Architecture: Continuity, Controversy and Change since 1850*. Delhi : Oxford University Press.

10110303 Elective-IC (Applied Ergonomics)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject 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 design including designing for the physically challenged and the elderly.

Unit-I. Introduction to Human Function

Human being in the manmade world and importance of ergonomics, Gross human anatomy, Ergonomics for children at workplace old people.

Unit-II. Ergonomics and Design

Introduction to Anthropometrics, static and dynamic anthropometrics, Muscles and work physiology, Static and Dynamic work including maximum capacity.

Unit-III. Disability, Ageing and Inclusive Design

Built environment for the physically handicapped, Ramp, toilets and corridor design, Spatial Requirements for wheel chair movement-Design issues in the design of old age homes, Criteria to be considered when designing for the visually impaired.

Unit-IV. Environmental Ergonomics

Biomechanics, Environmental Condition including, thermal, illumination, noise and vibration, Bio transducers and nervous system including their limitations

Unit-V. Health Effects of Environmental Stressors

Controls and Displays, psycho psychological aspects of Design, Occupational hazards in work environment, Visual stress, Postural Stress, Stress due to commuting.

References:

1. Chaira, J. D. and Callender, J. H. (1987). *Time Savers Standards for Building Types*. Singapore : McGraw-Hill.
2. Crosbie, M. J. and Watson, D. (2005). *Time Savers Standards for Architectural Design: Technical data for Professional Practice*. 8th Ed. The McGraw-Hill Company.

10110304 History of Architecture and Human Settlements – II : Classical & early Medieval period (700 BCE – 1000 CE)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject 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.

Unit-I. Classical Architecture - Greek Architecture and Roman Architecture

Study of principles of design, proportion, Optical corrections and Classical Orders. Building types viz., Temples, Sanctuaries, Thermae, Amphitheatres, Circus, Aqueducts etc. Study of planning principles adopted, Agora, Forum and their effect on settlement planning.

Unit-II. Early Christian Architecture

Study of Architectural character, evolution of Church form, building typologies, and building elements, polymath architecture, Baptisteries, early Basilican churches; settlement planning, and fortification systems.

Unit-III. Buddhist Architecture in India

Study of religious philosophy, resultant evolution of building typologies, building elements and associated forms during Hinayana and Mahayana phases. Types of structures and elements developed eg: Stupas, Viharas, Chaityas, Stambhas, Toranas, sacred railing etc. in India. Study of form variations across various countries.

Unit-IV. Indo Aryan Architecture

Development of fortification, walled towns, settlement patterns and the causative factors. Role of Shilpasasthras and Arthasasthra in settlement planning. Study of worshipping places in Indo Aryan / Nagara style, design of buttressed shikharas, rock-cut and structural examples of temples.

Unit-V. Dravidian Architecture

Development of fortification, walled towns, settlement patterns and the causative factors. Role of Shilpasasthras in settlement planning. Study of worshipping places in Dravidian style (Chola, Chalukya, Pallava, Satavahana, Hoysala, Vijayanagara etc.), design of Gopuram and Shikhara, Hindu, Buddhist and Jain cave and rock-cut temple architecture.

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. Courier Dover Publications.
12. Ingersoll, R. and Kostof, S. (2013). *World architecture: a cross-cultural history*. Oxford : Oxford University Press.
13. Prammar, 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.

10110305 Structural Mechanics

Number of Credits	4	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective: To familiarize the student with the effects of transverse forces such as shear force & bending moment in beams; determination of SF & BM in simple beams under different loading systems, geometrical properties such as centroid, moment of inertia etc of sections for different shapes

Unit-I. Geometric properties of sections

Centre of gravity, Moment of inertia and section modulus for various structural shapes.

Unit-II. Beams: Types & Properties

Types of beams and their behaviour, types of supports and reactions, bending moment and shear forces; simply supported, cantilever and overhanging beams, relation between bending moment and shear force.

Unit-III. Theory of Simple Bending

Theory of simple bending and assumptions. $M/I = f/y = E/R$ applications. Flexural formula. Determination of different types of stresses induced in beams and shafts due to bending and twisting moments respectively.

Unit-IV. Bending and Shear Stresses

Bending stresses and Shearing stresses in beams, distribution of shear stress over different sections like, rectangular, circular, triangular, I and T-sections.

Unit-V. Forces in Arches

Determination of horizontal thrust, radial shear & normal force, axial thrust, bending moment & shear force for three-hinged arch. Structural concepts in post & lintel, arch, dome, & vault construction. Concept of behaviour of heterogeneous materials in direct force and bending.

Material testing laboratory-II

1. Tension test on mild steel and deformed steel bars.
2. Deflection test on Simply Supported / cantilever Beams of (a) wood and (b) steel to find Young's modulus.
3. Torsion test on mild steel bar to determine the Modulus of Rigid
4. Determination of the fineness of cement (Blains Permeability apparatus).
5. Determination of normal consistency of cement by Vicat's Apparatus.
6. Initial and final setting time of cement with Vicat's Apparatus.
7. Soundness test on cement by Autoclave method.

References:

1. Bansal, R. K. *Engineering Mechanics*. New Delhi : Laxmi Publications.
2. Junnarkar, S. B. (1991). *Mechanics of Structures*. Vol. 1. 20th Ed. Delhi : Charotar.
3. Kurmi, R. S. *Strength of Materials*. New Delhi : S. Chand & Company.

4. Mukherjee, S. *Elements of Engineering Mechanics*. New Delhi : PHI Learning.
5. Ramamrutham, S. (2008). *Engineering Mechanics: A Textbook of Applied Mechanics*. Dhanpat Rai Publishing.
6. Vazirani and Ratwani. (2008). *Analysis of Structures*. Vol. I. New Delhi : Khanna Publishers.

10110306 Building Materials and Construction – III

Number of Credits	4	Subject Category	T+S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective: Focus on various building materials and construction techniques would be emphasised based on the performing standards and codes, wherein application of each material would be discussed in detail, both in the context of historical and contemporary methodology. With time, each topic can also focus on latest trends in practice and usage of new technology/materials. Emphasis is given on importance of water and damp proofing in building construction.

Unit-I. Doors

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

Unit-II. Windows and Ventilators

Types of windows based on the make (sliding, pivot, casement, louvered, fixed, bay window, etc.) and material (wood, steel, glass and aluminium) hardware fixtures, joinery, window-fixing details. *Set of drawings: Types of timber and metal doors (joinery and fixing details).*

Unit-III. RCC

Introduction, Application of RCC in building components (foundation, columns, beams, slabs and walls) Typical details for RCC footing, pile foundation - precast pile, cast in situ piles, types of piles, method of driving piles, walls, column, beams, lintels, sunshades, floor and roof slabs (1 & 2 way slabs) cantilever. *Set of drawings: RCC footing, column, beam, slab.*

Unit-IV. Water Proofing and Damp Proofing

Causes and defects of dampness, methods adopted for waterproofing and damp proofing at different levels of a building, admixtures and different materials (rigid, flexible) used in the process. *Set of drawings: Details of application of Damp Proof Course and Water Proofing.*

Unit-V. Deep Excavation, Scaffolding & Formwork, Shoring, and Underpinning

Definition, problems in deep excavation, terms of timbering, methods of timbering, precautions to be taken in deep excavation, de-watering. Types of scaffolding, formwork (slab, arches, vaults and domes) shoring and underpinning, precautions to be taken and methods adopted. *Set of drawings: Drawings on various supporting structures with materials*

Site study and Report: Students have to visit a site and study the building with respect to the above-discussed topics and give a brief report with sketches and photographs at the end of the semester.

Note:

- Lecture classes shall be supplemented with adequate studio hours where students are required to prepare construction drawings.

- b) Site visits and Market studies shall be conducted to facilitate understanding of latest materials and construction techniques on-site.
- c) Pedagogy should establish the linkage of the relevant material and construction techniques from past to present.
- d) Performing standards and Codes used for various Building Materials and Construction Techniques needs to be focused.
- e) Alternative construction techniques for respective topics needs to be discussed in detail.
- f) *With time, each topic can also focus on latest trends in practice and usage of new technology/materials.*

References:

1. Barry, R. (1999). *The Construction of Buildings Vol.II*. 5th Ed. New Delhi : East-West Press.
2. Bindra, S. P. and Arora, S. P. (2000). *Building Construction: Planning Techniques and Methods of Construction*, 19th Ed. New Delhi : Dhanpat Rai Publications.
3. BIS and relevant IS codes.
4. Ching, F. D. K. (2000). *Building Construction Illustrated*. 3rd Ed. Wiley.
5. Chudley, R. (2008). *Building Construction Handbook*. Noida : Elsevier.
6. McKay, W. B. (2005). *Building Construction Metric Vol. 1-IV*, 4th Ed. Mumbai :Orient Longman.
7. Meghashyam, K. K. (2005). *Reinforced Concrete Constructions for 21st C*. New Delhi :J.M. Jaina.
8. Rangwala, S. (2004). *Building Construction*. 22nd Ed. Anand : Charotar Publishing.
9. Rangwala, S. C. (1963). *Building Construction: Materials and types of Construction*, 3rd Ed. New York : John Wiley and Sons, Inc.
10. Sushil-Kumar, T. B. (2003). *Building Construction*. 19th Ed. Delhi : Standard Publications.

10110307 Lighting, Ventilation & Acoustics

Number of Credits	2	Subject Category	T
Lecture Periods per Week	1	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	2	External Jury	--
Total Periods per Week	3	Total Marks	100

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

Unit-I. Day lighting

Introduction: Physics of light, Photometry, Transmission of light, recommended illuminances, Glare, Daylight illuminance, Luminance distribution, Design methods, Total flux method, Daylight factor method, BIS method, Pepper-pot diagram, Models and computer tools. Planning for daylight, day light utilization factor.

Lab: Introduction to Lux meter. Simple experiments to measure Lux levels under different sky conditions, Class room lux measurements, etc.

Unit-II. Electric Lighting

Lamps, Power factor, Luminaries, reflector, type of lens, cove lighting, valance lighting, cornice lighting, track lighting, light strip, troffer, wall washer, flood light, down light, spot light, spill, point, line and area source. Design methods: Point method, lumen method, IES glare Index system.

Lab: Introduction to brightness meter, experiments on colour & light, brightness & colour etc.

Unit-III. Ventilation

The wind, The effects of topography on wind patterns, Air currents around the building, Air movement through the buildings, air changes, quality of air, use of fans, thermally induced air currents, pressure losses: Buoyancy-driven (Stack effect, Venturi effect) – Use of court yard.

Lab: Types of anemometer and its use. Wind tunnel experiment for wind movement around the buildings, Simple experiments to measure outdoor and indoor wind velocity.

Unit-IV: Fundamentals of architectural acoustics

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

Unit-V. Acoustics of Architectural Spaces

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

Lab: Introduction to sound level meter. Simple experiments to predict RT, Background noise level and frequency analysis.

References:

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

10110308 Guided Study

Number of Credits	3	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To inculcate the habit of reading books related to architecture and allied subjects in a structured manner.

Course Content

This course involves library based study and report writing. The students are expected to read two or more books in a given subject area or by a particular author, as assigned by the faculty. They are expected to write critical essays, book reviews or a research report based on their readings.

In addition, students are expected to follow academic writing and referencing conventions from the III Semester onwards.

10110309 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks

IV SEMESTER

10110401 Architecture Design Studio - Rural Context

Number of Credits	6	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	200
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	6	External Jury	200
Total Periods per Week	9	Total Marks	400

Subject Objective: The objectives of this studio are four fold. The first objective is to expose the students to the opportunities and challenges of designing in a rural environment. The second objective is to sensitize the students to space-specific contextual factors in designing, the third objective is to sensitize the students to the special needs of the differently able people, suffering from various types of physical limitations, as they negotiate the built environment. The fourth objective is to enable the students apply theoretical knowledge learnt in the previous semester in architectural design exercise.

Course Content:

Students are to be familiarized with the rural environment through field visits and introductory lectures. They will study local cultural milieu, built-form characters, building materials, and technology, and the relationship between built form and open spaces. They will learn the relationship between the building and its natural environment. Students are also to be exposed to the principles of barrier free environment. They will study the movement patterns and ergonomic requirements to design facilities to meet the special needs of the people with physical disabilities. They are also to be explore the opportunities and design implications of various types of building materials and structural systems, especially as they determine the artistic, conceptual, poetic, creative, spatial and experimental aspects of architecture. Special emphasis shall be on understanding the implications of using different types of building materials i.e. brick, stone, earth, timber, bamboo, steel, aluminium, concrete, glass etc. to leverage the special qualities of materials to meet the needs in terms of strength, durability, texture, visual appeal, & overall functionality.

Studio project:

Design exercise could be any medium sized public building having more than one floor in a non-urban setting. Projects to introduce the concepts of shared open space, clustering, community engagement. Emphasis will also be laid on site planning. The design studio shall be closely integrated with building construction studio. Emphasis shall be laid on clarity of detail and architectural expression in functional and constructional terms.

References:

1. Edward, S. and Maisel, J. (2004). *Universal Design*. New York : Taylor & Francis.
2. Preiser, W. (2001). *Towards universal design evaluation*. New York : McGraw-Hill.
3. Seidle, J. (1996). *Barrier-free design*. 1st Ed. New York : Routledge.
4. Story, M. F., Mueller, J. L. and Mace, R. L. (1998). *The universal design file: Designing for people of all ages and abilities*. North Carolina : North Carolina State University Press.
5. Jain, K. and Jain, M. (1992). *Mud Architecture of the Indian Desert*. Ahmadabad : Aadi Centre.
6. Muthiah, S., Meyappan, M., Ramswamy, V. and Muthuraman, V. (2000). *The Chettiar Heritage*. Chennai : Chettiar Heritage.

7. Oliver, P. (1997). *Encyclopedia of Vernacular Architecture of the World*. Cambridge : Cambridge University Press.
8. Pramari, V. S. (1989). *Haveli-Wooden Houses and Mansions of Gujarat*, Ahmadabad : Mapin Publishing.
9. Rapoport, A. (1969). *House, Form & Culture*. Eaglewood : Prentice Hall Inc.

10110402 Computer Applications (Simulation and Modelling)

Number of Credits	3	Subject Category	L
Lecture Periods per Week	3	Internal Assessment	50
		End Examination (Viva-Voce)	50
Studio/Lab/Workshop/Practical's	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: Empowering students to use computers as 2D drafting and 3D modelling tool and to familiarize realistic rendering and architectural presentation techniques using computers.

Unit-I. Introduction to AutoCAD as 2D drafting tool

Digital drawings tools, drawing lines and shapes, modifying lines and shapes, drawing with accuracy and speed. Organizing plans, sections and elevations, drawing and printing to scale, text styles and sizes, hatches and dashed lines. Stencils and blocks, advanced editing tools, and dimensioning drawings.

Unit-II. 3D modelling using AutoCAD

Introduction to 3D-modelling technique using AutoCAD. 3D basics: Axes, Planes and Faces. 3D Object Modification: Rotate, Mirror, Array and Scale. 3D Boolean operations: Union, Subtract, Intersect. 3D primitive objects: Box, Wedge, Cone, Sphere, Cylinder, Torus and Pyramids. Solid modeling: Revolve, Shell, Taper, Loft, Path extrusion and sweep.

Unit-III. Introduction to 3D Modelling and Rendering

Building Modelling and basic rendering techniques, using 3DSMax or equivalent.

Unit-IV. Advanced 3D Modelling

Advanced modelling, V-Ray rendering engine, or equivalent.

Unit-V. Workshops

A - Workshop on Sketch-up as modelling tool

B - Workshop on In-Design as presentation tool

(Introduction to other commonly used software tools in a one-day workshop)

References:

1. Bark, S. (2012). *An Introduction to Adobe Photoshop*. Ventus Publishing ApS, Sheffield.
2. Gindis, E. (2014). *Up and Running with AutoCAD 2015: 2D & 3D Drawing and Modelling*. Oxford : Elsevier.
3. Seidler, D. R. (2007). *Digital Drawing for Designers: A Visual Guide to AutoCAD 2012*. London : Fairchild Publications.
4. Smith, B. L. (2007). *3ds Max 2008 Architectural Visualization Beginner to Intermediate*. Sarasota : 3DATS.
5. Tutorials: <http://www.lynda.com/>

10110403 Art Appreciation

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: Disseminating a broad overview of Art and Design and enabling students to understand visual awareness, creativity and cultural understanding of Design as a Multi-dimensional creative Art.

Unit-I. Introduction- Defining the disciplinary differences

Introduction to various types of Art, Concept of beauty and Aesthetics. Evolution of art and design.

Unit-II. Art and Design- A historical perspective

History of Art. Art through ages. Importance of Visual perception, Design elements from nature.

Unit-III. Expression of Art and Design

Relationship between Art and Design with man, space and environment. Concept of space. Articulation of form, sense of enclosure, Organisation of spaces.

Unit-IV. Introduction to theories

Golden proportion, Theories of scale and proportion, Vitruvian theory, Modular man, principles of Design and elements of Architecture.

Unit-V. Relations in Art, Design and Architecture

Factors influencing the process of Art, Design and Architecture. Form and function. Review of selected examples.

References:

1. Cantanese, A. J. and Snyder, J. C. (1988). *Introduction to Architecture*. New York : McGraw hill Books Co.
2. Ching, F. D. K., Jarzombek, M. and Prakash, V. (2010). *A Global History of Architecture*. 2nd Ed. John Wiley & Sons.
3. Fred, S. K. (2009). *Art through the ages a Global History*. 3rd Ed. Clark Baxter.
4. Heidegger, M. (1993). *The origin of the work of Art-Basic writings*. Harper Collins.
5. Heskett, J. (2002). *Design-A very short introduction*. Oxford University Press.
6. Rapoport, A. (1969). *House Form and Culture*. New Jersey : Prentice Hall.
7. Salingaros, N. (2009). *A Theory of Architecture*. Umbau-Verlag.
8. Vitruvius, Translation: Morris, H. M. (1960). *The Ten Books on Architecture*.

10110404 History of Architecture and Human Settlements – III : High and Late Medieval period (1000 CE – 1500 CE)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject 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 patterns 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.

Unit-I. Architecture of the Romanesque, Byzantine and Gothic Phases

Study of Architectural character, evolution and transformation of Church form, building typologies and building elements viz., Pointed arch, church towers etc. and their influence on the church form; Influence of structural elements like Pendentive, Flying buttress, Stained glass etc. on the built form and the resultant settlement planning.

Unit-II. Indo Aryan Architecture (1000 – 1500 AD)

Development of fortification, walled towns, settlement patterns and the causative factors. Role of Shilpasasthras in settlement planning. Study of worshipping places in Indo Aryan / Nagara style, design of buttressed shikharas, rock-cut and structural examples of temples.

Unit-III. Dravidian Architecture (1000 – 1500 AD)

Development of fortification, walled towns, settlement patterns and the causative factors. Role of Shilpasasthras in settlement planning. Study of worshipping places in Dravidian style (Chola, Chalukya, Pallava, Satavahana, Hoysala, Vijayanagara etc.), design of Gopuram and Shikhara, Hindu, Buddhist and Jain cave and rock-cut temple architecture.

Unit-IV. Architecture of the Delhi Sultanate - Introduction to Islamic Architecture

History of Islam: advent, development and principles – architectural character of the Islamic style - Advent of Islam into the Indian subcontinent - Establishment of the Delhi Sultanate: Imperial style - Delhi: Slave, Khalji, Tughlaq, Sayyid & Lodhi dynasties; Development of basic mosque and tomb prototypes.

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.

10110405 Structural Analysis

Number of Credits	4	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject 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.

Unit-I. 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.

Unit-II. Analysis of Beams

Analyze Continuous beams by Theorem of Three moments and draw SFD, BMD. Analyse Continuous beams, Portal frames and Substitute frames by Moment Distribution Method and draw SFD, BMD.

Unit-III. 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.

Unit-IV. Bearing Capacity of Soils, and Settlements of Foundations

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.

Unit-V. Bearing Pressures

Concept of Bearing Pressures, Calculation of maximum and minimum bearing pressures, checking the stability of Masonry Dams and Retaining walls.

Concrete technology laboratory-I

1. Voids ratio and porosity of sand.
2. Arrangement of bricks using English Bond for one brick thick wall, one-and-half brick thick wall for Tee junction.
3. Arrangement of bricks using English bond for one brick thick, one and half and two brick thick square pillars.
4. Determination of bulk density and specific gravity of Fine aggregate
5. Determination of bulk density and specific gravity of Coarse aggregates.
6. Field Density of Soil.

7. Liquid limit and plastic limit classification of soils.
8. Moisture content in coarse aggregate (or) Water absorption test on coarse aggregate.
9. Testing load carrying capacity of masonry arches/vault/dome and its failure.

References:

1. Dass, M. M. *Structural Analysis*. New Delhi : PHI Learning.
2. Jindal, R. L. *Elementary Theory of Structures*.
3. Junnarkar, S. B. (1997). *Mechanics of Structures*. Vol. II. 22nd Ed. Charotar Publishers.
4. Punmia, B. C., Jain, A. K. and Jain, A. K. (1992). *Theory of Structures*. 9th Ed. New Delhi : Laxmi Publications.
5. Ramamrutham, S. *Theory of Structures*. New Delhi : Tata McGraw Hill Education.
6. Reddy, C. S. (1999). *Basic Structural Analysis*. New Delhi : Tata McGraw-Hill Education.
7. Vazirani and Ratwani. (2008). *Analysis of Structures*. Vol. I. New Delhi : Khanna Publishers.
8. Wamock, F. V. *Strength of Materials*.

10110406 Building Materials & Construction – IV

Number of Credits	4	Subject Category	T+S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Objective: To impart knowledge on various types of floors and flooring material, partitions and panelling, various surface finishes, various modes of vertical transportation. To equip students with the advances in the building construction methods and their applications.

Unit-I. Floors and Flooring Materials

Introduction to types of floors (ground, upper) and types of paving, essential requirements of a floor, factors affecting selection of flooring material, natural and artificial flooring materials like mud, brick, stone, tile, jack-arch floors, cement concrete, granolithic, wooden flooring, timber floor supported on rolled steel joists (RSJ), flag stone floor resting on RSJ, rubber, Vinyl, PVC, PVA etc., introduction to various floor finishes and fixing details.

Unit-II. Staircases

Definitions, Tread, riser, stringer, nosing, flight, landing, head room, handrail, balusters, newel post etc. Types of staircases: straight, dog-legged, open-well, geometrical, circular, spiral, bifurcated. Construction details & types of finishes of wooden, metal stairs and R.C.C. stairs. Emphasis should also be given on details related to differently-abled people. *Set of drawings: Types of Staircase, RCC, timber and metal (joinery and fixing details).*

Unit-III. Partitions, panelling and false ceiling

Introduction, requirement of partition, types of partitions (viz. Brick, clay, concrete, glass, timber, gypsum etc.) Various types of panelling (glazed, wooden etc.), details for panelling, sound proof and lightweight partitions. *Set of drawings: Types of partitions, panelling and false ceiling (joinery and fixing details).*

Unit-IV. Surface Finishes

Smooth finishes, textured finishes, ribbed, hitched, exposed aggregate finish, weathering of finishes, rough cast, dry dash, stucco, gypsum, and pop applications, protective and decorative coatings, cladding. Defects in plastering, type of plastering, method of plastering. Varnishes, polish and Paints-distempers, emulsions, cement base paints, oil base. Constituents of oil paints, characteristics of paints, types of paints and process of painting on different surfaces. Types of varnish, methods of applying varnish, French polish, melamine finish, lacquer finish their applications in building activities. Laminates and veneers, type of laminates, laminated wood, veneer from different types of timber, and their characteristics. Emphasis should also be given on details related to differently-abled people.

Unit-V. Advanced building construction

Advanced building materials- synthetic boards, acoustical materials, Aluminium composite panel, Long span roofs - Domes, Shells, Folded plates, Tensile structures, Space frames, Pneumatic structures, cable structures, pre-engineered concrete construction, Structural

glazing, Modular coordination and pre-fabrication, Advanced tools and equipments. Designing and construction details of types of escalators, travelators, lifts and ramps.

Site study and Report: Students have to visit a site and study the building with respect to the above-discussed topics and give a brief report with sketches and photographs at the end of the semester.

Note:

- a) Lecture classes shall be supplemented with adequate studio hours where students are required to prepare construction drawings.
- b) Site visits and Market studies shall be conducted to facilitate understanding of latest materials and construction techniques on-site.
- c) Pedagogy should establish the linkage of the relevant material and construction techniques from past to present.
- d) Alternative construction techniques for respective topics needs to be discussed in detail.

References:

1. Barry, R. (1999). *The Construction of Buildings Vol.II*. 5th Ed. New Delhi : East-West Press.
2. Bindra, S. P. and Arora, S. P. (2000). *Building Construction: Planning Techniques and Methods of Construction*, 19th Ed. New Delhi : Dhanpat Rai Pub.
3. BIS and relevant IS codes.
4. Brookes, A. J. (1983). *Cladding of Buildings*. Longman Inc.
5. Ching, F. D. K. (2000). *Building Construction Illustrated*. 3rd Ed. Wiley.
6. Chudley, R. (2008). *Building Construction Handbook*. Noida : Elsevier.
7. Eldridge, H. J. (1976). *Common Defects in Buildings*. London : HMSO.
8. Emmit, S. and Gorse, C. A. (2006). *Barry's Advanced Construction of Buildings*. Blackwell Publications.
9. McKay, W. B. (2005). *Building Construction Metric Vol.1-IV*, 4th Ed. Mumbai : Orient Longman.
10. Meghashyam, K. K. (2005). *Reinforced Concrete Constructions for 21st C*. New Delhi: J. M. Jaina.
11. Punmia, B. C. (1993). *Building materials and Construction*. New Delhi : Lakshmi Publications.
12. Rai, M. (1986). *Advances in Building Materials and Construction*. CSIR.
13. Rangwala, S. (2004). *Building Construction*. 22nd Ed. Anand : Charotar Pub. House.
14. Rangwala, S. C. (1963). *Building Construction: Materials and types of Construction*, 3rd Ed. New York : John Wiley and Sons.
15. Sushil-Kumar, T. B. (2003). *Building Construction*, 19th Ed. Delhi : Standard Pub. Distributors.

10110407 Water Supply & Building Sanitation

Number of Credits	2	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's	0	External Jury	--
Total Periods per Week	2	Total Marks	100

Subject Objective: To equip the students of architecture about the building services related to water supply and building sanitation, so as to enable them to comprehend the subject thoroughly and integrate the learning into architectural design.

Unit-I. Water Supply

Introduction, types of sources, yield & spacing of wells, intakes, pumping and transportation of water. Treatment of water, qualities of potable water. Domestic water distribution system, reservoirs, supply system layouts, Pipe appurtenances, pumps, pumping plants, overhead tanks, water demand calculations. Building service connection, Ferrules, Water meters. Layout of domestic water piping systems, joints, fittings and valves. Cold & hot water lines in buildings, Water supply to high rise buildings: problems encountered & systems adopted.

Unit-II. Building Sanitation

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

Unit-III. Plumbing and Sanitary Appliances

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

Unit-IV. Design of Plumbing Systems

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

Unit-V. Sewerage

Indian standards and byelaws for sanitary conveyance. Disposal of sewage from isolated building, Gradients used in laying of drains and sewers for various sizes. Septic tank details & capacity calculation. Sewage treatment. Use of pumps in sanitation, biogas, soil disposal without water carriage, rural sanitation.

References:

11. Birdie, B. S. (1996). *Water supply and Sanitary Engineering*. Dhanpat Rai and Sons.
12. National Building Code of India. (2005).
13. Punmia, B. C., Jain, A. K. and Jain, A. K. (1995). *Water Supply Engineering*. New Delhi : Laxmi Publications.
14. Punmia, B. C., Jain, A. K. and Jain, A.K. (1998). *Waste Water Engineering*. New Delhi : Laxmi Publications.
15. Rangwala, S. C. (2005). *Water Supply and Sanitary Engineering*. Charoter Publishing.

10110408 Guided Study

Number of Credits	3	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To inculcate the habit of reading books related to architecture and allied subjects in a structured manner.

Course Content

This course involves library based study and report writing. The students are expected to read two or more books in a given subject area or by a particular author, as assigned by the faculty. They are expected to write critical essays, book reviews or a research report based on their readings.

In addition, students are expected to follow academic writing and referencing conventions from the III Semester onwards.

10110409 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

2.

3. **Course Content**

4. The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

5.

6. 75% - 84% : 60 marks

7. 85% - 94%: 80 marks

8. 95% and above: 100 marks

V-SEMESTER

10110501 Architecture Design Studio - Heritage Context

Number of Credits	6	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	200
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	6	External Jury	200
Total Periods per Week	9	Total Marks	400

Subject Objective: The objectives of this studio are three fold. First objective is to enable the students to study the existing built environment in urban settings, to understand Human behavioural, character of the place, including socio-cultural aspects. The second objective is to sensitise the students to the specific requirements of design interventions in areas having significant built heritage characteristics; The third objective is to enable the students apply theoretical knowledge learnt in the previous semester in architectural design exercise;

Course Content:

The course involves the students to study and understand the special characteristics of the built environment in an urban context having significant and distinctive architectural feature. Such areas may include old parts of Indian cities or even newer areas having important architectural landmarks or buildings designed by a well-known architect in near vicinity.

Through site visits and studio exercises, students are to be exposed to the historic sense of the place, social and physical relationships and cultural milieu. Students are especially expected to apply the lessons learnt in History of Architecture and Theory of Design, through design exercises in this studio.

Design philosophy should support the architectural character of the built environment and respond positively (but not necessarily mimic), to the historic context, through appropriateness of use, built form and choice of building materials.

Studio Project:

Design of a multi-functional public building in the urban setting in heritage context (either within or in close proximity to a locally significant land mark). Projects could also involve adoptive reuse or addition / to an existing building having significant architectural characteristics; Students are introduced to urban development control; codes and bye laws; Special zoning guidelines related to heritage conservation; Exercises in articulation and manipulation of programmed needs, design methodology, criticism and evaluation of alternative concepts are to be performed.

References:

1. Cullen, G. (1961). *The Concise Townscape*. New York : Van Nostrand.
2. Giedion, S. (2009). *Space, Time and Architecture*, rev. Ed. Cambridge : Harvard University Press.
3. Rossi, A. (1989). *Architecture of the city*. Massachusetts : The MIT Press.
4. Schulz, N. C. (1988). *Architecture: Meaning and Place - selected Essays*. 1st American Ed. New York : Rizzoli.
5. Schulz, N. C. (1991). *Towards a Phenomenology of Architecture*. New York : Rizzoli.
6. Steele, J. (2005). *The Architecture of Rasem Badran - narratives on people and place*. Thames & Hudson.

7. Thomas, D. (2002). *Architecture and the Urban Environment-A vision for the new age*. Oxford : Architectural Press.

10110502 Interior Architecture & Space Programming

Number of Credits	3	Subject Category	T
Lecture Periods/Week	3	Internal Assessment	50
		End Evaluation	50
Practicals/Lab/Workshop Periods/Week	0	External Jury	--
Total Periods/Week	3	Total Marks	100

Subject 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.

Unit-I. 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.

Unit-II. 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.

Unit-III. 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.

Unit-IV. 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.

10110503 Behavioural Architecture

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

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

Unit-I. Introduction to Behavioral Architecture

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

Unit-II. Building Systems

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

Unit-III. Building – Behavioral Interface

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

Unit-IV. Behavioral Design

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

Unit-V. Urban Environment

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

References:

1. Burnette, C. (1971). *Architecture for human behaviour*. Philadelphia Chapter : AIA.
2. Canter, D. and Lee, T. (1974). *Psychology and the built environment*. New York : Halstead Press.
3. Christopher, A. et al. (1977). *A Pattern Language*. New York : Oxford University Press.
4. Clovis, H. (1977). *Behavioural Architecture*. McGraw Hill.
5. Lynch, K. (1973). *The image of a city*. Cambridge : MIT.
6. Sanoff, H. (1991). *Visual Research Methods in Design*. New York : John Wiley & Sons.
7. Zeisel, J. (1984). *Enquiry by design: Tools for Environment-Behaviour Research*. Cambridge : Cambridge University Press.
8. Zeisel, J. and Eberhard, J. P. (2006). *Inquiry by Design - Environment/Behaviour/Neuroscience in Architecture, Interiors, Landscape and Planning*. New York : W. W. Norton & Company.

10110504 History of Architecture and Human Settlements – IV : Late Medieval and early Modern architecture (15th century to 19th century)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

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

Unit-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;

Unit-II. Development of Provincial Styles and phase of Mughal Architecture

Establishment of the Mughal empire and evolution of Indo-Islamic architecture under the Mughal emperors through synthesis of Rajput architectural styles as a corollary of political accommodation. Influence of specific Emperors such as Akbar and Shah Jahan; Building of Fatehpur-Sikri and Shahjahanabad. Mughal garden architecture; Variations in Mughal architecture and evolution of distinct provincial architecture based on geographic, cultural, political and other influences, with a special focus on Deccan region.

Unit III. 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 urbanisation 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 concrete, steel and glass; new Industrial Exhibitions.

Unit-IV. Art Noveau, Arts and Crafts Movement

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

Unit-V. 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 Delhi : Abhinav Publications.
8. Tadgell, C. (1990). *The History of Architecture in India*. New Delhi : Penguin Books (India) Ltd.

10110505 RCC Structures

Number of Credits	4	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective: to strengthen student's knowledge about reinforced cement concrete and its applications in buildings. To equip students about the methods of designing various structural members using reinforced cement concrete.

Unit-I. Introduction to RCC

Introduction to RCC design, characteristics of RCC, assumptions, nominal mix, Design mix. Neutral axis; balanced, under & over reinforced sections.

Unit-II. Design of Reinforcement in Beams

Design of singly reinforced beams for flexure, shear & bond. Concept of doubly reinforced beams and design.

Unit-III. Basic Concepts and design of different types of slab

Concepts and design of different types of slabs spanning in one direction, two directions, continuous slab, cantilevered slab, circular slab and flat slab.

Unit-IV. Design of RCC Columns and Staircases

Design of RCC columns, axially and eccentrically loaded Columns. Concepts and Design of different types of staircases.

Unit-V. Foundations

Types of foundations – raft, pile etc. Design of foundation for R.C .C structure –Foundation at different levels- Piles, Pile Cap and pile load test.

Material testing and site visits I

1. Site visit for reinforcement detailing and casting of a) Beams b) slabs. Preparation of the drawings for the same.
2. Determination of Fineness Modulus of fine aggregate sample and plot a particle size distribution curve and also find the effective size and uniformity co-efficient.
3. Determination of Fineness Modulus of coarse aggregate sample and plot a particle size distribution curve and also find the effective size and uniformity co-efficient.
4. Determination of workability of concrete by compaction factor test.
5. Casting of cement concrete cubes with different grades of concrete
6. Compressive strength test of cement concrete cubes, Tensile strength test on steel.

References:

1. Arumanikyam. (2000). *Design of RCC Structures*. I.K. International Publishing House.
2. Bhavikathi, S. S. (2008). *Design of RCC Structural Elements*. Newade International Publishers.

3. Murthy, V. N. S. *Soil Mechanics & Foundation Engineering*. Sai Kripa Technical Consultants.
4. Punmia, B. C. (2005). *Soil Mechanics and Foundation Engineering*. Delhi : Laxmi publications.
5. Punmia, B. C. (2006). *R C C Designs*. Delhi : Laxmi Publications.
6. Punmia, B. C. (2007). *Limit State Design of Reinforced Concrete*. Delhi : Laxmi Publications
7. Ramachandra, S. (2004). *Limit State Design of Concrete Structures*. Scientific publishers.
8. Ramamrutham, S. (2000). *Design of RCC Structures*. New Delhi : Tata McGraw Hill Education.
9. Sai, R. K. S. (2010). *Design of Steel Structures*. Pearson Education India.
10. Swamisaran. (2010). *Analysis and Design of Substructures*. 2nd Ed. (LSD).
11. Varghese, P. C. (2011). *Limit state Design of Reinforced Concrete*. PHI Learning.
12. Design Aid SP 16,
13. Detailing of Reinforcement, SP 34
14. Explanatory Hand Book SP24
15. IS 456-2000
16. IS 800 -2007.
17. IS 875-1987

10110506 Working Drawings-I

Number of Credits	4	Subject Category	S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination (Viva-Voce)	50
Studio/Lab/Workshop/Practical's per Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

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

1. Introduction to working drawings: shop drawings / vendor drawings.
2. An exercise in fundamental elements in a "Working Drawing-Plan" an assignment on a typical standard "Working Plan".
3. Various formats for working drawing preparation, various types of vendor drawings, such as aluminium composite panels, steel doors, fire rated doors, curtain wall systems, aluminium windows, etc.
4. Working drawing details:
 - a. Developing Key plans, General Arrangement Plans, Part plans, Roof Plan / Terrace Plan and the like.
 - b. Excavation drawings, Foundation drawings, Center-line drawings, Floor Plans, Sections, Elevations.
 - c. Basic internal electrical and plumbing drawings.

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. Jeong, K-Y. (2010) *Architecture Annual*. Seoul : Archiworld Co.
4. Joe, B. (Ed). (2002). *Details in Architecture: Vol. I-V*. Victoria : The Images Publishing group.
5. Osamu, A. W., Linde, R. M. and Bakhoun, N. R. (2011). *The professional practice of architectural working drawings*. 4th Ed. Hoboken : John Wiley & Sons.
6. Weston, R. (2004). *Plans Sections Elevations – Key buildings of the twentieth century*. London : Laurence King Publishing.

10110507 Electrical, HVAC, Fire Safety and Building Automation

Number of Credits	2	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical/ Week	0	External Jury	-
Total Periods per Week	2	Total Marks	100

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

Unit-I. Fundamental Electrical Concepts

Fundamental principles of Electricity, voltage, amperage, wattage. Generation & distribution of power, LT&HT lines, electricity conductors, Indian Electricity Act.

Unit-II. Electrical Systems in Built-Environment

Electricity distribution in buildings, Service wires, meter boards, circuits, switch boards, electrical safety devices in buildings, MCBs, Earthing. Introduction to Electric layouts.

Unit-III. Air Conditioning

Air-conditioning: refrigeration cycle, systems of air conditioning: Unit, split, package, Direct-expansion, Chilled water System, Ducting & air conditioning layout, fittings and fixtures.

Unit-IV. Fire Safety in Buildings

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

Unit-V Building Automation

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

References:

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

10110508 Guided Study

Number of Credits	3	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To inculcate the habit of reading books related to architecture and allied subjects in a structured manner.

Course Content

This course involves library based study and report writing. The students are expected to read two or more books in a given subject area or by a particular author, as assigned by the faculty. They are expected to write critical essays, book reviews or a research report based on their readings.

In addition, students are expected to follow academic writing and referencing conventions from the III Semester onwards.

10110509 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks

VI - SEMESTER**10110601 Architecture Design Studio - Functionally Complex Buildings**

Number of Credits	6	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	200
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	6	External Jury	200
Total Periods per Week	9	Total Marks	400

Subject Objective: The objectives of this studio are twofold. The first objective is to expose the students to the challenges of designing functionally complicated buildings, having a complex array of activities and services; The second objective is to familiarise the students to the task of coordinating integration of structural design and specialised building services in the framework of architectural design. The third objective is to let the students understand advanced construction technology and newer building materials.

Course Content:

The focus of the studio is on functionality and integration of advanced technology and services. The studio enables understanding the complex mechanisms of designing services intensive buildings in tight urban context, having multiple levels (above and/or underground). The special emphases are on utilitarian parameters, space optimisation, conformance with regulatory requirements, integration of structural systems and building services (HVAC, fire, electrical, communication, plumbing etc.) in architectural layout and construction technology. The studio encourages the students to explore modern automation and intelligent systems for building management and energy conservation. They will learn about site planning and landscaping in tight spatial context.

Studio Project:

Emphasis on the design of services intensive, multi-storeyed, buildings in tight urban spatial context, such as buildings for health care, hospitality institutional or multifunctional commercial usage. Design focuses on closed environment, with emphases on interior spaces, integration of various services, and conformance with regulatory norms. The external environment to take into consideration circulation of emergency vehicles and parking optimisation. The design studio may be closely synchronised with working drawing studio.

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 : BirkhauserVerlag AG.
4. Huxtable, A-L. (1984). *Tall Buildings Artistically Reconsidered*.
5. Kloft, E. and Johann, E. (2003). *High-rise Manual: Typology and Design, Construction and Technology*, 1st Ed. Basel : Birkhauser Verlag AG.
6. Markus, K., Rollbacher, R., Herrmann, E., Wietzorrek, U. and Ebner, P. (2009). *Typology+: Innovative Residential Architecture*. Basel : BirkhauserVerlag AG.
7. Parker, D. And Wood, A. (2013). *The Tall Buildings Reference Book*. New York : Routledge.
8. Wood, A. and Ruba, S. (2012). *Guide to Natural Ventilation in High Rise Office Buildings*. New York : Routledge.

10110602 Design Communication - II

Number of Credits	3	Subject Category	T
Lecture Periods per Week	1	Internal Assessment	50
		End Examination (Viva-Voce)	50
Studio/Lab/Workshop/Practicals/Week	3	External Jury	--
Total Periods per Week	4	Total Marks	100

Subject Objective: to equip students with digital and 3D presentation techniques, fundamentals of photography, basic skills about architectural photography, photo journalism and documentation.

Unit-I. Communication Methods

Interviewing techniques, framing Questionnaires, Group discussions.

Unit-II. Critical Writing Skills

Writing Case studies, book reviews, literature reviews.

Unit-III. Photographic Communication

Introduction to photography, types of Cameras, equipment- cameras & lenses, Principles of photo composition. Exposure, Aperture, Speed, colour, black & white, Film processing, printing & developing.

Unit-IV. Architectural Photography and Photo Journalism

Architectural Photography, Exterior and Interior photography. Photo journalism, Practical exercises to understand composition.

Unit-V. Photographic Documentation

Photo documentation of buildings highlighting quality of architectural spaces.

References:

1. Harris, M. (2001). *Professional Architectural Photography*. Focal Press.
2. Harris, M. (2002). *Professional Interior Photography*. Focal Press.
3. Heinrich, M. (2008). *Basics Architectural photography*. Birkhauser Verlag AG.
4. Sounders, D. (1988). *Professional Advertising Photography*. London : Merchurst.

10110603 Theory of Architecture

Number of Credits	2	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/Week	0	External Jury	--
Total Periods per Week	2	Total Marks	100

Subject 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.

Unit-I. Introduction

Introduction to theory, design, philosophy, aesthetics - chronological overview from Stone Age to Postmodernism. Discussions/Presentations on Works/Philosophies of Plato, Aristotle, Karl Marx, Friedrich Hegel, Vitruvius Pollio, Louis Sullivan.

Unit-II. Modernism

The principles and philosophy of modernism- in art, design and architecture, worldview, theories & perceptions of time and space, mode of reasoning. Discussions/Presentations on Works/Philosophies of Frank Lloyd Wright, Walter Gropius, Le Corbusier, Ludwig Mies van der Rohe, Pablo Picasso, Immanuel Kant, Friedrich Nietzsche, Max Weber.

Unit-III. Structuralism

The principles and philosophy of Structuralism - in art, design and architecture, worldview & mode of reasoning . Discussions/Presentations on Works/Philosophies of Aldo Rossi, Kenzō Tange, Ferdinand de Saussure , Claude Lévi-Strauss , Jacques Lacan, Roman Jakobson, Herbert Spencer.

Unit-IV. Postmodernism

The principles and philosophy of Postmodernism- in art, design and architecture, worldview, theories & perceptions of time and space, mode of reasoning . Discussions/Presentations on Works/Philosophies of Le Corbusier, Robert Venturi, Charles Moore, Mario Botta, Renzo Piano, Frank Owen Gehry, Jane Jacobs, Fredric Jameson.

Unit-V. Post-structuralism/Deconstruction

The principles and philosophy of Post-Structuralism, of art, design and architecture, worldview & mode of reasoning. Discussions/Presentations on Works/Philosophies of Jacques Derrida, Peter Eisenman, Bernard Tschumi, Philip Johnson, Henri LeFebvre, Merleau-Ponty, Juhani Pallasmaa, Jürgen Habermas, Frank Gehry, Daniel Libeskind, Rem Koolhaas, Zaha Hadid.

Biomimicry/biomimetics: The principles , philosophy and Examples. Discussions/ Presentations on Works/Philosophies of Antoni Gaudi, Norman Foster, Michael Pawlyn.

Note: The course should have mandatory discussions/lectures/seminars about/ on the philosophy/ideas of below mentioned authors/persons:

Vitruvius Pollio (De architectura: treatise on Architecture), Louis Sullivan (Form Follows Function), Le Corbusier (Towards a new Architecture), Henri LeFebvre (Social Production of Space), Bernard Tschumi (deconstructivism), Peter Eisenman (deconstructionism, Post-structuralism, work's with Jacques Derrida), Michel Foucault (ideas on Power, Knowledge, Aesthetics, Method, Epistemology), Merleau-Ponty (perception & Art ; Phenomenology, Post/Structuralism), Martin Heidegger (The Origin of the Work of Art, existential phenomenology), Juhani Pallasmaa (Architecture & the senses).

References:

1. Ching, F.D.K. (1979). *Architecture – Form, Space and Order*. Van Nostrand Reinhold Company.
2. Deleuze, G. and Hand, S. (1988). *Foucault*. Minneapolis : University of Minnesota Press.
3. Eisenman, P. (1999). *Diagram Diaries*. New York : Universe.
4. Heidegger, M. (1993). *Building Dwelling Thinking*. Basic Writings. HarperCollins.
5. Johnson, P. and Wigley, M. (1988). *Deconstructivist Architecture*. New York : Museum of Modern Art.
6. Lefebvre, H. (1991). *The production of space*. Oxford: Cambridge.
7. Merleau-Ponty, M., and InEdie, J.M. (1964). *The primacy of perception*. North Western University Press.
8. Pallasmaa, J. (2005). *The eyes of the skin: Architecture and the senses*. Chichester : Wiley-Academy.
9. Pawlyn, M. (2011). *Bio-mimicry in Architecture*. London : RIBA Publishing.
10. Tschumi, B. (1994). *Architecture and disjunction*. Cambridge, Massachusetts : MIT.
11. Venturi, R. (1966). *Complexity and Contradiction in Architecture*. New York : The Museum of Modern Art.
12. Vitruvius, P. and Morgan, M. H. (1960). *Vitruvius: The ten books on architecture*. New York : Dover Publications.

Further Readings:

13. Day, C. (1990). *Places of the soul: Architectural and environmental design as a healing art*. The Aquarian Press.
14. Hillier, B. (1996). *Space is the machine: A configurational theory of architecture*. Cambridge : Cambridge University Press.
15. Lakoff, G. (1993). *The contemporary theory of metaphor*. In : Ortony, A. (Ed.) *Metaphor and Thought*. 2nd Ed. (pp. 202-251) Cambridge: Cambridge University Press.
16. Leon, A. B. (1996). *On the Art of Building in Ten Books*. MIT.
17. Rossi, A. (1966). *L'architettura della città*. Translated by: Ghirardo, D. and Ockman, J. (1982) *The Architecture of the City*. Cambridge : MIT Press.
18. Schulz, N. C. (2007). *The Phenomenon of Place*. In : Larice, M. and Macdonald, E. (Ed.). *The Urban Design Reader* (pp. 125–137). Routledge.
19. Smith, K. H. (2012). *Introducing architectural theory: Debating a discipline*. New York : Routledge.

10110604 History of Architecture and Human Settlements - Modern and Post-Modern Era (20th century and 21st century)

Number of Credits	3	Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical per Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective:

- To introduce the condition of modernity and bring out its impact in the realm of architecture.
- To study modern architecture as evolving from specific aspects of modernity: industrialization, urbanisation, material development, modern art as well as society's reaction to them.
- To study the further trajectories of modern architecture in the post WWII period to develop a critical understanding about the changing developmental trajectories.
- To create an overall understanding of the architectural developments

Unit-I. Modern Movement and International Style

Second phase of Industrial Revolution (development of automobiles and elevator technologies, rise of mass-production paradigm); Emergence of Modern Architecture, Chicago School, Bauhaus movement and CIAM, International style, Post War reconstruction in Europe, and its influences on Modern Architecture, Philosophies of minimalism and Form Follows Function; works of great modern masters (Peter Behrens, Walter Gropius, Mies Van der Rohe, Le Corbusier, later works Frank Lloyd Wright; Luis Kahn, Alvar Alto etc.); Planning thoughts associated with Modernism: Towers in the sky and automobile dependent urban thoughts of Corbusier and Wright, Neighbourhood concept C.A. Perry Theories of Structuralism, De-constructivism; Critical Regionalism and Metabolism

Unit-II. Late-Colonial Architecture in India

Early modern architecture in India, Edwin Lutyens, Herbert Baker and building of New Delhi; Changing politics of Architecture; Art-Deco / Indo-Deco architecture. Health crisis in Indian cities and beginning of modern city planning, Patrick Geddes-Conservative surgery-case study.

Unit-III. Post-Colonial Modernism and Development Planning in India

Post-colonial, Nehruvian nation building initiatives; Planning Commission and public sector led industrialisation; Building of new industrial towns (e.g. Bhilai, Durgapur, Roukella etc.), New capital cities (e.g. Bhubaneswar, Chandigarh and Gandhinagar); Works of Corbusier and Luis Kahn in India and their influences on Indian architects; Architecture and urbanism by great Indian masters: A. Kanvinde, B.V Doshi, Charles Correa, Raj Rewal etc.

Unit-IV. Post and Late Modern Architecture

Socio-political changes during the 1960s and its implications for architecture, Counter reaction to Modernism; Post-modernism and classical revivalism; Works of James Sterling, Philip Johnson, Robert Venturi, Michael Graves etc. Counter-reaction and industrial aesthetics of Richard Rogers, Norman Foster; Works of Zaha Hadid, Rem Koolhaas, Renzo Piano and Daniel Libeskind; Oil crisis of the 1970s and rising environmental consciousness; Theory of New Urbanism and Sustainable Urban Development.

Unit – V. Contemporary Architecture in India

Socio-economic changes in India from 1990s onwards and its implications for architecture; Rapid urbanisation, Rise of private townships, gated communities and globalised business parks; Availability of new building materials; Land and environmental conflicts; Rise of informality in production of space; Works of contemporary masters - Hafeez Contractor, Dean D'Cruz, Morphogenesis Studio etc.

References:

1. Benevolo, L. (1977). *History of Modern Architecture*. 2 Vols., reprint, MIT Press.
2. Curtis, W. J. (1982). *Modern Architecture since 1900*. Phaidon Press.
3. Frampton, K. (1994). *Modern Architecture: A Critical History*. London : Thames & Hudson.
4. Jenks, C. (2007). *The Story of Post-Modernism*. London : Wiley and Sons.
5. Lang, J., Desai, M. and Desai, M. (2000). *Architecture and independence : The search for identity – India 1880 to 1980*. New Delhi : Oxford University Press.
6. Lang, J.T (2002). *A Concise History of Modern Architecture in India*.
7. Lu, D (Ed). (2011). *Third World Modernism, Architecture, Development and Identity*. Oxon : Routledge.
8. Mehrotra, R. (2011). *Architecture in India Since 1990*. Pictor.
9. Metcalf, T. (1980). *An imperial Vision*. Electa : Faber & Faber.
10. Schulz, C. N. (1993). *Meaning in Western Architecture*. New York : Rizzoli International Publishers.
11. Singh, M. and Mukherjee, R. *New Delhi- Making of a Capital*. New Delhi : Roli Books.
12. Tafuri, M. (1980). *Modern Architecture*. Harry N. Abrams Inc.
13. Verma, P. (2010). *Becoming Indian – The Unfinished Revolution of Culture and Identity*. New Delhi : Penguin India.

10110605 Steel Structures

Number of Credits	4	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective: to introduce the concepts of designing with steel structures and its components. To elucidate the role of steel ropes/strands in pre-stressing in concrete members. To enable students to understand and design components such as staircases with steel structural members.

Unit-I. Introduction to Steel Structures

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

Unit-II. Steel Connections

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

Unit-III. Design of Steel Beams

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

Unit-IV. Design of Steel Columns

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

Unit-V. Pre-stressed Concrete Structures

Principles, Materials, Classification, General information about devices, Equipment, Analysis for stress, Simple calculations in design of cross-section details (P, e, Safe stresses).

Concrete Technology Laboratory – II

1. Site visit on steel structures and skyscrapers.
2. Concrete mix Designs (Innovative laboratory experiment on individual interest)
3. Non Destructive Test on concrete - Rebound Hammer Test.
4. Flexural strength of RCC beams
5. Study of other Non Destructive Test on hardened concrete (Not for exams)
 - a. Ultra sonic pulse velocity test
 - b. Concrete core Extraction.

References:

1. Bhavikatti, S. S. (2010). *Design of Steel Structures*. I.K. International Publishing House.
2. Duggal, S. K. (2000). *Design of Steel Structures*. Tata McGraw Hill Education.
3. Ram, K. S .S. (2010). *Design of Steel Structures*. Pearson Education India.
4. Shiyekar, M. R. (2011). *Limit State Design in Structural Steel*. PHI Learning Pvt Ltd.
5. Subramanian, N. (2008). *Design of Steel Structures*. Oxford University Press.

10110606 Working Drawings-II

Number of Credits	4	Subject Category	S
Lecture Periods per Week	2	Internal Assessment	50
		End Examination (Viva-Voce)	50
Studio/Lab/Workshop/Practical's per Week	3	External Jury	--
Total Periods per Week	5	Total Marks	100

Subject Objective: to train the students to prepare detailed Working drawings for effective execution at construction site, preparation of integrated services drawings, and detailing for various types of drawings and methods of transmittals and record keeping.

Preparation of Working drawing details:

- an overview of site marking procedure, "techniques/thumb rules" to ensure effective translation from "working drawings" to actual site execution, and developing Site Plan, Site Marking Plan, Site Grading / Levelling Plan.
- integration with schedule of joinery, schedule of hardware, finishing materials, method of dimensioning, appropriate section line markings.
- developing elevations, sections, part sections, wall sections integrated with finishing materials, etc. ,
- Construction details for lifts, dumb waiters, escalators, travelators.
- External Plumbing Layout and details.
- Details of Septic tank.

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

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

References:

- Building and Construction Authority. (2005). CONQUAS-21. Singapore : The BCA Construction Quality Assessment System.
- Jefferis, A. and Madsen, D.A. (2005). *Architectural Drafting and Design*. 5th Ed. New York : Thomson Delmar Learning.
- Jeong, K-Y. (2010) *Architecture Annual*. Seoul : Archiworld Co.
- Joe, B. (Ed). (2002). *Details in Architecture: Vol. I-V*. Victoria : The Images Publishing group.
- Osamu, A. W., Linde, R. M. and Bakhoun, N. R. (2011). *The professional practice of architectural working drawings*. 4th Ed. Hoboken : John Wiley & Sons.
- Weston, R. (2004). *Plans Sections Elevations – Key buildings of the twentieth century*. London : Laurence King Publishing.

10110607 Disaster Resilient Buildings

Number of Credits	3	Subject Category	T
Lecture Periods/Week	3	Internal Assessment	50
		End Evaluation	50
Practicals/Lab/Workshop Periods/Week	0	External Jury	--
Total Periods/Week	3	Total Marks	100

Subject 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.

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: Behaviour of various types of buildings, structures, and collapse patterns; Behaviour 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*. John Wiley & 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*. Wiley-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*.

10110608 Guided Study

Number of Credits	3	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To inculcate the habit of reading books related to architecture and allied subjects in a structured manner.

Course Content

This course involves library based study and report writing. The students are expected to read two or more books in a given subject area or by a particular author, as assigned by the faculty. They are expected to write critical essays, book reviews or a research report based on their readings.

In addition, students are expected to follow academic writing and referencing conventions from the III Semester onwards.

10110609 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks

VII SEMESTER**10110701 Architecture Design Studio - Housing**

Number of Credits	9	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	250
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	9	External Jury	250
Total Periods per Week	12	Total Marks	500

Subject Objective: The objectives of this studio are four fold. First objective is to expose the students to the complexities of providing shelter for people from different socio-economic background in close proximity to each other, in urban areas. The second objective is to sensitize the students about land scarcity and expose them to different typologies of high-density housing. The third objective is to expose the students to the challenges of bigger scale site planning involving a group of buildings. Fourth objective is to enable the students apply theoretical knowledge learnt in previous semesters in architectural design exercise.

Course Content:

Issues related to housing shortages, basics of housing finance, incremental housing, sites and services schemes, slums and squatter settlements are to be discussed in the class. The students are expected to design in a climate responsive and environment friendly way while planning medium sized housing complexes. The students are especially expected to apply the appropriate technology for low-cost housing, the knowledge learnt in the previous semester in Landscape Design, Disaster Resilient Buildings, Quantity Estimation & Specifications, and Construction Management in the same semester.

The students are expected to carry out detailed site analysis, documenting physical features, vegetation, land forms soil characteristics, slope analysis and natural drainage patterns. Site planning exercise should depict understanding of vehicular and pedestrian movement patterns, land grading and conservation of ecologically sensitive features;

They are also expected to be conscious about the need for energy conservation through passive design. They will apply advanced simulation and modeling techniques to orient their buildings and decide energy performance parameters. Sample quantity estimates and specifications are to be prepared.

Studio project:

There could be two design exercises: low-rise high-density housing and high-rise high-density housing. While designing socio-economic determinants, regulatory and technological alternatives shall be studied in detail. Exercises in simulation and conceptual modelling shall be conducted. Application of concepts of project phasing, financing and construction planning are to be applied.

References:

1. Brooks, R. G. (1988). *Site Planning: Environment, Process and Development*. Michigan.
2. Clapham, D., Clark, W. A. V. and Gibbs, K. (2012). *The Sage Handbook of Housing Studies*. London : Sage Publications.

3. Correa, C. (2010). *A Place in the Shade: The New Landscape and Other Essays*. New Delhi : Penguin Books.
4. Ferre, A. and Tihamer, S. H. (2010). *Total Housing: Alternatives to Urban Sprawl*. New York : ACTAR Publishers.
5. Greater London Council. (1978). *An Introduction to Housing Layout: A GLC Study*. London.
6. Lee, K. E. (1984). *Time Saver Standards for Site Planning*. McGraw-Hill Ryerson.
7. Levitt, D. and Levitt, B. (2010). *The Housing Design Handbook*. New York : Routledge.
8. Root, B. J. (1985). *Fundamentals of landscaping and site planning*. AVI Publications.
9. Untermann, R. and Small, R. (1977). *Site Planning for Cluster Housing*. Van Nostrand Reinhold.

10110702 Introduction to Landscape Design

Number of Credits	3	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's	2	External Jury	--
Total Periods per Week	4	Total Marks	100

Subject Objective: To introduce the students to the discipline of Landscape architecture & its relevance to Architecture. To gain an insight into the changing relationship of human with nature, to develop the understanding of site and site planning. To develop the skill of integrated design of open and built spaces.

Unit-I. Landscape – an Introduction

Introduction to landscape - its meaning, Experience of a landscape, Aesthetics & Imagery of a landscape, Relationship of humans and nature, How landscapes relate to land, nature, environment and place; How the scales & conception of landscapes evolve over time, Sense of place in the landscape.

Unit-II. Site Planning

Site survey and appraisal, Site Inventory checklist – Topography, vegetation, soil, hydrology, climate etc. Principles of site planning, Design issues in site planning and siting of buildings. Integrating the built and open spaces.

Unit-III. Elements of Designed Landscapes

Brief overview of the use of landforms, water, plants, built elements, application of materials, street furniture in a designed landscape.

Unit-IV. Exploration of sustainable landscape solutions at the site, brief overview of Xeriscaping, green roofs & walls, rain water harvesting etc.

Studio component of the semester may be integrated with Architectural Design of the current semester.

References:

1. Appleton. (1996). *The Experience of Landscape*. Wiley.
2. Geoffrey, and Jellico, S. (1987). *The Landscape of Man*. Thames and Hudson.
3. Holl, G. P. (2006). *Questions of Perception Phenomenon logy of Architecture*. Richmond : William Stout Publishers.
4. Laurie. (1986). *An Introduction to Landscape Architecture*. Elsevier.
5. Lynch, K. (1962). *Site Planning*. Cambridge : The MIT Press.
6. Reid, G. (2002). *Landscape Graphics*. New York : Watson-Guptill.
7. Simonds, J. O. (2006). *Landscape Architecture: A Manual of Land Planning and Design*.

10110703 Seminar

Number of Credits	6	Subject Category	S
Lecture Periods per Week	1	Internal Assessment	100
		End Examination (Viva-Voce)	100
Studio/Lab/Workshop/Practical's/Week	3	External Jury	---
Total Periods per Week	4	Total Marks	200

Subject Objective: This shall be the outcome of a logical research on a topic related to any aspect of Architecture and allied subjects. It is expected that the students will demonstrate effective oral presentation in a hall of audience, as well as structured writing.

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

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

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

10110704 Elective – IIA (Building Repairs and Restoration)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject 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.

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.

10110704 Elective – IIB (Environmental Impact Assessment)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: Introduce tools and techniques of EIA and its application; Ensure that environmental factors are considered as a part of decision making process; to identify possible adverse impacts so as to avoid or mitigate them

Unit-I. Introduction

Definition, concepts, need & relevance of Environmental Impact assessment in decision making process; Evolution of EIA and its importance in global, Indian and local context; Principles of EIA; Classification of EIA projects.

Unit-II. Process and Methodologies

Measurement of environmental impact, Process of EIA in India & Abroad; Importance of scoping & screening in EIA process; Role of public participation at various levels of decision making; Methodologies, checklists, matrices, network & social cost-benefit analysis, habitat evaluation systems, comprehensive study of various project types, impact calculation & ways to mitigate.

Unit-III. Environmental audit and management

Definitions & concepts of audits, GHG Emissions, energy foot print, carbon foot print, partial audits, compliance audits, methodologies & regulations.

Unit-IV. Various other assessment techniques

PRA techniques, definition & concepts, objectives, techniques, advantages & limitations; SEA, evolution need and relevance, scope and tasks.

Unit-V. EIA in India

EIA regulations in India, initiatives, environmental appraisal procedure, problems associated with relocation, resettlement, refugees & environmental justice, future strategies. Study of an environmental appraisal report and EIA statement of any two projects of national importance.

References:

1. Glasson, J. R. and Chadwik, A. (2012). *Introduction to Environmental Impact assessment*. Routledge Publications.
2. Kulkarni, V. and Ramachandra, T. V. (2006). *Environmental Management*. The Energy and Resources Institute.
3. Richard, K. M. (2002). *Environmental impact assessment, a methodological perspective*. Boston : Kluwer Academic Publishers.
4. Thorpe, A. (2007). *The Designer's Atlas of Sustainability*. Washington DC : Island Press.

10110704 Elective – IIC (Set Design)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: To create awareness and provide exposure about the design potential in theatre & cinema set design to architecture students, to inculcate the ability to translate the requirements of the script to physical manifestations according to the traditions followed in the theatre & cinema industry.

Unit-I. Film and Society

Examination of the 20th century culture and society through film. Critical analysis of cultural and social conflicts are portrayed and worked out in popular films, and examination of how motion pictures create a window into modern society. Film as cultural text to better understand history and cultural manifestations.

Unit-II. History and Theater Film Set Design

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

Unit-III. Graphic Design and Typography for Exhibit Design

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

Unit-IV. Set Design and Concept Wrap

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

Unit-V. Stage Design

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

References:

1. Baiche Bousmaha & Walliman Nicholas. *Neufert Architect's data*. Blackwell science ltd.
2. Chiara De Joseph & crosbie.J.Michael. 1990. *Time saver standards for building types*. McGraw Hill company

10110704 Elective – IID (Advanced Architectural Acoustics)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: This course will give basic understanding about the science behind the building acoustics. It will help students for applying prediction methods to assess the noise mitigation and transmission in buildings. Further this course will expose students to perform basic room acoustic measurements and to determine the various indicators used for performing spaces.

Unit-I. Measurement and predictions

Fundamentals, Legal frame work, background noise, reverberation, echo, reverberation time (T20, T30, EDT T60), optimum reverberation time, clarity, definition, loudness, ray diagram, testing rooms, anechoic chambers, reverberation chambers.

Unit-II. Room acoustics - concepts

Geometry: Sound behaviour in enclosed space, free field & reverberant field, room modes. Bass trap, acoustical detailing of interior spaces. Simulation software: EASE, Odeon etc.

Unit-III. Acoustical design

Site selection, acoustics of ancient Greek and Roman theatres, design of open air theatre, acoustical design of Lecture halls, meeting rooms, recording studios, auditoriums, concert halls, churches, home theatres, cinema theatres etc.

Unit-IV. Noise Control

External noise source and its control (Traffic, Rain, industry etc.), Source within buildings and its control (Fans, chillers, boilers, HVAC noise sources), air born and structure borne sound transmission, vibration isolation, damping.

Unit-V. Environmental noise

Site planning, Background noise criteria (NR, PNC, STI), Noise barrier, Types and design of Noise barrier, Urban Soundscape, Keynote, foreground and soundmark, Hi-fi, lo-fi, micro and macroscale modelling.

References:

1. Barron, M. (2009). *Auditorium acoustics and architectural design*. 2nd Ed. Taylor & Francis.
2. Cox, T. J., and Antonio, P. D. (2009). *Acoustic Absorbers and Diffusers*. 2nd Ed. Taylor & Francis.
3. Eagan, D. *Concepts in Architectural Acoustics*.
4. Hopkins, C. (2008). *Sound Insulation: Theory into Practice*. 1st Ed. Butterworth Heinemann.
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.
8. Vigran, T. E. (2008). *Building Acoustics*. 1st Ed. Taylor & Francis.

10110704 Elective – IIE (Advanced Building Technology)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: to familiarize the students with the advanced building technologies

Unit-I.

Introduction to Limit state method and practicing design of structural elements slabs, beams, columns and foundations.

Unit-II.

Industrial Structures in Steel. Multi Storied / Tall Structures / Towers.

Unit-III.

Large Span Construction-flat slabs-shell structures, folded plates, portal frames space frame & trusses, tensile structures.

Unit-IV.

Pre-fabricated construction & Pre-engineered building. New Material in Construction. Cold form sections, FRP.

Unit-V.

Earth Quake resistant construction practices and design. Behaviour of structures during earth quacks. Retrofitting of buildings.

References:

1. Agarwal, P. and Shrikhande, M. (2010). *Earthquake Resistant Design of Structures*. PHI Learning Pvt Ltd.
2. Bureau of Indian Standards. (1993). *Code of practice for ductile detailing of RC structures subjected to Seismic forces*. IS:13920..
3. Bureau of Indian Standards. (2002). *Criteria for Earthquake Resistant Design of Structures - General Provisions and Buildings*. IS: 1893 (Part 1).
4. Bureau of Indian Standards. (2002). *Repair and Seismic strengthening of buildings – Guidelines*. IS:13935.
5. Day, R. W. (2002). *Geotechnical Earthquakes Engineering Hand Book*. New Delhi : Tata McGraw-Hill.
6. Hayder, A. R. (2014). *Strengthening Design of Reinforced Concrete with FRP*. CRC Press.
7. Kumar, K. (2009). *Basic Geotechnical Earthquake Engineering*. New Delhi : New Age International Publications.
8. Okamoto, S. *Introduction to Earthquake Engineering*. University of Tokyo Press.
9. The Associated Cement Companies Ltd. *Guidelines for Earthquake Resistant Non Engineered Construction*.

10110705 Estimation, Costing and Specifications

Number of Credits	4	Subject Category	T
Lecture Periods/Week	4	Internal Assessment	50
		End Evaluation	50
Practicals/Lab/Workshop Periods/Week	0	External Jury	--
Total Periods/Week	4	Total Marks	100

Subject Objective: This course is intended to impart students with the necessary technical knowledge for preparation of Specifications and calculating estimates and detailed costing for small to medium scale projects.

Unit-I. Introduction

Introduction to Quantity estimation, costing and specifications related to building projects. Definition of estimating and costing, Purpose of estimation and costing, Procedure of estimating or method of estimating, data required to prepare an estimate (Drawings/ specification/ rates), complete estimate structure.

Unit-II. Measurement of materials and works

Introduction to measurement of various construction work items, importance and significance in construction projects i.e. Units of measurement, rules for measurement, Methods of taking out quantities- Long wall and short wall method, centre line method, partly centre line, cross wall method. Standard modes of measurement as per Indian Standards for various work items.

Unit-III. Types of estimates

Preliminary/Approximate Quantity Estimates: Importance & purpose of Preliminary / Approximate estimates, Plinth area method, Cubical contents method and centre line method and their preparation. Types of approximate estimates, basic differences and advantages.

Detailed Quantity Estimation: Types of detailed estimates and their application, Methods of deriving detailed quantities for various construction work items. Preparation of Detailed estimate, Work items as per construction stages: Foundations, Superstructure, Finishing works in a simple building. Description & significance of Items in Bill-of-Quantities (BOQ).

Unit-IV. Costing

Introduction, meaning, purpose, methods of estimating cost of construction for various work items, cost indices, rates of labour and material, analysis of rates, preparation of abstract of estimated cost, use of CPWD schedule of rates. Deriving construction cost as per BOQ.

Unit-V. Specifications:

Introduction, Definition, importance and purpose of specifications, impact on costing. Principles and practices. Types of specifications. Knowledge of manufacturers' specifications for construction materials/products. Specification of common building materials including carriage & stacking of materials. Specifications for a simple building. Standard specifications of BIS. General abbreviations used in specifications. Specification of new building materials.

References:

1. Birdie, G. S. (2005). *Text Book of Estimating and Costing*. Dhanpat Rai Publishing.
2. Chakraborty, M. *Estimating, Costing, Specification & Valuation*
3. C.P.W.D. Standard Schedule of Rates.
3. Dutta, B. N. (1998). *Estimating and Costing in Civil Engineering*. 24th Ed. UBS Publishers Distributors Ltd.

10110706 Construction Project Management

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practicals/ Week	1	External Jury	--
Total Periods per Week	4	Total Marks	100

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.

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.

4. Punmia, B. C., and Khandelwal, K. K. (2006). *Project planning and control with PERT and CPM*. New Delhi : Laxmi Publications.
5. Wiest, J. D., and Levy, F. K. (1982). *A Management Guide to PERT/CPM*. New Delhi : Prentice Hall of India.

10110707 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks

10110801 Professional Training

Number of Credits	30	Subject Category	L
Lecture Periods per Week	--	Internal Assessment	--
Tutorial Periods per Week	--	End Examination	--
Studio/Lab/Workshop/Practicals/ Week	--	External Jury	1200
Total Periods per Week	--	Total Marks	1200

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.

The objective of the practical training is to expose the students to working in real life projects. The students are expected to work under the supervision of experienced architects registered with the Council of Architecture to understand how various components related to architecture are applied. As part of their practical training, the students are expected to work on presentation/ working drawings, specifications and quantity estimation. The students are also expected to familiarise themselves with coordination of structural and services drawing with architectural drawings. It is desired that the students undertake site visits and understand construction practices.

At the end of the practical training, the students are required to present selected works, which are best representative of the training undergone in the form of drawings. The students are also required to submit a report describing various concepts learnt during training, experiences of site visit and estimation / costing activities etc. Training attendance log sheets shall also be submitted as part of the report. The report requires to be submitted for internal assessment.

IX Semester

10110901 Architecture Design Studio - Urban Context

Number of Credits	9	Subject Category	S
Lecture Periods per Week	3	Internal Assessment	250
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	9	External Jury	250
Total Periods per Week	12	Total Marks	500

Subject Objective: The objectives of this studio are three fold. First objective is to expose the students to the complexities of large-scale architectural interventions in specific urban settings, having multiple stakeholders. The second objective is to let the students explore how to harmonise and contextualise the architectural design with the immediate built environs and the larger urban fabric. The third objective is to sensitise the students about the interface between public and private domain.

Course Content:

Students are to be exposed to the complexities of large-scale architectural projects, often involving a group of buildings in a public realm and having multiple stakeholders. Students are encouraged to look beyond the concerns of individual building project to address the interface between public and private realm; and also contextualize their design interventions to the surrounding urban environs. The studio enables the students to apply the lessons learnt in the Introduction to Urban Design class.

The students are expected to carry out site analysis and site planning at a real life location, considering its locational context, physical features, views, orientation, volumetric analysis and figure ground study of the built-form characteristics, visual imageries, street-scape and skyline analysis; pedestrian, vehicular circulation pattern, and utility networks. They also try to understand the correlation between, physical, socio-cultural, environmental and socio-economic dimensions of the built environments, so as to identify opportunities and constraints associated with large-scale urban interventions. Students are then expected to apply this understanding to a realistic site to create physical environments through basic tools of master planning, such as: movement networks, open spaces, suggestive builtform, infrastructure network and planning norms.

Studio project:

Design exercise could be any medium to large scale project in the public domain, situated within an existing (and preferably compact) urban fabric, such as: redevelopment of commercial areas, waterfront development, transit-hubs, market squares, densification along transit corridors, mixed use complexes.

References:

1. Carmona, M., Heath, T., Oc, T. and Tiesdell, S. (2010). *Public Places Urban Spaces*. Oxford : Architectural Press.
2. Lang, J. T. (2005). *Urban Design: A Typology of Procedures and Products*. Oxford : Elsevier/Architectural Press.
3. Larice, M. and Macdonald, E. Ed. (2013). *The Urban Design Reader*, 2nd Ed. The Routledge Urban Reader Series. Abingdon, Oxon : Routledge.

4. Krier, R. (1979). *Urban form and space*. London : Academy Editions.
5. Lynch, K. (1984). *Good city form*. Boston : MIT Press.
6. Marshall, S. (2009). *Cities design and evolution*. New York : Routledge.
7. Moughtin, C., Cuesta, R., Sarris, C. And Signoretta, P. (2003). *Urban Design - Methods and Techniques*. Oxford : Architectural Press.
8. Watson, D., Plattus, A. and Shibley, R. (2003). *Time-Saver standards for urban design*. New York : McGraw Hill.
9. Whyte, W. H. (1980). *The social life of small urban spaces*. Washington D.C : Conservation Foundation.

10110902 Introduction to Urban Design

Number of Credits	3	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	2	External Jury	--
Total Periods per Week	4	Total Marks	100

Subject Objective: To introduce Urban design as a professional discipline situated at the interface between architecture, landscape architecture and urban planning; To sensitise the students about the concept of public realm, understanding of the city as a three dimensional entity and perception of spaces at multiple scales; familiarize with the implementation processes through various statutory and non-statutory guidelines.

Unit-I. Introduction and Scope

Relationship between Architecture, Urban Design and Urban Planning; Brief review of the evolution of the urban design as a discipline, basic principles and theories. Broad understanding of urban forms and spaces at various spatial scales through examples from historic cities.

Unit-II. Typologies and Procedures

Concepts of public and private realm; understanding different types and procedures of urban design interventions their scale relationships; constraints and challenges of urban design in democratic versus authoritarian settings.

Unit-III. Elements of Urban Design

Understanding the city as a three dimensional element; Urban form as determined by interplay of masses, voids, order, scale, harmony, symmetry, colour and texture; Organization of spaces and their articulation in the form of squares, streets, vistas and focal points; Concept of public open space; Image of the city and its components such as edges, paths, landmarks, street features;

Unit-IV. Urban Design and Sustainability

Sustainability concept; Relationship of urban design with economic, environmental and social sustainability; Urban renewal and urban sprawl; Concepts of Transit Oriented Development, Compact City, Healthy City and Walkable City;

Unit-V. Urban Design Implementation

Urban design and its control; Institutional arrangements for design and planning, their roles, powers and limitations; Types of planning instruments, structure plans, master plans and local area plans and zoning guidelines; Design communication and role of public participation;

Studio component of the semester may be integrated with Architectural Design of the current semester.

References:

1. Larice, M. and Macdonald, E. Ed. (2013). *The Urban Design Reader*. 2nd Ed. The Routledge Urban Reader Series, Abingdon, Oxon : Routledge.
2. Carmona, M., Heath, T., Oc, T. and Tiesdell, S. (2010). *Public Places Urban Spaces*. Oxford : Architectural Press.
3. Marshall, S. (2009). *Cities design and evolution*. New York : Routledge.
4. Lang, J. T. (2005). *Urban Design: A Typology of Procedures and Products*. Oxford : Elsevier/Architectural Press.
5. Moughtin, C., Cuesta, R., Sarris, C. and Signoretta, P. (2003). *Urban Design - Methods and Techniques*. Oxford : Architectural Press.
6. Watson, D., Plattus, A. and Shibley, R. (2003). *Time-Saver standards for urban design*. New York : McGraw Hill.

10110903 Architecture and Urbanism in Asia

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

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

Unit-I. Setting the Context

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

Unit-II. Opportunities and Challenges

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

Unit-III. Looking Towards East and Southeast Asia

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

Unit-IV. Looking Towards South and West Asia

Understanding underlying socio-political dynamics and critiquing new architecture and urban development patterns in Asian metropolises such as Dubai, Abu Dhabi, Karachi, Dhaka and Paro.

Unit-V. Similarities and Dissimilarities

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

References:

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

10110904 Elective-III

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: To enhance the capabilities of the students to comprehend architecture at a higher academic level in an urban context.

Following elective subjects are made available as Elective-III:

Sl. No.	Elective – III : List of Subjects Offered	Department
A	Project Formulation & Appraisal	Planning
B	Traffic & Transportation Planning	"
C	Planning & Management of Informal Sector	"
D	Utilities & Networks Planning	"
E	Real Estate Planning & Management	"
F	Bio-climatic Architecture	Architecture

The Syllabus for the above subjects is made available from respective departments from time-to-time.

10110904 Project Formulation & Appraisal (Elective-III A)

Number of Credits	4	Subject Category	CT
Lecture Periods/Week	2	Internal Assessment	50
Tutorials/Week	2	End Evaluation	50
Practicals /Lab/Workshop Periods/Week	--	External Jury	--
Total Periods/Week	4	Total Marks	100

Subject Objective: Introduce aspects of project planning, management, implementation and appraisal.

Unit 1: Project formulation / planning

Methodology for project identification and formulation; detailed project report, and feasibility studies, techniques of financial appraisal, pay-back period, internal rate of return (IRR), DCF, net present value (NPV), cost benefit ratio (CBR), financial cost-benefit analysis, economic cost benefit analysis.

Unit 2: Pre-implementation planning phase

Work break down structure; network analysis; CPM, PERT; resource levelling and allocation; time-cost trade off aspects.

Unit 3: Project management

Importance of project management; reasons for shortfall in performances; scientific management; life cycle of project; planning and control, human aspects, development of project network, critical path, PERT & CPM; project organization, contracting, procurement and recruitment budget; fund flow statement and stabilization; organization of project, matrix organization, task forces, project teams; monitor and control of project; tools and techniques for project management, classical persuasive and non-persuasive strategies and techniques; new techniques of management by objective (MBO); integrated reporting system, flow diagrams, bar, charts, milestone charts; techniques of monitoring of development works - standard oriented costs control, turnkey system, vertical production method, inventory cost control techniques, and unified status, index techniques.

Unit 4: Project appraisal and financing techniques

Technical/Financial/Organisational criteria, appraisal criteria (NPV/ B/C. Ratio/ I.R.R.) – financial analysis, SWOT analysis; capital costs, financing plans, operation costs, projections of costs and revenues, financial viability, debt servicing, income and expenditure statement, project balance sheets, rate of returns; social cost benefits analysis rationale for SCBA, UNIDO approach.

Unit 5: Project implementation, monitoring and evaluation

Project implementation, stages of implementation; actors in projects implementation; project monitoring; meaning objectives and significance; monitoring techniques; integrated reporting, milestones, time and cost over-run and under runs, unit index techniques; project evaluation; life of a project; techniques of project evaluation; input analysis, financial cost-benefit analysis, social-cost benefit analysis; case studies in urban and regional development projects.

10110904 Traffic and Transport Planning -- II (Elective- IIIB)

Number of Credits	4	Subject Category	CT
Lecture Periods/Week	4	Internal Assessment	50
Tutorials/Week	--	End Evaluation	50
Practicals/Lab/Workshop Periods/Week	--	External Jury	--
Total Periods/Week	4	Total Marks	100

Subject Objective: To inculcate knowledge of Urban Transport planning process, modelling, safety and appraisal of the projects.

Unit 1: Introduction to urban transport planning process

Study area definitions, sampling of travel methods, survey techniques; programming and scheduling, processing of travel data, analysis and interpretation of traffic studies; introduction to transport planning process, trip generation, trip distribution, trip assignment, modal split, introduction to TRIPS, CUBE, TRANSYT, ARCADY, etc.; freight transport characteristics.

Unit 2: Public transport

The roles and characteristics of public transport modes, understanding and estimating public transport demand, designing and operating public transport systems, logistics and supply chain management, vehicle utilisation, vehicle routing, passenger information systems, public transport costs, fares and investment appraisal, application of intelligent transport systems, local authorities and transport executives.

Unit 3: Transport safety

Indian and international accident patterns; accident data sources, identification of hazards and diagnosis of safety problems, interpretation of safety information; human factors in road accidents; vehicle factors in accidents and injury prevention measures; infrastructure problems and solutions; system safety and safety audit; safety education; safety modelling; vulnerable road users; planning for target group – children, adults, handicapped and women.

Unit 4: Transport and environment

Introduction to urban pollution issues and policy, transport noise screening tools, vehicle emissions and trends, air quality management, exploratory analysis of urban air quality data, dispersion modelling approaches, norms and guidelines for highway landscape, energy and environmental implications in transport, standards and design considerations.

Unit 5: Financial and economic appraisal of transport projects

Estimates of quantities, unit rates, cost escalation, revenues, financial viability, economic project cost; approaches for economic evaluation, project cost and scheduling, savings in fuel consumptions, travel time savings, savings in VOC, determination of EIRR and sensitivity analysis.

10110904 Planning and Management of Informal Sector (Elective-IIIC)

Number of Credits	3	Subject Category	CT
Lecture Periods/Week	2	Internal Assessment	50
Tutorials/Week	2	End Evaluation	50
Practicals/Lab/Workshop Periods/Week	--	External Jury	--
Total Periods/Week	4	Total Marks	100

Subject Objective: To understand the issues involved in the planning and management of informal sector.

Unit 1: Understanding informality

Characteristics of informal economic activities, other types of informality; informal sector vis-à-vis poverty; dimensions of urban poverty, magnitude of problem, urban poverty alleviation programmes, impact of macro-economic structural adjustment policies on poor urban households.

Unit 2: Informality in commercial sector

Formal and informal economy at the local scale; types and categories of informal sector service providers; advantages and disadvantages in the Indian context; statistics related to employment and turnover of informal sector market; examples of integration between formal and informal sector market entities; dependency factors of local economy on formal sector

Unit 3: Basic needs and alternative approaches for delivery of basic services

Development of the concept of basic needs; identification of basic needs and their provision for various target groups and informal sectors; standards for basic needs, NGO's and voluntary organizations associated with provision of basic needs, community planning approach, low cost alternatives and institutional reforms approach.

Unit 4: Migratory impulses and impact on informal sector

Characteristics of migrants and their association with growth of informal sector; socio-economic deprivation and informal sector; development of informal sector concept.

Unit 5: Dealing with informality

Characteristics and functions of spontaneous growth in urban context, actions for improvement; appraisal of the role of government, private and voluntary organizations and their existing organisational set-up and limitations; planning and development of urban settlements in respect of the spontaneous growth; case studies from India and other developing countries.

Note: To bring an holistic and pragmatic dimension to the course, the five core underlying parameters of a) Sustainability, b) Equity, c) Efficiency, d) Harmony, and e) Safety, are to be incorporated in the instruction strategies through case studies and examples, wherever applicable.

10110904 <u>Real Estate Planning and Management</u>		(Elective- IIID)	
Number of Credits	2	Subject Category	NT
Lecture Periods/Week	3	Internal Assessment	50
Tutorials/Week	1	End Evaluation	--
Practicals /Lab/Workshop Periods/Week	0	Examination	50
Total Periods/Week	4	Total Marks	100

Subject Objective:

Unit 1: Land

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

Unit 2: Developments of land and real property

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

Unit 3: Real property markets

Heterogeneity and imperfections, valuation of real property – principles and practices; private ownership and social control of land; disposal of land; land development charges and betterment levy; land use restrictions, compensation and requisition taxation of capital gain on land versus public ownership, economic aspects of land policies at various levels of decision making.

Unit 4: 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.

Unit 5: Other forms of real estate development

Case studies of real estate development in public, private, partnership sectors; Real estate s facilitator of development; Development of real estate as a tool for controlling land and property prices; Transaction and renting of real estate, Lease deeds/ sale deeds, sale documents, registration; Mortgage and pledging.

10110904 Utilities and Network Planning (Elective-IIIE)

Number of Credits	2	Subject Category	NT
Lecture Periods/Week	2	Internal Assessment	50
Tutorials/Week	2	End Evaluation	50
Practicals/Lab/Workshop Periods/Week	--	External Jury	--
Total Periods/Week	4	Total Marks	100

Subject Objective: Developing skills to design utility networks and alignment plans in the context of a new or existing area taking into consideration the local needs and limitations.

Unit 1: Components of typical utility networks in an urban area

Appraisal and critical evaluation of an existing road network, water supply situation, drainage and sewerage system, and solid waste management situation in a given urban context; understanding the nature of the problem in utilities and services; understanding relations between land use change, demographic change and development pattern with utility services demand.

Unit 2: Water supply plans

Calculating the demand of water supply based on population projections and land use type; designing layout and alignment of new water supply lines in a typical residential site; augmenting plans of an existing water supply line.

Unit 3: Storm water drainage

Calculation of generation of Dry Weather Flow (DWF) and Storm Weather Flow (SWF) from an area based on population projections and soil type; designing layout and alignment of new drainage lines; natural drainage channels based on natural gravity; catchment of drainage channels; utility of open and covered drains; developing augmenting plans of an existing drainage line.

Unit 4: Other Infrastructure

Power, gas, telecommunication lines; locating all infrastructure lines within the ROW in efficient road cross sections; planning the local circulation pattern in relation to adjoining land use and on street activities; integration of underground infrastructure planning with local circulation planning and design.

Unit 5: Financial and institutional aspects of utilities planning

Estimates of projects of laying infrastructure lines in residential neighbourhoods; role of line agencies in municipal areas; jurisdiction and scope of work of line agencies; cost recovery methods of infrastructure planning and development projects.

Note: To bring an holistic and pragmatic dimension to the course, the five core underlying parameters of a) Sustainability, b) Equity, c) Efficiency, d) Harmony, and e) Safety, are to be incorporated in the instruction strategies through case studies and examples, wherever applicable.

10110904 Bio-Climatic Architecture (Elective-IIIF)

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

Subject Objective: Bio climatic architecture is based on the way of a building and its form to select an appropriate strategy to suit the climate and modify it to human comfort and wellbeing. It focuses on design synthesis and strategies to develop optimum performance of building.

Unit-I.

Introduction to climatic elements, classification of climatic zones, criteria for classification. Factors causing comfort and discomfort.

Unit-II.

Sun and Architecture- Solar path, Sun Angles, Solar Azimuth, Altitude angles, Design of shading devices, solar active and passive systems. Site Plan and orientation.

Unit-III.

Day lighting design, cool day light, Day light factor, visual comfort and quality.

Unit-IV.

Solarium, attached green houses, trombe wall, thermal mass, phase change materials, direct gain from thermal storage, heat transfer from walls, roof and windows, U- values.

Unit-V.

Types of ventilation, ventilation in and around buildings, indoor air quality, stack effect, induced ventilation. Green rating systems like ECBC, GRIHA, IGBC, LEED studied in terms of climate.

References:

1. Givoni, B. (1994). *Passive and Low Energy Cooling of Buildings*. New York : Van Nostrand Reinhold.
2. Keith, M. J. (1996). *Energy Management and Operating Costs in Buildings*. London : E & FN Spon.
3. Krishnan, A., and Others. (2001). *Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings*. New Delhi : TAT A McGraw-Hill.
4. O'Callaghan, Paul, W. (1980). *Buildings for Energy Conservation*. London: Pergamon Press.
5. Ursulla, E. (2003). *Solar technologies for Buildings*.

10110905 Dissertation

Number of Credits	7	Subject Category	T
Lecture Periods per Week	2	Internal Assessment	100
		End Examination (Viva-Voce)	100
Studio/Lab/Workshop/Practical's/Week	3	External Jury	--
Total Periods per Week	5	Total Marks	200

Subject Objective: The primary objective of this subject is to enable students to establish a strong theoretical foundation, clarity of thought and also to orient the students to structured research in a focussed manner. The process of study shall enable students to conduct in depth analysis and objective research on a topic of their interest. Students may be encouraged to select the topic which may eventually culminate in the Architectural Design Thesis in the subsequent semester.

Students may choose a topic related to Architecture and allied subjects. The topics must be vetted by the faculty. Emphasis must be on critical understanding, logical reasoning and structured writing.

Students may be encouraged to select the topic which may eventually culminate in the Architectural Design Thesis of the subsequent semester. Students can thus utilise this as an opportunity for pre-Thesis study, amounting to literature review and relevant case studies which are otherwise required for Thesis.

By the end of the semester, students are expected to submit a written paper of approximately 3500 words. Standard referencing conventions and technical writing norms must be adhered to. Students are expected to present the progress of the study at various stages of the semester. Final assessment of the students' work may be based on written Paper as well as oral communication. However, greater weightage may be given for writing skills and research content of the study.

References:

1. Anderson, J. and Poole, M. (1998). *Thesis and assignment writing*. Brisbane : John Wiley.
2. Borden, I. and Ray, K. R. (2006). *The dissertation: an architecture student's handbook*. 2nd Ed. Oxford : Architectural Press.
3. Fink, A. (1998). *Conducting research literature reviews: from paper to the Internet*. Thousand Oaks : Sage.
4. Murray, R. (2005). *Writing for academic journals*. Berkshire:Maidenhead, Open University Press.

10110906 Building Economics

Number of Credits	3	Subject Category	T
Lecture Periods per Week	3	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's/Week	0	External Jury	--
Total Periods per Week	3	Total Marks	100

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

Unit-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.

Unit-II. Theory of Demand

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

Unit-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.

Unit-IV. Capital, Interest and Profits

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

Unit-V. Economic Analyses of Projects

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

References:

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

10110907 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks

X – Semester**10111001 Thesis Project**

Number of Credits	25	Subject Category	S
Lecture Periods per Week	7	Internal Assessment	500
		End Examination	--
Studio/Lab/Workshop/Practical's/Week	21	External Jury	500
Total Periods per Week	28	Total Marks	1000

The Architectural Thesis is the culmination of the development of the student's knowledge, attitudes and skills over the course of studies in architecture. It is an occasion for exercising conscious choices in the field, based on the student's personal abilities and inclinations, and for testing out his commitment. The student, in consultation with the faculty, is expected to demonstrate through an imaginative approach, his expertise in effecting positive changes in our built environment. The scope and extent of the thesis work shall be substantial and realisable in application or concept as appropriate to the selected area of work.

10111002 Professional Practice

Number of Credits	4	Subject Category	T
Lecture Periods per Week	4	Internal Assessment	50
		End Examination	50
Studio/Lab/Workshop/Practical's per Week	0	External Jury	--
Total Periods per Week	4	Total Marks	100

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

Unit-I. Architecture profession

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

Unit-II. Practicing Architecture

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

Unit-III. Architect's Office

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

Unit-IV. Arbitration, Valuation and Easements

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

Unit-V. Architectural profession in the global market

International Architectural competitions, Globalisation, meaning & advantages, WTO/GATS, their relevance to architectural profession in India, Architectural practices in US, UK, Middle East & South Asian countries, Pre-requisite for Indians to work in other countries & vice versa, impact of IT on architectural practice, emerging trends in architectural collaborations.

References:

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

10111003 Attendance

Number of Credits	2	Subject Category	
Lecture Periods per Week	--	Internal Assessment	100
		End Examination	--
Studio/Lab/Workshop/Practical's per Week	--	External Jury	--
Total Periods per Week	--	Total Marks	100

Subject Objective: To encourage students engagement in the teaching-learning process on a day-to-day basis, by attending classes regularly.

Course Content

The students are to be evaluated based on their overall attendance in the semester, encompassing all subjects. The grading shall be as follows:

75% - 84% :	60 marks
85% - 94%:	80 marks
95% and above:	100 marks