Course Structure for Undergraduate Programme

Leading to the award of

Degree of Bachelor of Architecture

Session 2019-'20 onwards

Duration of the Programme

10 Semesters (Five Years)

Adopted in the 224th Meeting of the DAC held on 26 Jun & 01 Jul 2019, the 1st Meeting of the BOAC held on 04 Jul 2019; and,

Approved in the 22nd Meeting of the Senate held on 08, 10 & 11 Jul 2019.

Minor modifications adopted in the 10th Meeting of the DFC held on 07 & 10 Jul 2020, the 3rd Meeting of the DUGC held on 30 Jul 2020, the 2nd Meeting of the BOAC held on 07 Aug 2020; and,

Approved in the 28th Meeting of the Senate held on 23 Dec 2020.

Further, minor modifications adopted in the 19th Meeting of the DFC held on 07 & 14 May 2021, the 4th Meeting of the DUGC held on 17 Jun 2021, the 3rd Meeting of the BOAC held on 29 Jun 2021, the 5th Meeting of the SUGC held on 27 Sep 2021; and,

Approved in the 31st Meeting of the Senate held on 03 Feb 2022.

Department of Architecture, Town and Regional Planning
Indian Institute of Engineering, Science and Technology, Shibpur

Salient features of the 10-semester B Arch Programme are enumerated below.

1.0 Minimum Standards of Architectural Education of the Council of Architecture

1.1 As per the overall guideline of the Council of Architecture, the 5-year curricular structure is divided into two parts.

1.2 The First Part of three years duration attributing knowledge and skill about visual design, hard and soft skills of drawing, materials and methods of building construction, evolution of architectural space and related technology over the years, plumbing services, building services, building science, surveying, structural design, landscaping etc., all culminating towards developing a student to undertake architectural design of different scale and complexity.

1.3 The Second Part of two years duration having four components, viz. one entire semester of professional training in an architectural farm, two semesters of classes preparing a student for advanced courses leading towards different master programmes and specializations in the form of Electives, architectural designs of advanced complexity, and one semester for undergraduate level thesis where a student explores on one architectural project of real-life situation under a supervisor.

1.4 Due to the interdisciplinary nature of the B Arch programme, a number of courses are historically offered by the Departments of Humanities & Social Sciences, Mathematics, Applied Mechanics, and Civil Engineering.

2.0 Components of the B Arch Course Structure

2.1 Total credits for the 10-semester B Arch Programme, as enumerated in Table 1, is 236 @ 24 credits per semester, on an average.

2.2 Emphasis of practical courses (studio/ lab.) within the Programme is illustrated by the fact that though the number of theoretical and practical courses are almost equal, 45% of the total credits need to be earned through theoretical courses compared to 55% credits through practical ones.

Table 1. Semester-wise distribution of no. of courses offered, and credits with contact periods required per week in the Bachelor of Architecture Course Structure

Year/ Sem. ('YY')	**Credit**	No. of Courses – Credit (No. of pds.)			Pds. / Wk.	Year/ Sem. ('YY')	**Credit**	No. of Courses – Credit (No. of pds.)			Pds. / Wk.
		Theory	Practical (Studio/Lab.)					Theory	Practical (Studio/Lab.)		
			With contact pd.	Without contact pd.					With contact pd.	Without contact pd.	
11	**24**	5 – 14 (14)	3 – 10 (15)	-	29	12	**26**	5 – 14 (14)	3 – 12 (20)	-	32
21	**27**	6 – 17 (17)	3 – 10 (15)	-	32	22	**28**	5 – 14 (14)	4 – 12 (18)	1* – 2	32
31	**24**	5 – 12 (12)	3 – 12 (18)	-	30	32	**26**	4 – 10 (10)	4 – 14 (21)	1* – 2	31
41	**25**	5 – 15 (15)	2 – 10 (15)	-	30	42	**8**	-	-	3** – 8	-
51	**24**	3 – 10 (10)	3 – 12 (18)	1† – 2	28	52	**24**	-	1 – 12 (16)	2‡ – 12	16
Total: 75 courses with 236 credits | 38 theoretical courses with 106 credits (106 pds.) | 37 practical courses with 130 credits (156 pds.)											

*: Educational Tours – AP2291 and AP 3291

**: Internship – Professional Training (AP4291), Training Report (AP4292), Training viva-voce (AP4293)

†: Comprehensive Viva-Voce (AP5191)

‡: B Arch thesis related final examinations: Architectural Thesis II (AP 5291) and Architectural Thesis Viva-Voce (AP 5292)

3.0 Structure of the Curriculum

3.1 The courses offered in the B Arch programme can be classified into nine types of courses as per the provisions of the Regulations for Undergraduate Programmes, 2019, viz. Fundamental Courses, Departmental Core, Departmental Electives, Open Electives, Projects and Thesis, Comprehensive Viva-Voce, Internship, Educational Tour, and Non-Credit Courses. The structure of these courses has been illustrated through Table 2.

Table 2. Structure of the B Arch curriculum

Types of courses	No. of courses (Credits)	Percentage
Fundamental Courses (FC)	16 courses (41 credits)	21% of total no. of courses (17% of total credit)
Departmental Core (DC)	37 courses (99 credits)	49% of total no. of courses (42% of total credit)
Departmental Electives (DE)	2 courses (6 credits)	3% of total no. of courses (3% of total credit)
Open Electives (OE)	1 OE in lieu of 1 DE (optional) (3 credits)	1% of total no. of courses (optional) (1% of total credit)
Projects and Thesis (PR)	12 courses (76 credits)	16% of total no. of courses (32% of total credit)
Comprehensive Viva-Voce (CV)	1 course (2 credits)	1% of total no. of courses (1% of total credit)
Internship (IN)	3 courses (8 credits)	4% of total no. of courses (3% of total credit)
Educational Tour (ET)	2 courses (4 credits)	3% of total no. of courses (2% of total credit)
Non-Credit Courses (NC)	2 courses (0 credit)	3% of total no. of courses (0% of total credit)
Total	**75 courses (236 credits)**	

3.2 The detailed semester-wise course structure is enumerated in the following pages where colour code of Table 2 has been used for easy identification of the class of a course.

Course Structure – 1st Year 1st Semester: First Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP1101	Design Fundamentals	3	0	0	100	3
AP1102	Materials and Methods of Construction I	3	0	0	100	3
MA1102	Mathematics IA	2	1	0	100	3
AM1102	Engineering Mechanics	3	0	0	100	3
HU1103	English for Engineers	2	0	0	50	2
	Sub total	**13**	**1**	**0**	**450**	**14**
Practical Courses						
AP1171	Basic Design	0	0	6	150	4
AP1172	Descriptive Geometry I	0	0	6	150	4
WS1171	Workshop Practice	0	0	3	50	2
	Sub total	**0**	**0**	**15**	**350**	**10**
TOTAL		**29**			**800**	**24**
SA1171	Non-Credit Course (NCC / Physical Training)	0	0	2	50	

Course Structure – 1st Year 2nd Semester: Second Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP1201	Materials and Methods of Construction II	3	0	0	100	3
MA1202	Mathematics II~~A~~	2	1	0	100	3
CS1201	Introduction to Computing	3	0	0	100	3
AM1202	Strength of Materials	3	0	0	100	3
CE1202	Fundamentals of Ecology and Environmental Pollution	2	0	0	50	2
	Sub total	**13**	**1**	**0**	**450**	**14**
Practical Courses						
AP1271	Architectural Design Studio I	0	0	6	150	4
AP1272	Descriptive Geometry II	0	0	6	150	4
AP1273	Details of Construction Practice I	0	0	3	100	2
CS1271	Computing Lab	0	0	3	50	2
	Sub total	**0**	**0**	**18**	**450**	**12**
TOTAL		**32**			**900**	**26**
SA1271	Non-Credit Course (NCC / Physical Training)	0	0	2	50	

Fundamental Courses (FC)	Departmental Core (DC)
Non-Credit Courses (NC)	Projects and Thesis (PR)

Course Structure – 2nd Year 1st Semester: Third Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP2101	Evolution of Architecture I	3	0	0	100	3
AP2102	Materials and Methods of Construction III	3	0	0	100	3
AP2103	Landscape Architecture and Site Planning	3	0	0	100	3
AP2104	Plumbing Services	3	0	0	100	3
CE2117	Structural Analysis	3	0	0	100	3
CE2118	Surveying	2	0	0	50	2
	Sub total	**17**	**0**	**0**	**550**	**17**
Practical Courses						
AP2171	Architectural Design Studio II	0	0	9	200	6
AP2172	Details of Construction Practice II	0	0	3	100	2
AP2173	Computer Aided Design and Drawing	0	0	3	100	2
	Sub total	**0**	**0**	**15**	**400**	**10**
TOTAL		**32**			**950**	**27**

Course Structure – 2nd Year 2nd Semester: Fourth Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP2201	Evolution of Architecture II	3	0	0	100	3
AP2202	Materials and Methods of Construction IV	3	0	0	100	3
AP2203	Climatology	2	0	0	50	2
AP2204	Building Services I: Illumination and Electrical Installations	3	0	0	100	3
CE2217	Design of Reinforced Concrete Structures	3	0	0	100	3
	Sub total	**14**	**0**	**0**	**450**	**14**
Practical Courses						
AP2271	Architectural Design Studio III	0	0	9	200	6
AP2272	Details of Construction Practice III	0	0	3	100	2
AP2273	Landscape and Site Planning Practice	0	0	3	100	2
CE2287	Surveying Practice	0	0	3	100	2
AP2291	Educational Tour I[1]	~12 days			50	2
	Sub total	**0**	**0**	**18**	**550**	**14**
TOTAL		**32**			**1000**	**28**

Fundamental Courses (FC)	Departmental Core (DC)
Projects and Thesis (PR)	Educational Tour (ET)

[1]Educational Tour I will be conducted after completion of the B Arch 3rd Semester Examinations and to be completed preferably before the staring of the B Arch Fourth Semester.

Course Structure – 3rd Year 1st Semester: Fifth Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP3101	Evolution of Architecture III	3	0	0	100	3
AP3102	Estimation and Specification	2	0	0	50	2
AP3103	Building Services II: Mechanical Installations	2	0	0	50	2
AP3104	Building Services III: Architectural Acoustics	2	0	0	50	2
CE3117	Design of Steel Structures	3	0	0	100	3
	Sub total	**12**	**0**	**0**	**350**	**12**
Practical Courses						
AP3171	Architectural Design Studio IV	0	0	12	250	8
AP3172	Working Drawing I	0	0	3	100	2
AP3173	Estimation Practice	0	0	3	100	2
	Sub total	**0**	**0**	**18**	**450**	**12**
	TOTAL	**30**			**800**	**24**

Course Structure – 3rd Year 2nd Semester: Sixth Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP3201	Evolution of Architecture IV	3	0	0	100	3
AP3202	Valuation of Real Properties	2	0	0	50	2
AP3203	Energy Efficient Architecture	2	0	0	50	2
AP3204	Disaster Resistant Architecture	3	0	0	100	3
	Sub total	**10**	**0**	**0**	**300**	**10**
Practical Courses						
AP3271	Architectural Design Studio V	0	0	12	250	8
AP3272	Interior Design Practice	0	0	3	100	2
AP3273	Working Drawing II	0	0	3	100	2
CE3287	Structure Project on Analysis and Design of Buildings	0	0	3	100	2
AP3291	Educational Tour II[2]	~ 12 days			50	2
	Sub total	**0**	**0**	**21**	**600**	**16**
TOTAL		**31**			**900**	**26**

Fundamental Courses (FC)	Departmental Core (DC)
Projects and Thesis (PR)	Educational Tour (ET)

[2]Educational Tour II will be conducted after completion of the B Arch 5th Semester Examinations and to be completed preferably before the staring of the B Arch Sixth Semester.

Course Structure – 4th Year 1st Semester: Seventh Semester

Course Code	Course Title		Contact Periods/ Week			Marks	Credit
Theoretical Courses			**L**	**T**	**S**		
AP4101	Theories of Architecture		3	0	0	100	3
AP4102	Professional Practice and Entrepreneurship Development		3	0	0	100	3
AP4103	Principles of Human Settlements		3	0	0	100	3
AP4121	Architecture and Human Behaviour	Elective I: Departmental	3	0	0	100	3
AP4122	Design of Everyday Things						
AP4123	Real Estate Development						
AP4124	Vernacular Architecture						
HU4101	Finance, Economics and Management for Engineers		3	0	0	100	3
	Sub total		**15**	**0**	**0**	**500**	**15**
Practical Courses							
AP4171	Architectural Design Studio VI		0	0	12	300	8
AP4172	Built-environment Monitoring Laboratory		0	0	3	100	2
	Sub total		**0**	**0**	**15**	**400**	**10**
	TOTAL		**30**			**900**	**25**

Course Structure – 4th Year 2nd Semester: Eighth Semester

Course Code	Course Title	Contact Periods/ Week	Marks	Credit
Practical Courses				
AP4291	Professional Training	24 weeks duration	100	4
AP4292	Training Report	Examination only	50	2
AP4293	Training Viva-Voce	Examination only	50	2
	TOTAL		**200**	**8**

Fundamental Courses (FC)	Departmental Core (DC)
Departmental Electives (DE)	Projects and Thesis (PR)
Internship (IN)	

Course Structure – 5th Year 1st Semester: Ninth Semester

Course Code	Course Title		Contact Periods/ Week			Marks	Credit
Theoretical Courses			**L**	**T**	**S**		
AP5101	Housing		3	0	0	100	3
AP5102	Urban Design and Architectural Conservation		4	0	0	100	4
AP5121	Construction Management	Elective II (Departmental) OR Open Elective	3	0	0	100	3
AP5122	Sustainable Architecture						
AP5123	Transportation Planning and Logistics						
	Sub total		**10**	**0**	**0**	**300**	**10**
Practical Courses							
AP5171	Architectural Design Project		0	0	12	300	8
AP5172	Architectural Thesis Programming		0	0	3	100	2
AP5173	Minor Research Project		0	0	3	100	2
AP5191	Comprehensive Viva-Voce		Examination only			100	2
	Sub total		**0**	**0**	**18**	**600**	**14**
TOTAL			**28**			**900**	**24**

Course Structure – 5th Year 2nd Semester: Tenth Semester

Course Code	Course Title	Contact Periods / Week			Marks	Credit
Practical Courses						
AP5271	Architectural Thesis I	0	0	16	450	12
AP5291	Architectural Thesis II	Examination only			300	8
AP5292	Architectural Thesis Viva-Voce	Examination only			150	4
	TOTAL	0	0	**16**	**900**	**24**

Departmental Core (DC)	Departmental Electives (DE)
Projects and Thesis (PR)	Comprehensive Viva-Voce (CV)

SYLLABI OF THE COURSES

Course Structure – 1st Year 1st Semester: First Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP1101	Design Fundamentals	3	0	0	100	3
AP1102	Materials and Methods of Construction I	3	0	0	100	3
MA1102	Mathematics IA	2	1	0	100	3
AM1102	Engineering Mechanics	3	0	0	100	3
HU1103	English for Engineers	2	0	0	50	2
	Sub total	**13**	**1**	**0**	**450**	**14**
Practical Courses						
AP1171	Basic Design	0	0	6	150	4
AP1172	Descriptive Geometry I	0	0	6	150	4
WS1171	Workshop Practice	0	0	3	50	2
	Sub total	**0**	**0**	**15**	**350**	**10**
TOTAL		**29**			**800**	**24**
SA1171	Non-Credit Course (NCC / Physical Training)	0	0	2	50	

Course Structure – 1st Year 2nd Semester: Second Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP1201	Materials and Methods of Construction II	3	0	0	100	3
MA1202	Mathematics IIA	2	1	0	100	3
CS1201	Introduction to Computing	3	0	0	100	3
AM1202	Strength of Materials	3	0	0	100	3
CE1202	Fundamentals of Ecology and Environmental Pollution	2	0	0	50	2
	Sub total	**13**	**1**	**0**	**450**	**14**
Practical Courses						
AP1271	Architectural Design Studio I	0	0	6	150	4
AP1272	Descriptive Geometry II	0	0	6	150	4
AP1273	Details of Construction Practice I	0	0	3	100	2
CS1271	Computing Lab	0	0	3	50	2
	Sub total	**0**	**0**	**18**	**450**	**12**
TOTAL		**32**			**900**	**26**
SA1271	Non-Credit Course (NCC / Physical Training)	0	0	2	50	

Fundamental Courses (FC)	Departmental Core (DC)
Non-Credit Courses (NC)	Projects and Thesis (PR)

FIRST SEMESTER

AP1101 | Design Fundamentals | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a fresh student of architecture to the fundamental principles of visual design.

COURSE OUTCOME

On successful completion of this course, the students will:—

(i) be able to conceive design as a process,
(ii) have a fair idea regarding the elements and principles of design,
(iii) have knowledge to prepare elementary colour schemes,
(iv) have acquaintance about spatial organization, and
(v) have a reasonable idea about design methodology with particular reference to architecture.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction to Design	2
2	Contrast	3
3	Figure Organization	5
4	The Idea of Unity	8
5	Colour	6
6	Depth and Plastic Illusion	5
7	Ordering Principles	2
8	Typography	6
9	Design Methodology	2

DETAIL COURSE CONTENT

Module 1 Introduction to Design **2 periods**

Defining design — Design as a process — Thought process as a design process: Vertical & Lateral

Module 2 Contrast **3 periods**

2.1 PERCEPTION OF LIGHT: Chroma – Brightness – Hue – Saturation
2.2 PERCEPTION OF REFLECTING SURFACES: Tonal quality: value, hue & intensity – Visual texture
2.3 COMPOSITION: Figure-Ground Relationship – Closure

Module 3 Figure Organization **5 periods**

3.1 Attraction Value and Attention Value
3.2 ORGANIZATION OF FIGURE ELEMENTS: Spatial basis for grouping and Likeness basis for grouping
3.3 SPATIAL ORGANIZATIONS: Centralized organization, Linear organization, Radial organization, Clustered organization, Grid organization
3.4 Variety in Unity

Module 4 The Idea of Unity 8 periods

4.1 BACKGROUND OF VISUAL UNITY: Structure of visual field — Eye movements in perception

4.2 QUALITIES OF UNITY: Closed pattern of movement, Balance, Proportional Relationships, Rhythm

4.3 MOVEMENT: Movement in design – Dynamic values in the visual field: Relation of the elements to the field structure, Shape of figure elements, Position of the figure in the ground

4.4 BALANCE: Symmetrical balance (axial and radial) – Occult Balance

4.5 PROPORTION AND RHYTHM: Organic basis of proportion and rhythm – Analysing proportion and rhythm: Simple numerical ratios, Values of the summation series, Geometric Ratios, Dynamic symmetry (golden-mean rectangle, root-five rectangle, root-two rectangle), Intrinsic geometric ratios — RHYTHM: Sequence of progression and alteration, Occult rhythm — Dominance and sub-ordination

Module 5 Colour 6 periods

5.1 COLOUR CHARACTERISTICS: Transmitted and pigment colour – Additive and subtractive colour mixing – Primaries, secondaries, tertiaries

5.2 COLOUR THEORY**:** Itten's 12-step colour wheel, Munsell colour system

5.3 PIGMENT AND TONE CONTROL: Tints, Shades, Greyed tones, Complimentaries

5.4 COLOUR SCHEMES**:** Related (Monochromatic and analogous) – Contrasting (Complementary, Split Complimentary and Triad)

5.5 PHYSIOLOGICAL-PSYCHOLOGICAL BASIS FOR COLOUR RELATIONS**:** Likeness – Sequence in hue, value and intensity perception – Psychological complements

5.6 SIMULTANEOUS CONTRAST**:** Value Contrast – Hue Contrast – Intensity Contrast

Module 6 Depth and Plastic Illusion 5 periods

6.1 BASIS OF SPACE ILLUSION: Size cues (Constancy phenomenon) – Space indications (use of line, tone and light)

6.2 INDICATIONS OF DEPTH ON A 2-D PLANE: Contrast and gradation in size, Converging parallels and diagonal action (linear perspectives, metric projections), Position in the picture plane, Overlapping, Diminishing detail, Atmospheric perspective, Advancing and receding colour

6.3 3-D ORGANISATION: Nature of the three-dimensional problem – Closed and open form – Interrelationship between material, structure and form

Module 7 Ordering Principles 2 periods

Axis – Symmetry – Hierarchy – Datum – Rhythm – Repetition – Transformation

Module 8 Typography 6 periods

8.1 STUDY OF TYPOGRAPHY: History, classification, anatomy and usage of various letterforms – Theoretical and applicable principles of letterforms.

8.2 EXPRESSIVE TYPOGRAPHY: Compositions with type – Typography in different contexts like New media, Posters, Signage, Books, Mailers, Motion graphics etc.

Module 9 Design Methodology 2 periods

Brief – **A**nalysis – **S**ynthesis – **I**mplementation – **C**ommunication & Feedback — Journey from known to unknown

REFERENCE BOOKS

1. Design Fundamentals / Robert Scott
2. Form, Space and Order / Francis D.K. Ching
3. Introduction to Design / Alan Pipes.

AP1102 | Materials and Methods of Construction I | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a fresh student of architecture to masonry and concrete, two conventional building materials.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) familiar with the construction materials, their physical properties and scope of application in real life situation;
(ii) able to select suitable material for construction- sensible use of earth's resources; and,
(iii) aware of the associated impacts of using the building construction material.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction to Buildings	6
2	Masonry	12
3	Mortar and Concrete	21

DETAIL COURSE CONTENT

Module 1 Introduction to Buildings — 6 periods

1.1 Need of studying the subject
1.2 Introduction to buildings - foundation, wall and roof; beam, column and slab
1.3 Introduction to building materials - Commonly used and state of the art materials, Futuristic materials, Physical and mechanical properties of materials.

Module 2 Masonry — 12 periods

2.1 Introduction to different types of masonry
2.2 STONE MASONRY: Building stones- types and properties; Stone masonry
2.3 BRICK MASONRY: Composition of good brick earth; Brick manufacturing process; Brick sizes, classification and properties; Principles in brick masonry construction; Brick bonding - English, Flemish, Rat trap, CBRI etc.
2.4 OTHER MASONRY: Mud, adobe, mud block masonry; Aerated Autoclaved Concrete Block masonry; etc.

Module 3 Mortar and Concrete — 21 periods

3.1 Introduction to mortar and concrete
3.2 CONSTITUENTS: Binder, fine aggregate, coarse aggregate
3.3 BINDERS: Lime; Cement - Types of Portland Cement - Pozzolona Cement, White Cement, Blast furnace slag cement, etc.; Storage of cement
3.4 AGGREGATES: Grading of aggregates–Fine & Coarse aggregate; Types and properties of aggregates
3.5 MORTAR: Classification, constituents and applications of Cement mortar; Discussion on properties, constituents and scope of application of: Lime mortar, Mud mortar, Composite mortars (Lime-Cement mortar, *Surki*-Lime mortar) , Gypsum mortar etc.
3.6 CONCRETE: Properties of concrete: Strength, Durability, Workability; Water-Cement Ratio; Concreting Processes – Batching, Mixing, Transporting, Placing, Compaction, Curing, Finishing; Concrete additives

and admixtures; Principal types of concrete construction - Plain Cement Concrete (PCC), Reinforced Cement Concrete (RCC), Pre-cast Concrete, Pre-stressed concrete, Special Concrete; Defects of concrete and their curing measures.

REFERENCE READINGS

1. "Brickwork" by John Carruthers, Butterworth-Heinemann
2. "Design of Structural Masonry" by W.M.C. McKenzie, Palgrave
3. "Timber Designers' Manual" by E. C. Ozelton & J. A. Baird, Science
4. "Building Construction Illustrated" By F D.K. Ching, John Wiley & Sons, Inc
5. "Building Materials" By S.K. Duggal, New Age International (P) Limited
6. "Complete Building Construction" By Mark Miller, Rex Miller, & Eugene Leger., John Wiley & Sons, Inc
7. "The Ecology of Building Materials" by Bjorn Berge, Architectural Press
8. Building materials by P. C. Varghese, PHI Learning Pvt. Ltd.
9. Building construction handbook by Chudley, R., & Greeno, R., Routledge.

MA1102 | Mathematics IA | 3 credits

Course Duration	Contact periods	Full Marks
14 weeks	3 lectures per week	100

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Functions of a Single Real Variable	15
2	Functions of Several Real Variables	15
3	Infinite Series	6
4	Multiple Integral	21

DETAIL COURSE CONTENT

Module 1 Functions of a Single Real Variable 15 periods

n-th order derivative, Leibnitz's theorem for successive differentiation, Taylor's theorem with Lagrange's and Cauchy's forms of remainders, Taylor's and Maclaurin's series, expansion of functions, curvature, asymptotes, curve tracing.

Module 2 Functions of Several Real Variables 15 periods

Partial derivatives, chain rule, differential and small error, Euler's theorem for homogenous functions, Taylor's theorem (statement only), expansion of functions of two real variables, maxima and minima, Lagrange's method of multipliers.

Module 3 Infinite Series 6 periods

Concept of convergence, Geometric series and p series, Comparison test, D' Alembert's Ratio Test, Cauchy's Root Test, Raabe's Test, Gauss Test, Power Series, Radius of convergence.

Module 4 Multiple Integral 2 periods

Double integral, change of order of integration, Jacobian change of variables, applications.

SUGGESTED READING

1. Advanced Engineering Mathematics – E. Kryszig.
2. Engineering Mathematics – B. S. Grewal.
3. Introductory Course in Differential Equation – Daniel E. Murray.
4. Differential Calculus – B. C. Das & B. N, Mukherjee.
5. Integral Calculus – B. C. Das & B. N, Mukherjee.
6. Advanced Calculus – D. V. Widder.

AM1102 | Engineering Mechanics | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].

(b) End-Semester Examination: 50%.

MODULE NO.	ARTICLE	NO. OF PERIODS
1.	**Introduction :** Concept of Engineering Mechanics- Statics and Dynamics – Scalar and Vector.	**01**
2.	**System of Force :** Force – Linear representation of force – System of co-planar forces – Parallelogram Law – Composition and Resolution – Transmissibility – Action & Reaction – Triangle Law & Polygon Law – Resultant by Analytical & graphical method – Vector diagram – Bow's notation. **Condition of Equilibrium :** Lami's Theorem – Conditions of equilibrium of co-planar system of (i) concurrent forces, (ii) non-concurrent parallel forces (like & unlike), (iii) non-concurrent non-parallel forces [simple problems excluding statically indeterminate].	**07**
3.	**Moments & Couples :** Moment of a force about a point – Physical significance of moment – moment of a system of parallel and inclined forces – Varignon's Theorem – Moment of a couple.	**03**
4.	**Friction :** Definition – Useful and harmful effects of friction – Laws of Static friction – Co-efficient of friction – Angle of friction – Angle of repose – Equilibrium of a body on a rough inclined surface with and without external force.	**02**
5.	Analysis of simple plane truss using method of joints and method of sections – analysis of simple space truss.	**04**
6.	Concept and definition of Centroid, Centre of Gravity, Centre of mass – Centroid by integration method of the uniform lamina of triangular, rectangular, circular, semi-circular shape – Centroid by moment method of T-section, equal and unequal angle-sections, equal and unequal I-sections, Channel sections, Z-sections. Theorem of Pappus.	**05**
7.	**Second Moment of Area :** Parallel axis theorem, Perpendicular axis theorem – Radius of Gyration – Second moment of Area of the different sections about axes lying in the plane of the sections by integration – Second Moment of Area of I-sections, T-sections, Angle-sections, Channel sections, Z-sections, Composite sections (composite area method) – related simple problems.	**05**
8.	**Rectilinear Motion :** Newton's Law of motion – D'Alembert's principle – Momentum and conservation of momentum of a body.	**06**
9.	**Curvilinear Motion :** Angular displacement, velocity, acceleration – relation between linear & angular velocity, linear & angular acceleration – D'Alembert's principle – Motion and path of a projectile (numerical problems) – Centripetal and centrifugal force (numerical problems).	**06**

TEXT BOOK

1. Engineering Mechanics - Timoshenko and Young.

AP1171 | Basic Design | 4 credits

Course Duration	Contact periods	Full Marks
13 weeks	6 studio classes per week	150

COURSE OBJECTIVE

The objective of this course is to impart primary compositional and design skills to a fresh student of architecture.

COURSE OUTCOME

On successful completion of this course, the students will acquire skills:—

(i) to prepare colour schemes,
(ii) to express tactile feelings through letter forms,
(iii) to undertake simple two-dimensional and three-dimensional compositions, and
(iv) to analyse simple compositions.

COURSE EVALUATION

Continuous internal assessment of students' work executed through drawing sheets, models etc. will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Colour Schemes	12
2	Tactile Feelings through Letter Forms	12
3	Two Dimensional Compositions	12
4	Three Dimensional Compositions	12
5	Modular Compositions	9
6	Designing Simple Products	15
7	Polyhedra	6

DETAIL COURSE CONTENT

Module 1 Colour Schemes — 12 periods

1.1 Representation of the primary, secondary and tertiary colours through colour-wheels, study of tints and shades, and study of the hue spectrum.

1.2 Study of related and contrasting colour schemes through simple applications.

Module 2 Tactile Feelings through Letter Forms — 12 periods

Expressing basic tactile feelings of materials like hard, fragile, soft, strong, rugged etc. through letter forms.

Module 3 Two Dimensional Compositions — 12 periods

Undertaking two-dimensional composition of simple geometric shapes using the principles of contrast.

Module 4 Three Dimensional Compositions — 12 periods

Undertaking three-dimensional composition of simple solids using the principles of figure organization.

Module 5 Modular Compositions — 9 periods

5.1 Study of different compositions based on geometric ratios and proportions like metallic ratios, root rectangles, star polygons etc.

5.2 Study of tessellations.

Module 6 Designing Simple Products **15 periods**

Undertaking designing of a simple product like album cover, book cover, brochure, CD cover, logo, mural, poster, stamp and first day cover, etc. along with analysis of organization of figure elements, qualities of visual unity, and colour scheme

Module 7 Polyhedra **6 periods**

Making paper models of polyhedron applying the principles of surface development

REFERENCE BOOKS

1. Design Fundamentals / Robert Scott.
2. Form, Space and Order / Francis D.K. Ching.
3. Introduction to Design / Alan Pipes.

AP1172 | Descriptive Geometry I | 4 credits

Course Duration	Contact periods	Full Marks
13 weeks	6 studio classes per week	150

COURSE OBJECTIVE

To introduce the basic tools, techniques and fundamental principles of Engineering Drawing to the first semester students of Architecture.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) be able to conceive three dimensional objects in two-dimensional plane.
(ii) have a fair knowledge regarding the basic tools and techniques used in Architectural Drawings.
(iii) have a fair idea to represent a three-dimensional object through plans, elevations and sections in cartesian system.

COURSE EVALUATION

Continuous internal assessment of students' work executed through drawing sheets etc. will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction	6
2	Types of lines used in Engineering Drawing	6
3	Concept of Scale	6
4	Orthographic Projection	24
5	Section of Solids	12
6	Surface Development	12
7	Intersection of Surfaces	12

DETAIL COURSE CONTENT

Module 1 Introduction — 6 periods

Introduction to Engineering Drawing and Descriptive Geometry — Introduction to the drawing instruments and their use.

Module 2 Types of lines used in Engineering Drawing — 6 periods

2.1 Lines (IS 10714 (Part 20): 2001 and SP 46: 2003)
2.2 Lettering [IS 9609 (Part 0) : 2001 and SP 46: 2003]
2.3 Importance of Lettering, Single Stroke Letters, Types of Single Stroke Letters, Size of Letters, Procedure for Lettering, Lettering Practice.
2.4 Dimensioning, Principles of Dimensioning, Execution of Dimensions, Methods of Indicating Dimensions, Arrangement of Dimensions

Module 3 Concept of Scale — 6 periods

3.1 Reducing and Enlarging Scales
3.2 Concept of Representative Fraction
3.3 Types of Scales- Plain Scale; Diagonal Scale; Vernier Scale
3.4 Scales generally used for Architectural and Engineering Drawing
3.5 Concept of Diagonal Scale

Module 4 Orthographic Projection 24 periods

4.1 Planes of Projection
4.2 Concept of 1st angle and 3rd angle projection
4.3 ISI code of practice
4.4 Projection of straight line, lamina and solid.

Module 5 Section of Solids 12 periods

5.1 True shape of a section
5.2 Principle Plane; Auxiliary Plane
5.3 Section of solid figures

Module 6 Surface Development 12 periods

6.1 Principal Developments
6.2 Parallel line developments and Radial Developments
6.3 Model making

Module 7 Intersection of Surfaces 12 periods

7.1 Line of intersection
7.2 Methods of determining the line of intersection between surfaces of two interpenetrating solids: Line method, Cutting plane method
7.3 Model making.

REFERENCE READINGS

1. N. D. Bhatt, Engineering Drawing [Plane and Solid Geometry], Charotar Publishing House
2. K. Venugopal, Engineering Drawing and Graphics, New Age International (P) Ltd., publishers, 2000.

WS1171 | Workshop Practices | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 workshop classes per week	50

COURSE EVALUATION

Continuous internal assessment of students' work will be undertaken by the course instructor(s), who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

COURSE CONTENT

Module 1 Fitting Shop **9 periods**

Introduction to different tools, equipment and measuring devices, sawing, filing and drilling — Practice jobs on MS Plate.

Module 2 Welding Shop / Carpentry Shop **9 periods**

Welding Shop

Arc welding practice by the students.

Carpentry

Specifications of wood and wood-products; Introduction to tools and equipment; Practice jobs and different wood-joineries like half-lap joint; tenon and mortise, tenon and dove-tailed briddle joint, right angled single mitred tenon and mortis joint and haunched tenon and mortise for windows frames etc.

NOTE: Students studying B Arch 1st Semester may opt for Carpentry Shop in lieu of Welding Shop.

Module 3 Machine Shop / Masonry **18 periods**

Machine Shop

Study of lathe and demonstration of different types of operations like facing, centering, turning, taper turning, knurling, groove cutting, threading — Study of shaping, milling, drilling, and demonstration of different types of operations.

Masonry

Practice of construction of brick masonry walls of English Bond, Flemish Bond etc., and different types of brick masonry arches.

NOTE: Students studying B Arch 1st Semester may opt for Masonry in lieu of Machine Shop.

- Students in 1st semester: Computer Science, Electrical Engineering, Electronics, Information Technology, and Architecture – WS1171
- Students in 2nd semester: Aerospace, Civil Engineering, Mechanical Engineering, Metallurgy, Mining – WS1271

SECOND SEMESTER

AP1201 | Materials and Methods of Construction II | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to teach the students about common building materials like timber, metals, glass, and their components; and to introduce them to the concepts and methods of constructions of openings and foundations.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) suggest usage of material such as metals, glass, plastic, adhesive etc.
(ii) understand functions and details of spanning over opening, door, window, hardware etc
(iii) propose combinations of the above mentioned materials and elements for a building.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Timber	3
2	Metals	5
3	Glass	3
4	Openings	16
5	Foundations	12

DETAIL COURSE CONTENT

Module 1 Timber **3 periods**

1.1 Structure and classification of timber.
1.2 Timber products – Veneer, Plywood, Laminated board, Block board, Batten board, Composite board, Fibreboard, Particleboard, Engineered wood, MDF and HDF, Engineered Bamboo.

Module 2 Metals **5 periods**

2.1 General characteristics of metals – Ductility, Elasticity, Malleability, Toughness, Weldability
2.2 Properties & uses of ferrous metals – Pig Iron, Cast Iron, Wrought Iron, Mild Steel, Alloy steel (hard steel); Reinforcement Bars – Corrosion Protection
2.3 Non-ferrous Metals (Aluminium, Copper, etc. and their alloys) - Properties, finishes, uses in buildings

Module 3 Glass **3 periods**

3.1 Principal constituents of glass
3.2 Types of glass— properties & uses

Module 4 Openings **16 periods**

4.1 SPANNING: Corbels, Lintels and Arches; Typical detail of a masonry window opening showing sill, lintel & chajja projection; Lintel types by construction methods: Brick lintel, RCC lintel (precast & in-situ); Typical details of an arch opening with nomenclature; Types of Arches: Semi-circular, Segmental, Flat , Relieving arch etc.

4.2 DOORS AND WINDOWS: Timber doors and windows – Steel doors and windows – Aluminium doors and windows – Other doors and windows – Fitting Hardware

Module 5 Foundation 12 periods

5.1 PURPOSE; Essential requirements; Settlement

5.2 CLASSIFICATION: Shallow (wall footings, inverted arch foundation, isolated footings, combined footing, strip footing, cantilever footing, mat or raft foundation); Deep (pile foundation, pier foundation)

REFERENCE BOOKS

1. A Textbook of Building Construction (2010), S. P. Arora and S. P. Bindra, Dhanpat Rai Publications.
2. Building Construction Handbook, 10th ed. (2014), R. Chudley and R. Greeno, Routledge.
3. Building Materials, 5th ed. (2019), B. C. Punmia and S. K. Duggal, New Age.
4. Building Construction, 11th ed. (2016), A. K. Jain and A. K. Jain, Laxmi Publications.
5. Building Materials (2005), P. C. Varghese, Prentice' Hall of India Private Limited.
6. Building Construction, 2nd ed. (2017), P. C. Varghese, Prentice' Hall of India Private Limited.

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MA1202 | Mathematics IIA | 3 credits

Course Duration	Contact periods	Full Marks
14 weeks	3 lectures per week	100

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Co-ordinate Geometry Two Dimensions	4
2	Co-ordinate Geometry Three Dimensions	9
3	Vector Algebra	4
4	Linear Programming	7
5	Statistics	10
6	Differential Equations	8

DETAIL COURSE CONTENT

Module 1 Co-ordinate Geometry Two Dimensions **4 periods**

Transformation of coordinates – Translation, Rotation, Translation of general equation of second degree.

Module 2 Co-ordinate Geometry Three Dimensions **9 periods**

Coordinates, Direction cosines, Planes, Straight lines, Spheres, Standard equations of simple surface, e.g. cylinders, cones, ellipsoids, hyperboloids etc.

Module 3 Vector Algebra **4 periods**

Sum and products of vector, Application in geometry.

Module 4 Linear Programming **7 periods**

Geometrical ideas of convex sets, feasible solutions and domains etc. Fundamental theorem of LPP (statement only), Graphical methods, Simplex Algorithm.

Module 5 Statistics **10 periods**

Analysis of data (direct and grouped), Frequency diagrams, Ogive, Histogram, Mean, Median, Mode, Measures of dispersion, Skewness, Kurtosis, Fitting of curves (Least square method), Correlation, Regression.

Module 6 Differential Equations **8 periods**

Second order differential equations with constant co-efficients, Cautchy-Euler differential equations and Variation of parameters.

REFERENCE READING

1. Analytical Geometry of Two & Three Dimensions and Vector Analysis – R. M. Khan.
2. Vector Analysis: Schaum's Outline Series - M. Spiegel.
3. Linear Programming and Game Theory – J. G. Chakraborty and P. R. Ghosh.
4. Linear Programming and Theory of Games –P. M. Karak.
5. Statistical Methods – N. G. Das
6. Fundamentals of Statistics – A. M. Gun, M. K. Gupta, B. Dasgupta.
7. An Introduction to Differential Equations – Ghosh, Maity.
8. Ordinary and Partial Differential Equations - M. D. Raisinghania.

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CS1201 | Introduction to Computing | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Number System and Codes	6
2	Arithmetic and Logic	5
3	Computer Organisation	6
4	Problem Solving Steps and Program Development Cycle	3
5	Introduction to Programming in C	18

DETAIL COURSE CONTENT

Module 1 Number System and Codes — 6 periods

Positional and non positional number systems – Binary, Octal, Hexadecimal number systems and Conversion – Representation of negative numbers and real numbers – Fixed and floating point numbers – Characteristics codes (ASCII, EBCDIC etc.) and others like Grey, Excess-3 etc.

Module 2 Arithmetic and Logic — 5 periods

Logic operations and gates – Half adder and full adder subtraction using add – Repetitive addition and subtraction to accomplish multiplication and division etc.

Module 3 Computer Organisation — 6 periods

CPU, Memory and I/O devices – Commonly used peripherals - Role of the CPU, Memory and I/O devices in the context of solving a problem.

Module 4 Problem Solving Steps and Program Development Cycle — 3 periods

Systematic decomposition – Flowchart – Algorithm - the three constructs (sequential, conditional and iterative) – Edit, compilation, Debugging and execution.

Module 5 Introduction to Programming in C — 18 periods

Idea of High level, Assembly level and M/c level language.
Interpretation and compilation.
Variables and data types (basic), simple programs,
assignment, decision, loops, scope: Global & local,
control structure (if, if-else, switch, for, while, do while, break and continue)
Structural data type (Array, record, file, set etc.), Function, recursion,
introduction to dynamic data structure.

AM1202 | Strength of Materials | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

Prerequisite: Elementary knowledge of Engineering Mechanics

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULE NO.	ARTICLE	NO. OF PERIODS
1	Stress, Strain, Elasticity, Hooke's Law, Factor of Safety, Concept of Working Stress	04
2	Determinate and indeterminate problems on direct Stress. Thermal stress	05
3	Thin wall pressure vessels. Mohr's circle for biaxial stresses. Elastic constants, mutual relationship	06
4	Shear Force and Bending Moment in Beams, Diagrams	06
5	Analysis of bending stress in beams, stress distribution diagrams, relevant applications	03
6	Analysis of shear stress in beams, stress distribution diagrams, relevant applications	03
7	Deflection of beams using direct integration method & Macaulay's method, diagrams and relevant applications	04
8	Torsion of shaft of circular section	04
9	Columns & Struts, determination of critical load subjected to concentric loading in different end conditions	04

TEXT BOOK

1. Strength of Materials - Timoshenko and Young.

CE1202 | Fundamentals of Ecology and Environmental Pollution | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

The objective of this course is to provide the students with basic understanding about the environment and its allied problems, and identify and solve environmental problems.

COURSE OUTCOME

At the end of the course, the students will be able to:

(i) suggest usage of material such as metals, glass, plastic, adhesive etc.
(ii) understand functions and details of spanning over opening, door, window, hardware etc
(iii) propose combinations of the above mentioned materials and elements for a building.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction	2
2	Ecology	6
3	Water and Waste Water	*6*
4	Basics of Air Pollution	5
5	Solid Waste Management	3
6	Noise Pollution	2
7	Environmental Issues	2

DETAIL COURSE CONTENT

Module 1 Introduction **2 periods**

Need for environmental studies; Resources; Sustainable development – definition/goals.

Module 2 Ecology **6 periods**

Definition of environment, biosphere, ecology, ecosystem; Components of environment, Biosphere, Ecosystem; Major types of ecosystems on earth, food chain and energy flow; Ecological pyramid; Biomagnification; Biogeochemical cycles; Biodiversity etc.

Module 3 Water and Waste Water **6 periods**

Sources; Quality; Treatment standards; Conservation and recycling water crisis and related issues

Module 4 Basics of Air Pollution **5 periods**

Definition; Sources; Classification; Effects on environment; Global effects; Relation between meteorological parameters and air pollution; Basic control strategies of air pollution.

Module 5 Solid Waste Management **3 periods**

Definition; Generation of SW; Components; Engineered system for SWM – generation, in-site process, collection; transfer and transport, processing, disposal.

Module 6 Noise Pollution **2 periods**

Definition; Characteristics of sound; Measurement; Control of noise pollution.

Module 7 Environmental Issues **2 periods**

Environmental Impact Assessment; Environmental Audit; Water and air pollution laws

SUGGESTED READINGS

1. Peavy, H. S., Rowe, D. R., and Tchobanoglous, G. (1985), Environmental Engineering, McGraw Hill Book Company, Singapore.
2. Masters, G.M. (1995), Introduction to Environmental Engineering and Science, Second Indian Reprint, Prentice Hall, New Delhi.
3. Edward J. Kormondy (1999), Concepts of Ecology (1999) Prentice –Hall
4. Rajagopalan, R. (2011) Environmental Studies – from Crisis to Cure 2nd Ed. Oxford University Press.

AP1271 | Architectural Design Studio I | 4 credits

Course Duration	Contact periods	Full Marks
13 weeks	6 studio classes per week	150

COURSE OBJECTIVE

The objective of this course is to impart primary architectural design skills to a student enabling him/her to undertake design of simplest built forms through activity study and space analysis of existing built forms.

COURSE OUTCOME

On successful completion of this course, the students will acquire fair skills to design medium sized lodging-rooming facilities, and moderately complex assembly spaces.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Interpreting Architectural Design Vocabulary	18
2	Documenting Architectural Design Process	21
3	Design of a Small Built Space	39

DETAIL COURSE CONTENT

Module 1 Interpreting Architectural Design Vocabulary 18 periods

Undertaking guided study of built spaces for exploring architectural design vocabulary comprising of different architectural form and space and the principles that guide their ordering in built environment (5 sheets)

1.1 PRIMARY ELEMENTS: point, line, linear elements, planar elements — 'FOUR HOUSE FORMS': cumulative compositions, cubic compositions, additive forms, subtractive forms — ADDITIVE FORMS: centralized form, linear form, radial form, clustered form, grid form — ORDERING PRINCIPLES: axis, symmetry, hierarchy, rhythm, datum, transformation — APPROACHING A BUILT SPACE: formal, oblique, spiral

1.2 AN EXERCISE IN MASS AND VOID: the students would make one physical model expressing their understanding of design vocabulary

Module 2 Documenting Architectural Design Process 21 periods

Undertaking documentation of an existing small residence through —

2.1 Preparation of its Key Plan in appropriate scale dealing with 'location', 'orientation', and 'access'

2.2 Preparation of its Site Plan in appropriate scale showing 'approach' to the site, internal road approaching the designed space(s), open parking spaces (if any), planting and landscaping (wherever available)

2.3 Preparation of area statement of existing spaces, their bubble diagram/ proximity analysis showing circulation of different users

2.4 Activity study of each built space (indoor and outdoor, if any) for 24 hours

2.5 Analysis of each built space through plan and two mutually orthogonal sectional elevations in suitable scale documenting materials used in building construction, internal and external finishes, availability of natural lighting and ventilation etc.

All the drawings are to be delineated appropriately.

Module 3 Design of a Small Built Space 39 periods

Undertaking architectural design of a small built space like eatery of different type/scale, street furniture, kiosks for different uses, urban public play areas, gate complex, small *Anganwadi* (not more than 20 students) etc. The design is advised to be evolved applying the design process learnt in Module 2. The design is to be presented through a set of architectural drawings prepared manually comprising key plan, site plan, floor plan(s), sectional elevations (all in appropriate scale), views and physical models. All the drawings are to be delineated appropriately.

EVALUATION SCHEME

Continuous internal assessment of students' work executed through drawing sheets, models etc. will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester. Suggested marks allotment for each module may be as follows:

Module 1: 25 marks | Module 2: 50 marks | Module 3: 75 marks.

However, the course instructor may change the marks allocated to different modules, if required.

REFERENCE BOOKS

1. Form, Space and Order / Francis D.K. Ching
2. Rendering with pen + ink / Robert W Gill
3. Time Saver Standards for Building Types / Joseph de Chiara and John Callender
4. Architects' Data / Ernst and Peter Neufert.

AP1272 | Descriptive Geometry II | 4 credits

Course Duration	Contact periods	Full Marks
13 weeks	6 studio classes per week	150

COURSE OBJECTIVE

The objective of this course is refinement of the initial concepts of previous learnings in Descriptive Geometry I (AP1172) along with new learnings to represent three-dimensional objects on two-dimensional surface using different projection systems.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) have detail idea about different projection systems;
(ii) have a fair idea of choosing specific projection systems required to represent different 3D objects;
(iii) be able to understand three-dimensional built from presented through different projection systems.

COURSE EVALUATION

Continuous internal assessment of students' work executed through drawing sheets, models etc. will be undertaken by the course teacher, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Axonometric Projection System	21
2	Perspective Projection System	30
3	Sciography	18
4	Model Making	09

DETAIL COURSE CONTENT

Module 1 Axonometric Projection System 21 periods

1.1 Isometric Projection System of Points, Lines, polygons and solids on Isometric Plane using Isometric Scale.
1.2 Dimetric and trimetric Projection Systems.
1.3 Isometric View(s) of built forms, buildings, complex structures.

Module 2 Perspective Projection System 30 periods

2.1 Development of concepts on Perspective Projection Systems – Types of perspectives - Learning of various relevant nomenclatures like Station Point, Picture Plane, Eye Level, Vanishing Points, Horizon Line – Orientation Sheet etc.
2.2 One-Point Perspective Projection
2.3 Two-Point Perspective Projection
2.4 Three-Point Perspective Projection.

Module 3 Sciography 18 periods

3.1 Study of basic principles of Sciography
3.2 Light Sources -Casting shades and shadows of points, lines, polygons and solids
3.3 Sciography - single and group of objects, built forms, furniture etc.

Module 4 Model Making 9 periods

REFERENCE BOOKS

1. N. D. Bhatt, Engineering Drawing [Plane and Solid Geometry], Charotar Publishing House
2. K. Venugopal, Engineering Drawing and Graphics, New Age International (P) Ltd., publishers, 2000.
3. Basic Perspective Drawing / J. Montage.
4. Architectural Graphics, F. D. K. Ching.

AP1273 | Details of Construction Practice I | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of this course is to impart building construction skills and knowledge to a student enabling him/her to build and/ or supervise whole or part of building construction activity. The objective of this course is to complement the series of theory subject 'Material and Methods of Construction' by introducing the drawing construction details of major architectural-civil building components.

COURSE OUTCOME

On successful completion of this course, the students will acquire skills to:—

(i) three dimensionally understand the building components;
(ii) produce architectural drawing and detailing of typical building components;
(iii) produce detailing for any new element comprising of various materials or components;
(iv) get particularly prepared for understanding working drawing of buildings in later stage of the programme.

COURSE EVALUATION

Continuous internal assessment of students' work executed through drawing sheets etc. will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Study of Bricks	6
2	Brick Bonding	9
3	Spanning of Openings	6
4	Timber Doors and Windows	9
5	Metal Doors and Windows	9

DETAILED COURSE CONTENT

Module 1 Study of Bricks **6 periods**

F.P.S. or Ordinary bricks, Metric Bricks — Terms associated with a Brick: Arris, Bed, Header, Stretcher, Face, Frog or Kick, Bed Joints, Course, Quoin, Stopped or Closed End, Vertical Joints, Perpends — Portions of A Brick: Bat (Half bat, Three-quarter bat, Bevelled bat large, Bevelled bat small) – Closer (Queen closer, Queen closer half, Queen closer quarter, King closer, Bevelled closer, Mitred closer) – Bullnose – Splay (Splay stretcher, splay header) — Drawing the above in suitable combination and scale.

Module 2 Brick Bonding **9 periods**

Preparing drawings of one brick thick wall, Right angled quoins, Square stopped ends, bonded tee junction for English bond and Flemish bond.

Preparing drawings of other brick bonds like Rat-trap bond, CBRI bond, Decorative Brickwork etc.

Module 3 Spanning of openings **6 periods**

Typical detail of a masonry window opening showing sill, lintel and chajja projection; Typical details of an arch opening with nomenclature; Study of arches like Semi-circular, Segmental, Flat , Relieving etc.

Module 4 Timber Doors and Windows **9 periods**

Study and preparing drawings of the following:

Sectional plans showing width of masonry and clear opening, frame, framing members, panels and glass panes; Elevation showing height of masonry and clear opening, door clearance, width of top, bottom and lock rails,

position of lock, hinges, handles etc.; Sectional elevation; Typical detail showing fixing of frame to wall, stile, panel and overlapping of shutters.

Module 5 Metal Doors and Windows **9 periods**

Study and preparing drawings of the following:

Sectional plan, front elevation, sectional elevation and typical details showing fixing of framing members, glass panes, floor springs and related other hardware.

REFERENCE BOOKS

1. Building Construction (2000), W. B. McKay, Orient Longman.
2. A Text Book Of Building Construction (2000), S. K. Sharma, S. Chand & Company Limited
3. Building Construction (2000), S. Kumar, Standard Publishers Distributors.
4. A Textbook of Building Construction (2010), S. P. Arora and S. P. Bindra, Dhanpat Rai Publications.
5. Building Construction Handbook, 11th ed. (2016), R. Chudley and R. Greeno, Routledge.

CS1271 | Computing Lab | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	**3 laboratory classes per week**	**100**

MODULE NO.	MODULE NAME AND TOPICS	NO. OF PERIODS
1	Introduction to Linux commands, vi editor and program writing and executing	6
2	Assignments on conditional statements (if, else)	3
3	Assignments on control structure (for, while, do-while) - I	3
4	Assignments on control structure (switch, break and continue) - II	3
5	Assignments on structural data type (Array, record)	6
6	Assignments on function and recursive function	3
7	Assignments on dynamic data structure	3
8	Assignments on file handling and file operations	3

Course Structure – 2nd Year 1st Semester: Third Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP2101	Evolution of Architecture I	3	0	0	100	3
AP2102	Materials and Methods of Construction III	3	0	0	100	3
AP2103	Landscape Architecture and Site Planning	3	0	0	100	3
AP2104	Plumbing Services	3	0	0	100	3
CE2117	Structural Analysis	3	0	0	100	3
CE2118	Surveying	2	0	0	50	2
	Sub total	**17**	**0**	**0**	**550**	**17**
Practical Courses						
AP2171	Architectural Design Studio II	0	0	9	200	6
AP2172	Details of Construction Practice II	0	0	3	100	2
AP2173	Computer Aided Design and Drawing	0	0	3	100	2
	Sub total	**0**	**0**	**15**	**400**	**10**
TOTAL		**32**			**950**	**27**

Course Structure – 2nd Year 2nd Semester: Fourth Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP2201	Evolution of Architecture II	3	0	0	100	3
AP2202	Materials and Methods of Construction IV	3	0	0	100	3
AP2203	Climatology	2	0	0	50	2
AP2204	Building Services I: Illumination and Electrical Installations	3	0	0	100	3
CE2217	Design of Reinforced Concrete Structures	3	0	0	100	3
	Sub total	**14**	**0**	**0**	**450**	**14**
Practical Courses						
AP2271	Architectural Design Studio III	0	0	9	200	6
AP2272	Details of Construction Practice III	0	0	3	100	2
AP2273	Landscape and Site Planning Practice	0	0	3	100	2
CE2287	Surveying Practice	0	0	3	100	2
AP2291	Educational Tour I[1]	~12 days			50	2
	Sub total	**0**	**0**	**18**	**550**	**14**
TOTAL		**32**			**1000**	**28**

Fundamental Courses (FC)	Departmental Core (DC)
Projects and Thesis (PR)	Educational Tour (ET)

[1]Educational Tour I will be conducted after completion of the B Arch 3rd Semester Examinations and to be completed preferably before the staring of the B Arch Fourth Semester.

THIRD SEMESTER

AP2101 | Evolution of Architecture - I | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the evolution of Indian architecture from the ancient to the late medieval times.

COURSE OUTCOME

On successful completion of this course, the students will have:

(i) a fair idea about the essentiality of architecture in human civilization since antiquity with particular reference to India as discovered in the Indus Valley;
(ii) a reasonable idea about evolution of ancient Indian trabeated timber architecture into first stupa & rock-cut architecture, and then into the medieval Dravida & Nagara temples; and,
(iii) fair knowledge about evolution of Islamic architecture in medieval India, adapting and fusing with indigenous elements, giving rise to arcuated architecture first time in the Indian horizon.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	The Beginnings of Civilizations	1
2	Architecture and Town Planning principles of the Indus Valley	2
3	Vedic Architecture	2
4	Stupa Architecture	2
5	Rock-cut Architecture	6
6	Earliest Temples	2
7	Temple Architecture of Southern India	6
8	Temple Architecture of Northern India	6
9	Beginning of Islamic Architecture in India	6
10	Mughal Period	6

DETAIL COURSE CONTENT

Module 1 The Beginnings of Civilizations 1 period

Architecture as an essential part of human civilization – Development of means of spanning and form of shelter with relation to available material through the Stone, the Bronze and the Iron Ages – The four River Valley Civilizations.

Module 2 Architecture and Town Planning Principles of the Indus Valley 2 periods

Relatively egalitarian society – Prominent features of town planning – Brick masonry techniques, wooden spanning systems — Study of (a) the Great Bath, Mohenjo-Daro, and (b) the Great Granary, Harappa.

Module 3 Vedic Architecture 2 periods

Outcome of migration – Dwellings and settlement patterns – Timber Construction – *Grama* protected by bamboo railing.

Module 4 Stupa Architecture 2 periods

Supreme sacred monument of Buddhism – Basic form and elements — Study of the Great Stupa, Sanchi.

Module 5 Rock-cut Architecture 6 periods

5.1 PILLARS: Plain circular shaft, campaniform capital, circular abacus, animal motif – Study of the Lion Capital, Sarnath.

5.2 EARLY ROCK-CUT ARCHITECTURE: Simple woodwork imitating forms – Study of the Lomash Rishi Caves, Barabar Hills.

5.3 ORISSAN GROUP (JAIN): Monastic retreats, plan and volumetric organizations, details.

5.4 HINAYANA PHASE: Responses to the need of congregation, no imagery, *chaityagriha* for congregation and worship, *viharas* as monasteries – Study of the basic elements of *chaityas* and *viharas* – Introduction of symbolic forms, translation of carpentry forms into stones – Study of the Chaitya Hall, Karli.

5.5 MAHAYANA PHASE: Influence of Hinduism, introduction of image, change in disposition of inner most cells of *vihara* serving as monastery as well as sanctuary.

5.6 BRAHMINICAL PHASE: Gradual elaboration of interior from primitive singular cell to isolated cell with ambulatory, culmination in emulation of structural temple – Study of the Kailasa Temples, Ellora.

Module 6 Earliest Temples 2 periods

Necessity, different philosophical interpretations, functions, nomenclature, forms, materials & constructions, iconography — Two main styles: South Indian (*Dravida*), and North Indian (*Nagara*).

Module 7 Temple Architecture of Southern India 6 periods

7.1 PALLAVA: Origin from rock-cut architecture, *mandapa* or pillared hall with a cell – Study of the monolithic Rathas, Mammallapuram.

7.2 Development of Dravida temples during CHOLA, PANDYA, VIJAYNAGAR and NAYAKA dynasties: Principles and functions of different parts of the temples through incremental growth (*vimana* over pillared *m*andapa, *Gopuram* enclosing *Prakarana*, *Amman* shrine, *Kalyan* mandapa, series of *gopuram* etc.), iconography, scale and proportion – Study of the Meenakshi Temple, Madura.

Module 8 Temple Architecture of Northern India 6 periods

8.1 ORISSA GROUP**:** Principles, functions and nomenclature of different parts, iconography, scale and proportion, through the study of enclosures, disposition of axes, surface treatment – Study of the Lingaraja Temple, Bhubaneswara.

8.2 KHAJURAHO GROUP**:** Principles, functions and nomenclature of different parts, iconography, scale and proportion through the study of plan forms, roof forms, and surface ornamentation – Study of the Kandarya Mahadeva Temple.

Module 9 Beginning of Islamic Architecture in India 6 periods

9.1 Persian origin, essentials of a typical Indian mosque, components of a typical tomb building and Rauza

9.2 Development of Delhi or Imperial Style under Slave, Khalji, Tughlaq, Sayyid and Lodi dynasties; understanding principles, scale & proportion, geometry, forms & functions, fusion elements, evolution of domes, arches, squinches etc. during Delhi or Imperial Style through study of Qutb Complex, Tomb of Ghias-ud-din Tughlaq, two representative tombs of Sayyid & Lodi dynasties (one single storied octagonal tomb with veranda and another two-three storied square tomb without veranda)

9.3 Culmination of the Lodi style in the Tomb of Sher Shah Suri, Sasaram.

Module 10 Mughal Period 6 periods

10.1 SANDSTONE PHASE during Akbar: beginning of garden tombs, study of the Humayun's Tomb, Delhi in terms of multi-axial symmetry in planning, materials, surface ornamentation, structural systems, visual experiences created – Study of the Fatehpur Sikri, Agra.

10.2 MARBLE PHASE during Jahangir and Shahjahan: transition from sandstone to marble leading to changes in methods of decoration, use of true double dome with Persian bulbous form, voluted bracket capital, foliated base of pillions, etc. – Formal Mughal Gardens – Study of the Red Fort, Delhi, and the Taj Mahal, Agra.

REFERENCE BOOKS

1. Satish Grover. Buddhist and Hindu Architecture in India. CBS.
2. Satish Grover. Islamic Architecture in India. CBS.
3. Percy Brown. Indian Architecture Vol.1 (Buddhist & Hindu). D. B. Taraporevala Sons & Co. Pvt. Ltd.
4. Percy Brown. Indian Architecture Vol.2 (Islamic Period). D. B. Taraporevala Sons & Co. Pvt. Ltd.
5. Sir Banister Fletcher's A History of Architecture. Ed. Dan Cruckshank. CBS, 1999.

AP2102 | Materials and Methods of Construction - III | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the materials and methods of construction related to floor, roof stairs, false ceiling, partition walls, and the modes of finishes with respect to flooring and internal & external surfaces.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) familiar with the construction materials, their physical properties and scope of application in real life situation;
(ii) able to select suitable material for construction- sensible use of earth's resources; and,
(iii) aware of the associated impacts of using the building construction material.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Floors and Roofs	8
2	Stairs	6
3	Damp Prevention and Water Proofing	9
4	Partition Walls	3
5	False Ceiling	3
6	Finishes	10

DETAIL COURSE CONTENT

Module 1 Floors and Roofs — 8 periods

1.1 Timber Floor; Jack arch floor.
1.2 RCC Floor - Slab (one-way, two-way and cantilever), Flat Slab, Ribbed floor; Pre-cast concrete floors.
1.3 Reinforcement of beams, columns and slabs.
1.4 Steel Floor with joist and deck-plate.
1.5 PITCHED ROOF: nomenclature and types - Lean-to-roof, Coupled roof, closed couple roof, King Post Roof Truss, Queen Post Roof Truss, Steel trusses, Roofing materials with fixing details. Roof drainage systems and details.

Module 2 Stairs — 6 periods

2.1 Components and requirements.
2.2 Classification based on form.
2.3 Structural systems of stairs; Materials used.

Module 3 Damp Prevention and Water Proofing — 9 periods

3.1 Causes and effects of dampness in buildings
3.2 METHODS OF DAMP PREVENTION: membrane damp proofing, integral damp proofing, surface treatment, guniting
3.3 Water proofing techniques of Foundation, Plinth, Cavity walls, Projections, Expansion/seismic joints, Flat roofs and terraces, Parapet wall (details of coping and drip course), Window sill and chajja (detail of drip

course), and any other relevant part of building.

3.4 Types of basements (deep, shallow), Waterproofing and water drainage of basements (tanked, integral, drained cavity).

Module 4 Partition Walls 3 periods

4.1 Usage of partition wall; Requirements for a good partition wall

4.2 Materials used in partition wall: brick, concrete, glass, metal, plaster board, wood wool, timber etc. – Comparison of partition walls of different materials

4.3 Typical details of different types of partition wall.

Module 5 False Ceiling 3 periods

5.1 Typical parts and materials: Gypsum, Plaster of Paris, Fibre, Wooden, Glass, Metal, PVC, Synthetic leather or cloth etc.

5.2 Other types (exposed, tightly-attached, acoustical, chilled, integrated service module etc.) – Only a brief overview.

Module 6 Finishes 10 periods

6.1 FLOORING: Brick, Stone, Concrete, Terrazzo, Tiled, Timber (parquet), Asphalt, Rubber, PVC, Linoleum, Cork, Magnesite, Glass and Acid-Proof.

6.2 INTERNAL WALL AND CEILING FINISHES: Cement plaster, Gypsum plaster, Wall putty, Gypsum, Plaster board.

6.3 EXTERNAL FINISHES: Cement plaster (smooth wood float finish, Pebble dash finish, Textured finish, Rough cast finish or Sponge finish), Pointing.

6.4 CLADDING (EXTERNAL & INTERNAL): Timber/timber product, Brick tiles, Ceramic tiles, Stone tiles, Metal, PVC, FRP, GFRC.

6.5 PAINTS: Constituents, functions, types; White washing and Colour washing.

REFERENCE READINGS

1. S.P. Arora and S.P. Bindra. (2010). A text book of building construction Dhanpat Rai Publications.
2. S. Bliss. (2005). Best practices guide to residential construction: Materials, finishes, and details. Wiley.
3. R. Chudley, and R. Greeno. (2014). Building construction handbook- 10th ed. Routledge
4. A.K. Jain and A.K. Jain. (2016). Building construction- 11th ed. Laxmi Publications.
5. S. Kumar. (2010). Building Construction. Standard Publisher.
6. P.C. Varghese. (2017). Building construction, 2nd ed. Prentice' Hall of India Private Limited.
7. E.C. Ozelton and J. A. Baird. "Timber Designers' Manual". Science
8. F.D.K. Ching. "Building Construction Illustrated". John Wiley & Sons, Inc.
9. S.K. Duggal "Building Materials". New Age International (P) Limited.
10. Mark Miller, Rex Miller and Eugene Leger. "Complete Building Construction". John Wiley & Sons, Inc.
11. Bjorn Berge. "The Ecology of Building Materials". Architectural Press.
12. P.C. Varghese. Building materials. PHI Learning Pvt. Ltd.

AP2103 | Landscape Architecture and Site Planning | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student of architecture to the history and theory of landscape and garden design in the world, as well as to the technical aspects related to it so that the student may be ready to successfully undertake the corresponding studio course in the next semester.

COURSE OUTCOME

On successful completion of this course, the students will be familiar with**:**

(i) history and theory of landscape and garden design;
(ii) role of natural systems in shaping the regional landscape, the role of landscape ecology in understanding these systems, and the role of impact assessment and landscape management in assuring sustainable landscape conservation and development; and,
(iii) technical aspects of site planning and design and how these might be applied to the principles of sustainable design through observation, documentation, and critical appraisals of project design, readings, and the review of projects and case studies.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction to Landscape Architecture and Site Planning	3
2	Historical Overview	10
3	Techniques of Site Planning	6
4	Plants and Planting	6
5	Landscape Structures	6
6	Site Utilities	4
7	Codal Provisions and National Guidelines	4

DETAIL COURSE CONTENT

Module 1 Introduction to Landscape Architecture and Site Planning 3 periods

1.1 Landscape theory and heritage.
1.2 Site planning and sustainable landscape development.
1.3 Regional landscapes, landscape ecology.

Module 2 Historical Overview 10 periods

2.1 Landscapes of Central Asia and India.
2.2 Landscape architecture in China and Japan.
2.3 European landscape design: Italy, France, England, Spain.
2.4 Landscape design in the 20th and 21st centuries.

Module 3 Techniques of Site Planning 6 periods

3.1 Site grading.
3.2 Stormwater management.
3.3 CIRCULATION: pedestrian, bicycle, vehicular.

Module 4 Plants and Planting **6 periods**

4.1 Introduction to horticulture.
4.2 Plant palette (herbaceous, woody plants).
4.3 Assessing existing vegetation.
4.4 Planting strategies (interior and exterior).

Module 5 Landscape Structures **6 periods**

5.1 Retaining walls, fences, screens, walls.
5.2 Surfacing and paving.
5.3 Water features.

Module 6 Site Utilities **4 periods**

6.1 Water Supply.
6.2 Sewage Disposal.
6.3 Lighting.
6.4 Sound Control.

Module 7 Codal Provisions and National Guidelines **4 periods**

7.1 National Building Code 2016, Volume 2, Parts 10 and 11
7.2 National Urban Greening Guidelines.

REFERENCE READINGS

1. Kevin Lynch. Site Planning. The MIT Press.
2. C.W. Harris and N.T. Dines. Time-saver Standards for Landscape Architecture, 2nd Ed. McGraw-Hill Publishing Co.
3. E. Boults, and C. Sullivan. Illustrated History of Landscape Design (2010). John Wiley & Sons.
4. Urban Greening Guidelines, 2014. http://www.indiaenvironmentportal.org.in/content/388807/urban-greening-guidelines-2014.

ADDITIONAL READINGS

1. IRC 86-2018: Geometric Design Standards for Urban Roads and Streets (First Revision). The Indian Road Congress.
2. IRC 103-2012: Guidelines for Pedestrian Facilities (First Revision). The Indian Road Congress.
3. IRC SP-12-2015: Guidelines for Parking Facilities in Urban Roads" (First Revision). The Indian Road Congress.
4. IRC SP-21-2009: Guidelines on Landscaping and Tree Plantation. The Indian Road Congress.
5. IRC SP-103-2014: Guidelines on Tree Plantation along Rural Roads. The Indian Road Congress.
6. IRC SP-118-2018: Manual for Planning and Development of Urban Roads and Streets. The Indian Road Congress.
7. IRC SP-118-2018: Manual for Planning and Development of Urban Roads and Streets. The Indian Road Congress.

AP2104 | Plumbing Services | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to familiarize a student of architecture to the water supply, sanitation and drainage requirements of a building situated within and outside a municipal area.

COURSE OUTCOME

On successful completion of this course, the students will:—

(i) be aware about water treatment processes and the systems of distributing treated water to a building unit,
(ii) be able to estimate the water requirements of buildings of different typologies and to design its storage facilities,
(iii) have a fair idea about the sanitary requirement of buildings of different typologies and be able to choose the appropriate pipe system for them,
(iv) have a fair idea about municipal drainage system and systems of disposing effluents in building units outside municipal area.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Sources and Requirements of Potable Water	4
2	Civic Water Distribution	3
3	Water Storage and Conveyance within Building Premises	6
4	Sanitation Requirements	3
5	Pipe System	8
6	Design Considerations for Drainage System	3
7	Drainage for Isolated Buildings	6
8	Fittings, Materials, and Appliances	6

DETAIL COURSE CONTENT

Module 1 Sources and Requirements of Potable Water — 4 periods

1.1 SOURCES OF WATER: Ground water, surface water
1.2 POTABLE WATER: Idea of physical and chemical processes involved with water treatment, Quality of water requirement as per WHO, Quantity of water requirements as per NBC.

Module 2 Civic Water Distribution — 3 periods

2.1 WATER DISTRIBUTION SYSTEMS: General principles of water distribution system, Systems of conveyance of water, Service reservoirs, Layout of water supply distribution system
2.2 WATER SUPPLY: Hierarchy of water supply, Service pipe, Direct and indirect system, Constant and Intermittent supply.

Module 3 Water Storage and Conveyance within Building Premises — 6 periods

3.1 STORAGE OF WATER: Requirements of Storage, Quantity to be stored, Materials used, Underground and overhead reservoirs
3.2 DESIGN OF DISTRIBUTION SYSTEM: Discharge computation, Gravity distribution system, Break pressure tank
3.3 DISTRIBUTION SYSTEMS IN MULTI-STORIED BUILDINGS: Pressurized distribution or hydro-pneumatic system, Pressure reducing valve.

Module 4 Sanitation Requirements 3 periods

4.1 SANITARY APPLIANCES: Wash basins, Cleaner's sink, Drinking water fountain, Water closets, Urinal for male and female, Flushing cisterns, Baths, Showers

4.2 Quantitative Requirements of Sanitary Appliances as per the NBC

4.3 Reading toilet and kitchen layout drawings.

Module 5 Pipe System 8 periods

5.1 HOUSE DRAINAGE PIPES: Soil pipes, Waste pipes, Soil-waste pipes, Ventilating pipes, Rain water pipes, Anti-siphonage pipes, Vent pipes, Junction pipes, Ventilation ducts and shafts

5.2 TRAPS: Water seal, Essentials of a good trap, Causes of loss or breaking of water seal, Classifications of traps based on shape and use/location

5.3 CLASSIFICATION OF PIPE SYSTEMS: Two-pipe system, One-pipe system, Single stack system, Partially ventilated single stack system, Choice of pipe systems

5.4 CHAMBERS: Invert, Collection chamber, Gully chamber, Inspection chamber, Manhole, Drop manhole, Inceptor/ Interceptor manhole, Manhole chamber.

Module 6 Design Considerations for Drainage System 3 periods

6.1 Aims of designing a drainage system and realization of the same — MUNICIPAL WASTES: Sewage (sludge, sullage and storm water) and Solid refuse — Drain, drainage, channel, sewer, sewerage

6.2 SEWAGE DISPOSAL: Dry or conservancy system (earth closets, trench latrines, bore-hole latrines, sanitary latrines) and Water carriage or drainage system — Sizing of rain-water pipes for roof drainage

6.3 RAINWATER HARVESTING SYSTEMS: On-site water reuse, Groundwater recharge, Opportunities and weakness, Downspout disconnection

6.4 SYSTEMS OF DRAINAGE: Separate system, Combined system, Partially separate system – Shape and size of sewers based on Dry Weather Flow.

Module 7 Drainage for Isolated Buildings 6 periods

7.1 SUSTAINABLE PRACTICES: Reduce, Reuse and Recycle — Segregation of wastes at source, on-site treatment of organic waste, centralized Garbage Collection System/ Garbage chute

7.2 SEPTIC TANK: Sludge and Scum — Design considerations: capacity (detention period, sludge removal, consumption of water), shape and dimensions, inlet and outlet, baffle wall, cover and manholes, ventilation, lining

7.3 DISPOSAL OF EFFLUENT: Soak Pit (lined and unlined), Dispersion Chamber and Dispersion Trench, Idea about Sewage Treatment Plant (STP), Reed Bed sewage treatment.

Module 8 Fittings, Materials and Appliances 6 periods

8.1 VALVES: Air Valves or Air Relief Valves, Reflux Valves or Check Valves or Non-return Valves or Flap Valves or Foot Valves, Safety Valves or Pressure Relief Valves, Sluice Valves or Gate Valves or Stop Valves, Scour Valves or Washout Valves or Blow-off valves, Mixing valves, Stop Cocks

8.2 TAPS: Bib Taps, Use of low-flow fixtures and systems, Self-closing taps

8.3 Fire Hydrants and Wet Riser

8.4 FITTINGS: Bends or elbows, Tees, Crosses, Wyes, Reducers, Increasers, Flanges, Caps, Plugs, Back Nuts

8.5 JOINTS: Different type of joints for different pipe materials with detail reference to Spigot and Socket joints, Flanged joints and cement mortar joints — Lagging of pipes

8.6 SUPPLY PIPES: Cast iron, steel, reinforced concrete, pre-stressed concrete, galvanized mild steel tubes, copper, brass, wrought iron, asbestos cement, lead, Polythene, UPVC

8.7 DRAINAGE PIPES: Salt glazed stoneware, cast iron, asbestos cement, lead, UPVC.

REFERENCE BOOKS

1. Bureau of Indian Standard. SP7 National Building code of India 2016, Volume 2 Part 9. BIS, New Delhi.
2. Text book of Water Supply and Sanitary Engineering, S K Hussain, Oxford and IBH Publishing Co.
3. Building Construction / Sushil Kumar / Standards Publishers Distributors, Delhi.

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CE2117 | Structural Analysis | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	**3 lectures per week**	**100**

COURSE OBJECTIVE

1. To equip the candidates with basic tools of structural analysis,
2. To provide an idea of structural behavior, and,
3. To introduce numerical methods of structural analysis so that the candidate can use the knowledge in future research and software analysis.

COURSE OUTCOME

At the end of the course, the students will**:**

(i) have a clear idea about structural indeterminacy, degree of freedom and behaviour of various structural systems;
(ii) be able to analyze basic structural elements for practical design and architectural planning;
(iii) become familiar with numerical methods of structural analysis (such as finite element method) and use this concept for software analysis of structure; this will also help them for future research.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

SYLLABUS

Structural redundancy, degree of freedom, analysis of statically determinate and indeterminate structure to obtain internal forces and displacement of structure. Introduction to numerical methods like finite element method.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME AND TOPICS	NO. OF PERIODS
1	INTRODUCTION TO STATICALLY DETERMINATE AND INDETERMINATE STRUCTURES: Degree of redundancy, degree of freedom, force and displacement methods, static and dynamic load.	4
2	FUNDAMENTALS OF ANALYSIS OF DETERMINATE STRUCTURE: Conjugate beam method, Strain energy method, Castigliano's theorem, calculation of force effect, rotation and deflection of beam and truss.	9
3	FUNDAMENTALS OF ANALYSIS OF INDETERMINATE STRUCTURE: Consistent deformation method, moment distribution method, slope deflection method, analysis of portal frames, elementary analysis of continuous beam curved in plan.	18
4	Introduction to matrix stiffness method	4
5	Introduction to finite element method	4

REFERENCE BOOKS

1. Structural Analysis, R.C. Hibbler, PHI.
2. Theory of Structures, S. Ramamruthan and R. Narayan, Dhanpat Rai Publ.
3. Fundamentals of Structural Analysis, S.K. Roy, and S. Chakraborty, S Chand.
4. Elements of Structural Analysis, N.C. Sinha, NCBA.
5. Structural Analysis, T.S. Thandavamoorthy, Oxford Publ.
6. Intermediate Structural Analysis, C.K. Wang, McGraw Hill Education.

CE2118 | Surveying | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

To provide the students with a basic understanding of principles of field surveying procedures and practices for engineering applications. The course also intends to impart basic knowledge on various topics of advanced surveying: for example, photogrammetry, Global Positioning Systems (GPS) and land use mapping.

COURSE OUTCOME

In this course, students will gain a theoretical and applied understanding of surveying principles and practices. The course learning outcome are:

(i) Measurement of distance using tape or EDM and angle using compass and theodolite
(ii) Profile levelling and contouring using levelling instruments
(iii) Principles and practices used in triangulation, traversing and plane table surveying
(iv) Surveying through Total Station equipment
(v) Land use mapping using aerial survey.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Basic Concepts of Surveying	4
2	Distance Measurement	3
3	Angle Measurement	3
4	Levelling	6
5	Conventional surveys	2
6	Total Station Surveying	4
7	GPS Surveys	4

DETAIL COURSE CONTENT

Module 1 Basic Concepts of Surveying 4 periods

Principles – Basic measurements – Control networks – Locating position - Errors in measurement

Module 2 Distance Measurement 3 periods

Principles and methods – Errors in taping and chaining – Electromagnetic Distance measurement (EDM) – measuring principles – errors, checking and calibration.

Module 3 Angle Measurement 3 periods

Measurement with compass and theodolite – methods of measurements – instrument adjustment – sources of error.

Module 4 Levelling 6 periods

Principles of levelling – equipment – effect of curvature and refraction – simple and differential levelling - adjustments – Contouring – methods of contouring.

Module 5 Conventional Surveys 2 periods

Traversing – plane rectangular coordinates – development of triangulation network – method of triangulation – traversing.

Module 6 Total Station Surveying **4 periods**

Principles – classification – salient features of total station – adjustments

Module 7 GPS Surveys **4 periods**

Concept of GPS - principles – errors – GPS survey methods - planning of GPS survey

SUGGESTED READINGS

1. Elementary Engineering Surveying, J. K. Ghosh, Studium Press (India) Pvt Ltd.
2. Surveying and Levelling (Vol. 1 and Vol. 2), T. P. Kanetkar and S. V. Kulkarni, Pune Vidyarthi Griha Prakashan.
3. Surveying (Vol. 1 and Vol. 2), S. K. Duggal, Tata McGraw-Hill Education India.
4. Surveying and Levelling, R. Subramanian, Oxford University Press.
5. Fundamentals of Surveying, S. K. Roy, Prentice Hall India Learning Private Limited.

AP2171 | Architectural Design Studio - II | 6 credits

Course Duration	Contact periods	Full Marks
13 weeks	9 studio classes per week	200

COURSE OBJECTIVE

The objective of this course is to facilitate the development of necessary skills in the student to create shelters of moderate complexity, schools up to secondary level, and small business buildings or professional's office, through a clear understanding of the interrelationships between circulation, functional uses of space (indoor as well as outdoor), area and proximity analyses, climatic and aesthetic considerations.

COURSE OUTCOME

On successful completion of this course, the students will acquire skills to fairly design a small residence, small school, and small office.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Design Assignment 1	54 (6 weeks)
2	Time Sketch	09 (1 week)
3	Design Assignment 2	54 (6 weeks)

DETAIL COURSE CONTENT

The students are required to undertake two architectural design assignments and one time-sketch (without repetition) from amongst the following broad topics representing three sub-occupancies of the National Building Code of India 2016:

- One-or two-family private dwellings, residence of a professional/ consultant etc.
- Different types of schools up to secondary level.
- Offices of professionals/ consultants like architects, engineers, doctors, lawyers and others; banks, post offices, police stations, etc.

The studio work undertaken shall emphasize behavioural, functional, climatic and aesthetic considerations in architectural design. The minimum duration of a design assignment, other than the time sketch, shall not be less than five weeks. The final submission of drawings will generally consist of site plan, different floor and roof plans, relevant elevations/sections, necessary details, model(s) and./or views.

EVALUATION SCHEME

Preferably 3 reviews shall be organized for each assignment excluding the time sketch. The reviews should preferably involve the practicing Architects and allied professionals as external examiners. Marks of each review shall be communicated to the students on regular basis as a part of continuous evaluation. Indicative evaluation scheme of an assignment may be as follows:

(a) Study and design programming (10-20%),
(b) Concept and design development (30-40%),
(c) Final Submission (30-40%), and,
(d) Studio performance (10-20%).

The marks allotted to each module may be as follows:

Module 1: 90 marks | Module 2: 20 marks | Module 3: 90 marks

However, the faculty-in-charge may change the marks allocated to different modules, if it is required to give more emphasis to one design assignment than the other.

REFERENCE BOOKS

1. Bureau of Indian Standards. National building Code of India 2016, Volume 1, Part 3. BIS, New Delhi.
2. J de Chiara and J. Callender. Time-Saver Standards for Building Types, 3rd Ed. McGraw-Hill.
3. D. Watson, M.J. Crosbie, and J. Callender. Time-Saver Standards for Architectural Design Data. McGraw-Hill.
4. Ernst and Peter Neufert. Architects' Data, 3rd Ed. Blackwell Science

AP2172 | Details of Construction Practice - II | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of the course is to expose a student to the practical aspects of the theoretical knowledge gathered from portions of the theoretical course AP1201 and that of the course AP2102.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) familiar with the construction techniques for foundation, floor and roof, stairs, and damp proofing and water proofing of building;
(ii) able to select suitable material for construction; and,
(iii) able to prepare details in Working Drawing which is included in forthcoming semester.

COURSE EVALUATION

Continuous internal assessment of students' work executed through drawing sheets etc. will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Details of Foundation	12
2	Details of Flat and Pitched Roofs	12
3	Details of RCC Stairs	9
4	Damp Prevention and Water Proofing	6

DETAIL COURSE CONTENT

Module 1 Details of Foundation 12 periods

1.1 Details of typical foundations up to plinth levels
1.2 Skin sections in brickwork showing typical damp-proof treatments in foundation and plinth in minimum 1:25 scale
1.3 Skin sections in RCC showing typical damp-proof treatments in foundation and plinth in minimum 1:25 scale.

Module 2 Details of Flat and Pitched Roofs 12 periods

2.1 Flat Roof- One way, Two Way Slabs
2.2 Reinforcement of roof slab
2.3 Beams and their reinforcement, Clear Cover, Stirrup distancing
2.4 Columns and their reinforcement, Clear Cover, Stirrup distancing
2.5 Types of Pitched roof as per materials and construction techniques, Scope of application and related building regulations, their advantages and disadvantages

Module 3 Details of RCC Stairs 9 periods

Details of a typical RCC staircase showing fixing details of:

3.1 Balusters (metal & wood)
3.2 Nosing to steps in suitable scale

(Minimum scale being 1:25)

Module 4 Damp Prevention and Water Proofing 6 periods

4.1 Water Proofing Treatment on Flat Roofs & Terraces (using lime concrete, bitumen etc.):

Details of water proofing treatments to flat roofs and terraces showing rain water pipe. Drawings are to be drawn in suitable scale, minimum scale being 1:25.

4.2 Water Proofing Treatment to Parapet Wall, Window Sill & Chajja:
Details of waterproofing treatments to parapet walls, window sills and chajja showing coping, drip course, moulds etc. Drawings are to be drawn in suitable scale, minimum scale being 1:25.

4.3 Waterproofing and water drainage of basements (tanked, integral, drained cavity)

4.4 Explanation through hands-on and/or installation video.

REFERENCE READINGS

1. S.P. Arora and S.P. Bindra. (2010). A text book of building construction Dhanpat Rai Publications.
2. S. Bliss. (2005). Best practices guide to residential construction: Materials, finishes, and details. Wiley.
3. R. Chudley, and R. Greeno. (2014). Building construction handbook- 10th ed. Routledge
4. A.K. Jain and A.K. Jain. (2016). Building construction- 11th ed. Laxmi Publications.
5. K.N. Jha. (2012). Formwork for concrete structures. Tata McGraw Hill Education Private Limited.
6. S. Kumar. (2010). Building Construction. Standard Publisher.
7. A.J. Macdonald. (2018). Structure and architecture, 3rd ed. Routledge.
8. R.C. Peurifoy, J. Schexnayder, and A. Shapira. (2010). Construction planning, equipment and methods, Indian Ed. McGraw Hill Education.
9. P.C. Varghese. (2017). Building construction, 2nd ed. Prentice' Hall of India Private Limited.
10. A. Watts. (2014). Modern construction envelopes. Birkhäuser / Springer
11. E.C. Ozelton and J. A. Baird. "Timber Designers' Manual". Science
12. F.D.K. Ching. "Building Construction Illustrated". John Wiley & Sons, Inc.
13. S.K. Duggal "Building Materials". New Age International (P) Limited.
14. Mark Miller, Rex Miller and Eugene Leger. "Complete Building Construction". John Wiley & Sons, Inc.
15. Bjorn Berge. "The Ecology of Building Materials". Architectural Press.
16. P.C. Varghese. Building materials. PHI Learning Pvt. Ltd.

AP2173 | Computer Aided Design and Drawing | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 laboratory classes per week	100

COURSE OBJECTIVE

The students will be introduced to 2d and 3d software so that they are prepared for carrying out architectural design exercises in digital media in the forthcoming semesters.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) understand the advantages of creating digital drawings and graphics in computer as well as their limitations;
(ii) create simple and complex 2-dimensional drawings and editing them;
(iii) annotate the drawings;
(iv) render digital graphics for presentation to clients; and,
(v) create and optimize building designs using Building Information Modelling.

COURSE EVALUATION

Continuous internal assessment of students' work will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction to 2d Graphics	3
2	Creating Simple and Complex 2d Objects	3
3	Modifying and Editing Objects	3
4	Writing Text, Dimension and Hatching	3
5	Organizing and Plotting Drawing	3
6	Rendering of 2d Drawings	6
7	Introduction to 3d Modelling	9
8	Introduction to Building Information Modelling	9

DETAIL COURSE CONTENT

Module 1 Introduction to 2d Graphics **3 periods**

1.1 Introduction to various CAD Software and their Modules.
1.2 Starting AutoCAD and understanding the user interface, modifying interface, saving a file.
1.3 Using ortho mode, object snaps.

Module 2 Creating Simple and Complex 2d Objects **3 periods**

2.1 Drawing lines, circles, arcs, ellipses, point objects.
2.2 Construction line, Multiline and Polylines.
2.3 Drawing rectangles, polygons, splines, curves.
2.4 Closed and Open Polygons.
2.5 Creating boundary and regions.

Module 3 Modifying and Editing Objects **3 periods**

3.1 Redrawing and regenerating a drawing.
3.2 Selecting, erasing, duplicating, rearranging, resizing, breaking and grouping objects.
3.3 Editing polylines, multiline and splines.
3.4 Exploding objects, chamfering and filleting objects.

Module 4 Writing Text, Dimension and Hatching 3 periods

4.1 Creating a line text, paragraph text; inserting text from outside AutoCAD.
4.2 Working with text style; editing and changing text.
4.3 Understanding dimension styles and variables, managing dimension styles.
4.4 Dimensioning multiple objects.
4.5 Adding hatch objects, modifying hatch objects.

Module 5 Organizing and Plotting Drawing 3 periods

5.1 Concept of layer, visibility, printability and locking of layers.
5.2 Concept of lineweight in architectural drawing.
5.3 Working with blocks, attributes, external references, editing references in place.
5.4 Creating plot Layout and Plotting.

Module 6 Rendering of 2d Drawings 6 periods

6.1 Introduction to Adobe Photoshop user interface - Raster and vector image.
6.2 Concept of layers, folder of layers, linked layers, blending modes.
6.3 Use of editing tools, managing exposure, colour balance etc.
6.4 Publishing final output.

Module 7 Introduction to 3d Modelling 9 periods

7.1 Drawing 3D from 2D shapes and objects: Extrusion of lines and surfaces.
7.2 3D Solids: Properties, Draw, Edit, Join, Change Attributes.
7.3 Use of Components library, Plugins.
7.4 Rendering: Use of Camera, Lights and View. Various rendering techniques.

Module 8 Introduction to Building Information Modelling 9 periods

8.1 User Interface and File Management.
8.2 View control and properties, View Types.
8.3 Levels, Walls, Doors, Windows, Component, Columns and Grids, Stairs, Roofs and Floors.
8.4 Annotations, Schedules, Rendering.

REFERENCE READINGS

1. James Leach, Shawna Lockhart, Eric Tilleson. 2019. AutoCAD 2020 Instructor. SDC Publications.
2. Aidan Chopra. 2010. Google SketchUp 8 for Dummies. John Wiley & Sons.
3. Steve Johnson. 2012. Adobe Photoshop CS2. Que Publishing.
4. Eric Wing. 2019. Revit 2020 for Architecture: No Experience Required. John Wiley & Sons.

FOURTH SEMESTER

AP2201 | Evolution of Architecture – II | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the evolution of Western architecture from the ancient to the pre-industrial times through the medieval ages.

COURSE OUTCOME

On successful completion of this course, the students will:—

(i) have a fair idea about the evolution of settlements and architecture in the Ancient World with reference to West Asia (Ancient Mesopotamia) and Ancient Egypt;
(ii) have a reasonable idea about the birth and development of classical western architecture with reference to Classical and Hellenistic Greece, and the architectural developments of Republican and Imperial Rome, in terms of new typologies, new materials and architectural forms and expressions;
(iii) gain an understanding of the influence of Christianity on the architecture of Western Europe starting from humble beginnings involving adaptive reuse of pre-existing buildings to Byzantine architecture in the eastern part of the Roman empire through medieval times and the evolution of grand cathedrals and novel structural systems;
(iv) understand the nuances of Renaissance Art and Architecture and the celebration of humanism;
(v) understand the transition from the ethos of Renaissance to the absolutism of Baroque in terms of architecture and the socio-political climate of the times; and,
(vi) gain an understanding of revival of the classical and its representation in Neoclassicism.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Architectural Development in Ancient Mesopotamia	3
2	Architectural Development in Ancient Egypt	3
3	Classical Greek and Hellenistic Architecture	6
4	Architecture of Imperial Rome	6
5	Early Christian and Byzantine Architecture	3
6	Architecture of Medieval Europe	6
7	Renaissance Art and Architecture	6
8	Baroque Architecture	3
9	Neo-Classicism	3

DETAIL COURSE CONTENT

Module 1 Architectural Development in Ancient Mesopotamia 3 periods

Tigris and Euphrates basin – The contextual factors influencing the architecture – building techniques and processes – three dimensional articulation of spaces – architectural elements – external finishing techniques – building services – introduction of the arch – temples and palaces as the chief building typologies – principles of architectural organization – symbolism and meaning – social underpinnings – Early Mesopotamian Architecture, Assyrian Architecture, Babylonian Architecture and City Planning – Study of (a) the Ziggurat of Ur-Nammu, Ur (Sumerian), and (b) the City of Babylon, Mesopotamia (Nebuchadnezzar II's reconstruction).

Module 2 Architectural Development in Ancient Egypt 3 periods

Belief in after-life, powerful priesthood, abundant labour – Evolution of tomb architecture: Mastabas to the Step Pyramid to the Bent Pyramid to the True Pyramids, study of the Great Pyramid of Cheops, Gizeh — Temple architecture: Typology, study of the Great Temple of Amun, Karnak, Thebes – Pylons, Obelisks and Sphinx.

Module 3 Classical Greek and Hellenistic Architecture 6 periods

Classical (Hellenic) Greece: city states, use of high quality limestone and marble, columnar and trabeated architecture, human scale, extrovert space – Typical Greek Temple: parts, columniation, intercolumniation – Orders**:** Doric, Ionic, Corinthian – Elements of Urban Architecture: agora, stoa, bouleutorion, theatre, Odeon, stadium, hippodrome and gymnasia – Study of the Parthenon at Acropolis, Athens – Hellenistic Architecture.

Module 4 Architecture of Imperial Rome 6 periods

Roman art and architecture: continuity of Greek architecture or an unique style – Imperial Rome: nation state, use of new materials, arcuated architecture, monumental scale, introvert space – Orders added: Tuscan and Composite (Roman) – Comparative proportions of the Classical Orders – Elements of Urban Architecture: temples, forum, basilicas, thermae & balneae, theatre, amphitheatre, circuses, triumphal arches & columns, aqueducts & bridges – Study of the Pantheon, Rome.

Module 5 Early Christian and Byzantine Architecture 3 periods

5.1 Adaptive reuse of existing unused buildings – Basilican Churches – Significance of Clerestory Lighting – Study of the Old Basilica of St. Peter, Rome.

5.2 Developments after acceptance of Christianity as state religion – Orthodox Churches and Greek cross – Pendentives for domes over square compartments – Radiant church interiors – Study of the Hagia Sophia, Constantinople.

Module 6 Architecture of Medieval Europe 6 periods

6.1 Medieval age – Episcopal cities – Development of stone vaulting into groined systems – Church plan as a Latin Cross – Study of the Pisa Cathedral with Baptistery and Campanile.

6.2 Further consolidation of Papal hierarchy, creation of lofty cathedrals – Progressive lightening and heightening of structure – Rectangular church plans – Introduction of structure as a framework with pointed arches, flying buttresses and rib vaults – Reduction of structural function of the wall enabling new articulation with tracery – Study of the Notre Dame de Paris.

Module 7 Renaissance Art and Architecture 6 periods

7.1 Re-birth of classical ideals in Europe: age of humanism, reformation movement – Artists and architects as important personalities: Vinci, Michelangelo, Raphael – Renaissance Art: Brunelleschi's linear perspective, renaissance sculpture, renaissance painting

7.2 Italian Renaissance architecture: characteristics, principal phases – Quattrocento (Early Renaissance): development of double shell ribbed dome, study of the *Duomo* of Florence Cathedral by Filippo Brunelleschi – High renaissance: development of compositional arrangement after classical ideals, study of *Tempietto* at St. Pietro, Montorio, Rome by Donato Bramante – Mannerism (Late High Renaissance): Study of the plan of the Basilica of St. Peter's, Rome by Michelangelo Buonarroti.

Module 8 Baroque Architecture 3 periods

Counter-reformation movement – Architecture as a statement of the wealth and power of the church – Spatial invention, drama and freedom of detail – Study of (a) Piazza of the Basilica of St. Peter's, Rome by Gian Lorenzo Bernini, and (b) St. Paul's Cathedral, London by Sir Christopher Wren.

Module 9 Neo-Classicism 3 periods

Age of Enlightenment – Departure from absolutism – Study of (a) *Monticello*, Virginia, USA by Thomas Jefferson, (b) the *Writers' Building*, Kolkata, India by Thomas Llyon, and (c) the Cenotaph to Newton (unbuilt) by Étienne-Louis Boullée.

REFERENCE BOOKS

1. M. Trachtenberg and I. Hyman. Architecture: From Prehistory to Postmodernity. Prentice Hall.
2. M Moffett, M Fazio and L Wodehouse. A World History of Architecture. McGraw-Hill.
3. Jan Gympel. The Story of Architecture from antiquity to the present. Könemann.
4. Encyclopaedia of Architectural Technology: Ed. Pedro Guedes / McGraw-Hill
5. Sir Banister Fletcher's A History of Architecture. Ed. Dan Cruckshank. CBS.

AP2202 | Materials and Methods of Construction - IV | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the domain of advanced building materials and its components.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) use different facade systems;
(ii) propose various structural forms and building systems for designing a building; and,
(iii) understand the construction feasibility of their design proposal.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Structures in Architecture	9
2	Facade System	6
3	Pre-Engineered Building System	6
4	Joints in Structure	6
5	Formworks and Temporary Support Structure	6
6	Construction Equipment	3
7	Thermal and Acoustic Materials	3

DETAIL COURSE CONTENT

Module 1 Structures in Architecture — 9 periods

1.1 Domes and Vaults, Shell structures, Folded plate structures, Tensile structures, Space frames, Pneumatic structures etc.
1.2 STRUCTURAL SYSTEM FOR HIGH RISERS: braced frame, rigid frame, wall frame, shear wall, outrigger, unfilled frame, flat plate, tube, coupled wall etc.
1.3 Fundamental principles and examples.

Module 2 Facade System — 6 periods

2.1 CURTAIN WALL: Fixing methods (unitized, semi unitized, stick, point fixing etc.)
2.2 Structural glazing.
2.3 METAL FACADE: panel and cladding, rain-screen mesh, louver etc.

Module 3 Pre-Engineered Building System — 6 periods

3.1 PRECAST CONCRETE: pros and cons, pre-stressing (pre and post tensioning), casting operation (job pre-cast, yard pre-cast)
3.2 Typical precast concrete components and other prefab elements
3.3 BUILDING SYSTEMS: Large-panel systems, Frame systems, Slab-column systems with walls, Mixed systems.

Module 4 Joints in Structure — 6 periods

4.1 TYPES OF JOINTS: Expansion joints, Construction joints, Sliding joints, Isolation joints, Seismic joints, Settlement joint etc.

4.2 Details of treatment and finishing.

Module 5 Formworks and Temporary Support Structure 6 periods

5.1 Materials and components used for formwork, supports and scaffolds, shoring, underpinning.
5.2 FORMWORK FOR TYPICAL COMPONENTS: slab, beam, column etc.
5.3 FORMWORK FOR SPECIAL STRUCTURES: precast concrete, shell, dome, folded plate etc.
5.4 FORMWORK FOR HIGH-RISE CONSTRUCTION: slipform, jumpform, table / flying form.

Module 6 Construction Equipment 3 periods

6.1 Excavation equipment; Compaction equipment; Hauling equipment; Hoisting equipment; Pumping equipment.
6.2 Applications and brief overview.

Module 7 Thermal and Acoustic Materials 3 periods

Types, Properties, Applications, and Details of construction.

REFERENCE READINGS

1. S.P. Arora and S.P. Bindra. (2010). A text book of building construction Dhanpat Rai Publications.
2. S. Bliss. (2005). Best practices guide to residential construction: Materials, finishes, and details. Wiley.
3. R. Chudley, and R. Greeno. (2014). Building construction handbook- 10th ed. Routledge
4. A.K. Jain and A.K. Jain. (2016). Building construction- 11th ed. Laxmi Publications.
5. K.N. Jha. (2012). Formwork for concrete structures. Tata McGraw Hill Education Private Limited.
6. S. Kumar. (2010). Building Construction. Standard Publisher.
7. A.J. Macdonald. (2018). Structure and architecture, 3rd ed. Routledge.
8. R.C. Peurifoy, J. Schexnayder, and A. Shapira. (2010). Construction planning, equipment and methods, Indian Ed. McGraw Hill Education.
9. P.C. Varghese. (2017). Building construction, 2nd ed. Prentice' Hall of India Private Limited.
10. A. Watts. (2014). Modern construction envelopes. Birkhäuser / Springer
11. E.C. Ozelton and J. A. Baird. "Timber Designers' Manual". Science
12. F.D.K. Ching. "Building Construction Illustrated". John Wiley & Sons, Inc.
13. S.K. Duggal "Building Materials". New Age International (P) Limited.
14. Mark Miller, Rex Miller and Eugene Leger. "Complete Building Construction". John Wiley & Sons, Inc.
15. Bjorn Berge. "The Ecology of Building Materials". Architectural Press.
16. P.C. Varghese. Building materials. PHI Learning Pvt. Ltd.

AP2203 | Climatology | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

The objective of this course is to introduce a student to the aspects of climatic issues that are to be considered generally during any architectural design.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) able to understand the climatic factors that contribute to human comfort inside a building;
(ii) able to arrange a building or organize groups of buildings in a climate sensitive manner;
(iii) able to use architectural elements like shading devices, light shelves, wind scoops etc. to control the influence of outside environment inside the building;
(iv) able to optimize energy usage and minimize the need of artificial techniques to enhance human comfort; and,
(v) prepared for using passive techniques of ensuring natural ventilation and illumination.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction to Climatology	4
2	Comfort: The Desirable Conditions	4
3	Principles of Thermal Design	4
4	Means of Thermal Control: Natural Ventilation	4
5	Means of Thermal Control: Structural Controls	4
6	Principles of Lighting	3
7	Thermal Design for Urban Areas	3

DETAIL COURSE CONTENT

Module 1 Introduction to Climatology — 4 periods

1.1 Climate and weather.
1.2 Basic climatic zones: hot & arid, hot / warm & humid, composite and cold.
1.3 Climatic parameters: solar radiation, temperature, relative humidity, prevailing wind, clouds.
1.4 Measuring instruments and units.
1.5 Features of dwellings in tropics: aspects of daylighting, plantation of trees.

Module 2 Comfort: The Desirable Conditions — 4 periods

2.1 Requirement of ventilation.
2.2 Heat balance of body.
2.3 Sun path diagram, comfort zone & bio-climatic chart, comfort range.
2.4 Air change per hour: recommended ACH values for different occupancies as per the NBC.
2.5 Methods of ventilation.

Module 3 Principles of Thermal Design — 4 periods

3.1 Thermal quantities – Heat flow, heat flow rate, density of heat flow rate.
3.2 Sol-air temperature and Solar gain factor.

3.3 Heat Exchange Process: Conduction, Convection, Radiation.
3.4 Evaporation, Calculation of heat loss & heat gain, Cooling & heating by air.
3.5 Transmittance of Composite Walls, Thermal Gradient.
3.6 Thermal Comfort Indices: ET, SET, Wind Chill Factor, MRT, WBGT.

Module 4 Means of Thermal Control: Natural Ventilation 4 periods

4.1 Principle of nature ventilation in buildings.
4.2 Cross-ventilation: position of openings, size of openings.
4.3 Control of openings: sashes, canopies, louvers, wind shadow.
4.4 Humidity control: wind scoop, Earth Air Tunnel.

Module 5 Means of Thermal Control: Structural Controls 4 periods

5.1 Solar control: internal blinds & curtains.
5.2 Heat absorbing glasses: SHGC, Nanomaterial.
5.3 Sun's position: effects of angle of incidence, stereographic projection, shadow angles.
5.4 Shading devices: vertical & horizontal, Design of shading devices.

Module 6 Principles of Lighting 3 periods

6.1 Aims of good lighting and realization of the same.
6.2 Planning the brightness pattern considering the visual task, the immediate background of the task (central field & visual field) and the general Surroundings (peripheral field).
6.3 Glare: direct, reflected & veiling.
6.4 Recommended values of illumination level for different occupancies as per the NBC.

Module 7 Thermal Design for Urban Areas 3 periods

7.1 Outdoor thermal comfort.
7.2 Sky View Factor.
7.3 Albedo: Albedo of different building materials, Cool paints.
7.4 Role of evapotranspiration.

REFERENCE READINGS

1. O.H. Koenigsberger, T.G. Ingersoll, A. Mayhew, S. V. Szokolay. (1974). Manual of tropical housing and building. Climatic design. Universities Press (India) Private Limited, Hyderabad.
2. B. Givoni. (1976). Man, Climate and Architecture. Applied Science Publ.
3. Mark DeKay, and G.Z. Brown. (2013). Sun, Wind, and Light: Architectural Design Strategies. John Wiley & Sons.
4. B. Givoni. (1998). Climate Considerations in Building and Urban Design. John Wiley & Sons.

AP2204 | Building Services I: Illumination and Electrical Installations | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

This course provides an exploration of building environmental systems and their integration into architectural design by introducing the students to concepts of one of the basic services and its applications. It further provides by evolving understanding in students to choose appropriate electrical installation systems and application and integration of this knowledge in their design projects.

This course provides understanding and use of daylight as an architectural determinant, explore daylighting influences on building occupants, understand the impact of natural lighting strategies on building energy efficiency and on sustainable design, Integrate natural and artificial illumination systems within building design, providing an introduction to the fundamentals of illumination engineering and architectural lighting design by familiarising them with calculation procedures for predicting daylight performance within buildings, lighting precedents studies as tools for research and spatial programming, designing with electric light as a form and material in space, light sources, light distribution, and electric lighting programming, understanding the implications of electric lighting on place making, spatial ordering, health, and human activities in indoor spaces. This course will introduce Principle of schematic lighting design and energy codes, qualitative and quantitative lighting design tools. Simulate natural lighting conditions through use of architectural models or computer analysis

COURSE OUTCOME

On successful completion of this course, the students will**:**

(i) use the techniques, skills, and modern engineering tools necessary for engineering practice of contemporary issues.
(ii) examine daylight in buildings and its effect on lighting design;
(iii) apply engineering principles to illumination engineering problems;
(iv) identify the criteria for the selection of lamps and lighting systems for an indoor or outdoor space by evaluating different types of lighting designs and applications by performing calculations on photometric performance of light sources and luminaries for lighting design;
(v) design the lighting scheme for landscaped spaces;
(vi) acquire a working knowledge of the wide range of lighting control systems available to a lighting design professional and the ability to select an appropriate control system and equipment for a specific application;
(vii) use computer software simulation for designing a simple lighting project and rendering the final design effects.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Introduction to Electricity and its distribution	2
2	Elements of electrical wiring system in buildings	4
3	Schematic layout of electrical installations for different building types	6
4	Introduction to Light and its characteristics	3
5	Daylighting	3
6	Light sources and luminaires	6
7	Lighting calculations and energy codes	6
8	Lighting designs for interior and exterior spaces	9

D E T A I L C O U R S E C O N T E N T

Module 1 Introduction to Electricity and its distribution 2 periods

1.1 Fundamentals of electricity, current, voltage;

1.2 Distribution of electric power in towns / cities and house hold connections;

Module 2 Elements of electrical wiring system in buildings 4 periods

2.1 Elements of building wiring system – feeders, panel board, circuit breakers' fuses, switches etc.

2.2 Electrical symbols;

Module 3 Schematic layout of electrical installations for different building types 6 periods

3.1 Installations from meter board to individual point;

3.2 Electrical wiring system; Distribution boards and layout of points;

3.3 Different materials and specification;

3.4 Earthling agreements; Lighting conductors;

3.5 Fixtures and accessories used in electrical installation;

3.6 Schematic layout of installations and points for different building types;

Module 4 Introduction to Light and its characteristics 3 periods

4.1 What is light, Electromagnetic wave theory, Ultraviolet light, Visible light, Colour models, Infrared light.

4.2 The power of light, Quantum theory, Flat response, Visible light, Effective irradiance.

4.3 How light behaves, Reflection, Transmission: Beer-Lambert or Bouger's law, Refraction: Snell's law, Diffraction, Interference, Manipulating light (diffusion, collimation, transmission losses, focusing lenses, mirrors, concave mirrors, internal transmittance, prisms, diffraction gratings).

4.4 Non-visual effects of light

Module 5 Daylighting 3 periods

5.1 Points to remember about daylighting, Integrating daylighting and electric lighting.

5.2 Top lighting, Side lighting, Basic principles of daylighting design and awareness.

5.3 Daylight Factor: Components of daylight factor – SC, ERC, IRC; Daylight penetration.

5.4 Solar Heat gain Coefficient (SHGC) of glass, VLT of glass, low e-glass and smart glass.

Module 6 Light sources and luminaires 6 periods

6.1 Qualities of light sources, how light is generated, the spectrum of light, Colour classification of light sources, Point source, Line source, or Area source;

6.2 Ballast or transformer, lamp size, voltage, bulb temperature, operating temperature, operating position, starting, warming up, and restarting, dimming characteristics, energy efficiency,

6.3 Lamp types – incandescent, halogen, fluorescent (standard straight and u-bent lamps), compact fluorescent, metal halide, sodium lamps, mercury vapour lamps; other light sources (induction lamps, light-emitting diodes, neon and cold cathode lamps).

6.4 How to choose basic luminaire types, Styles of luminaire – downlights, troffers, commercial fluorescent fixtures, industrial luminaires, linear lighting systems, architectural lighting fixtures, wall washers, wall grazing fixtures, accent fixtures, cove lights, task lights, decorative lighting.

Module 7 Lighting calculations and energy codes 6 periods

7.1 Basic theory – lamps, luminaires and directional lamps, initial versus maintained light levels

7.2 Predicting lighting results in design -- predicting general and ambient light levels, predicting task lighting and focal lighting levels.

7.3 Rough calculations for architects and interior designers -- the watts-per-square-foot method, a very simple lumen method, a very simple point method.

7.4 Energy Code Structure, Lighting Power Limits, Outdoor Lighting Power Limits, Calculation of Installed Lighting Power, Mandatory Switching Requirements, Mandatory Control Specifications, Optional Lighting Control Credits, Compliance Documentation.

Module 8 Lighting designs for interior and exterior spaces 9 periods

8.1 Sequential steps to successful lighting design solutions, determination of lighting design criteria, recording

of architectural conditions and constraints, determination of visual functions and tasks to be served.

8.2 Selection of lighting systems to be used, selection of luminaire and lamp types, determination of number and location of luminaires, Placement of switching and other control devices, consideration of aesthetics and other intangibles

8.3 Documenting lighting design: drawings and contract documents, base plans (floor plans, reflected ceiling plans, combined ceiling/floor plans), creating a lighting plan (lighting symbols, lighting tags, circuits, switching and dimming, details, legends, schedules and specifications).

8.4 Residential lighting design: living room lighting, dining room lighting, small kitchen lighting, lighting the larger kitchen, bathroom lighting, bedroom lighting,

8.5 Outdoor and landscape lighting design.

REFERENCE BOOKS

1. S.L. Uppal, and G.C. Garg. (2011). Electrical Wiring, Estimating and Costing. Khanna Publishers.
2. Surjit Singh. (2011). Electrical Estimation and Costing. Khanna Publishers.
3. Rajiv Shankar. (2010). Energy Auditing in Electrical Utilities. Viva Books.
4. Amlan Chakrabarti. (2011). Energy Engineering and Management. PHI Learning Pvt Ltd.
5. B.L. Theraja. A Text Book of Electrical Technology, Volume I. S. Chand & Co., New Delhi.
6. Philips. (2008). Basics of light and lighting. Koninklijke Philips Electronics N.V.
7. Rüdiger Ganslandt, and Harald Hofmann. (1992). Handbook of Lighting Design. ERCO Leuchten GmbH, Lüdenscheid.
8. Mark Karlen, and James Benya. (2004). Lighting design basics. John Wiley & Sons, Inc.
9. Alexander D Ryer. (1997). The Light Measurement Handbook. Technical Publications Dept., International Light, Inc.
10. DDC Architecture and Engineering Division. Manual for Quality, Energy Efficient Lighting. NYC Department of Design and Construction.
11. Bureau of Indian Standards. (1972). Indian Standard Code of Practice for Industrial Lighting. BIS, New Delhi.
12. L. Halonen, E. Tetri, and P. Bhusal. (2010). Guidebook on energy efficient electric lighting for buildings. Espoo, Finland: Department of Electrical Engineering, Aalto University.
13. Bureau of Indian Standards. (2016). SP 7 : National building code of India 2016, Vol. 2, Part 8 Building Services, Section 1 Lighting and Natural Ventilation. BIS, New Delhi.
14. Bureau of Energy Efficiency. (2017). Energy Efficiency Building Code. ECBC.
15. The California State University. (2018). Outdoor lighting design guide.
16. ZUMTOBEL (n.d.) Light for Outdoor and Architecture.

CE2217 | Design of Reinforced Concrete Structures | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

1. To enable the candidates with basic design approaches for beam, slab, column and foundation,
2. To impart knowledge about prestressed concrete for effective planning and design of architectural systems,
3. To equip the candidate with ductile detailing and sizing requirements of structural elements for sustainable planning of structures under earthquake load

COURSE OUTCOME

At the end of the course, the students will**:**

(i) be able to design elementary structural elements like beam, slab, column and foundation.
(ii) have ideas to design more complex and innovative structural systems with architectural appeal. They will also have ideas on prestressed concrete structures that will help them in planning with modern technologies;
(iii) effectively provide sustainable planning solutions for aseismic structures;

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

SYLLABUS

Design and detailing of elementary structural elements (beam, column, slab, foundation), Introduction to prestressed concrete structure design and ductile detailing concept.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME AND TOPICS	NO. OF PERIODS
1	Introduction to various loading on structures; design philosophies of working stress method and limit state method.	5
2	Design and detailing of singly reinforced and doubly reinforced beam, concept of development length, anchorage, lintel and chajja, Use of SP-16.	7
3	Design and detailing of one-way and two-way slab, concept of torsion steel in two-way slab, deflection criteria.	6
4	Design and detailing of axially loaded column, Introduction to long column and bi-axial bending, use of SP-16.	4
5	Design and detailing of isolated footing under axial and eccentric load, combined footing.	5
6	Introduction to design of pile, pile-cap, raft, grid slab, shells.	6
7	Introduction to pre-stressed concrete.	3
8	Ductile detailing provisions for design under earthquake.	3

RELEVANT IS CODES

1. IS: 456: 2000, Plain and Reinforced Concrete - Code of. Practice, BIS.
2. SP 16: Design Aids for Reinforced Concrete to IS 456:1978, BIS.
3. IS: 875 Part I and II, Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures. Part 1: Dead Loads, Part 2: Live load.
4. SP: 34(1987): Handbook on Concrete Reinforcement and Detailing, BIS.

SUGGESTED READINGS

1. Devdas Menon and S. Pillai. Reinforced Concrete Design. Mc Graw Hill.
2. N. Subramaniam. Design of Reinforced concrete Structures. Oxford University Press.
3. J N Bandyopadhyay. Design of Concrete Structures. PHI.
4. Verghese. Limit State Design of Reinforced Concrete. PHI.
5. IS 1893-Part 1: 2016 on CRITERION FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES, Part 1 General Provisions and Buildings, (Sixth Revision), BIS, New Delhi.
6. IS 13920: 2016. (Reaffirmed 1998). Edition 1.2. (2002-03). Indian Standard. DUCTILE DETAILING OF REINFORCED. CONCRETE STRUCTURES. BIS, New Delhi.

AP2271 | Architectural Design Studio - III | 6 credits

Course Duration	Contact periods	Full Marks
13 weeks	9 studio classes per week	200

COURSE OBJECTIVE

The objective of this course is to facilitate the development of necessary skills in the student to be able to design lodging facilities and assembly buildings, both at their moderate hierarchy, incorporating interrelationships between internal and external spaces, functional uses of space, climatic and aesthetic considerations, and volumetric study of built form and building materials and their applicability in design. Understanding of plumbing services is to be incorporated conceptually.

COURSE OUTCOME

On successful completion of this course, the students will acquire fair skills to design medium sized lodging-rooming facilities, and moderately complex assembly spaces.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Design Assignment 1	54 (6 weeks)
2	Time Sketch	09 (1 week)
3	Design Assignment 2	54 (6 weeks)

DETAIL COURSE CONTENT

The students are required to undertake two architectural design assignments and one time-sketch (without repetition) from amongst the following broad topics representing four sub-occupancies of the National Building Code of India 2016:

- Lodging and rooming houses like inns, clubs, motels, guest houses etc.
- Dormitories like school and college dormitories, students' and other hostels, youth hostels, military barracks etc.
- Hotels, resorts up to 3 star category.
- Medium sized assembly buildings like socio-cultural facilities (club, community halls etc.), art galleries, places of worship, museums, lecture halls, intra-city bus terminus, sports facilities (swimming pool, billiard parlour, bowling alleys, gymnasiums, indoor tennis court etc.

The studio work undertaken shall emphasize behavioural, functional, climatic and aesthetic considerations in architectural design. The minimal duration of a design assessment, other than the time sketch, shall not be less than five weeks. The final submission of drawings will generally consist of site plan, different floor and roof plans, relevant elevations/sections, necessary details, model(s) and./or views, along with a sheet showing plumbing services provided for one of the assignments.

EVALUATION SCHEME

Preferably 3 reviews shall be organized for each assignment excluding the time sketch. The reviews should preferably involve the practising Architects and allied professionals as external examiners. Marks of each review shall be communicated to the students on regular basis as a part of continuous evaluation. Indicative evaluation scheme of an assignment may be as follows:

(a) Study and design programming (10-20%),

(b) Concept and design development (30-40%),

(c) Final Submission (30-40%), and,

(d) Studio performance (10-20%).

The marks allotted to each module may be as follows:

Module 1: 90 marks | Module 2: 20 marks | Module 3: 90 marks.

However, the faculty-in-charge may change the marks allocated to different modules, if it is required to give more emphasis to one design assignment than the other.

REFERENCE BOOKS

1. Bureau of Indian Standards. National building Code of India 2016, Volume 1, Part 3. BIS, New Delhi.
2. J de Chiara and J. Callender. Time-Saver Standards for Building Types, 3rd Ed. McGraw-Hill.
3. D. Watson, M.J. Crosbie, and J. Callender. Time-Saver Standards for Architectural Design Data. McGraw-Hill.
4. Ernst and Peter Neufert. Architects' Data, 3rd Ed. Blackwell Science

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AP2272 | Details of Construction Practice - III | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of this course is to understand the construction details of advanced building components learnt in the corresponding theoretical course.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) have a fair idea of various alternate detailing of building components such as facade system, partition wall, cladding, false ceiling etc.;
(ii) prepare details in Working Drawing which is included in forthcoming semester; and,
(iii) propose innovative details for interior finishes.

COURSE EVALUATION

Continuous internal assessment of students' work executed through drawing sheets etc. will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Partition Walls	9
2	False Ceilings	6
3	Curtain Walls	9
4	Wall Cladding	6
5	Joints in structures	9

DETAIL COURSE CONTENT

Module 1 Partition Walls **9 periods**

1.1 Different types of partition walls showing typical openings in suitable scale, minimum scale being 1:25.
1.2 Suggested types are: Brick, Hollow block, Metal, Glass, Drywall etc.

Module 2 False Ceilings **6 periods**

2.1 Details of suspended type false ceilings in suitable scale, minimum scale being 1:25.
2.2 Explanation through hands-on and/or installation video.

Module 3 Curtain Walls **9 periods**

3.1 Details of curtain wall showing typical openings in suitable scale, minimum scale being 1:25.
3.2 Suggested types are: Stick or unitized or semi-unitized.
3.3 Explanation through hands-on and/or installation video.

Module 4 Wall Cladding **6 periods**

4.1 Details of wall cladding in suitable scale showing edges, openings etc. in suitable scale, minimum scale being 1:25.
4.2 Suggested materials: timber, metal, tiles etc.
4.3 Explanation through hands-on and/or installation video.

Module 5 Joints in Structures **6 periods**

5.1 Suggested list: Expansion Joints, Construction Joints, Sliding Joints, Isolation joints, Seismic joints, Settlement joints etc.

5.2 Details of treatment and finishing.

REFERENCE READINGS

1. S.P. Arora and S.P. Bindra. (2010). A Text Book of Building Construction. Dhanpat Rai Publications.
2. S. Bliss. (2005). Best Practices Guide to Residential Construction: Materials, finishes, and details. Wiley.
3. R. Chudley, and R. Greeno. (2014). Building Construction Handbook- 10th ed. Routledge
4. A.K. Jain and A.K. Jain. (2016). Building Construction- 11th ed. Laxmi Publications.
5. K.N. Jha. (2012). Formwork for Concrete Structures. Tata McGraw Hill Education Private Limited.
6. S. Kumar. (2010). Building Construction. Standard Publisher.
7. A.J. Macdonald. (2018). Structure and Architecture, 3rd ed. Routledge.
8. P.C. Varghese. (2017). Building Construction, 2nd ed. Prentice' Hall of India Private Limited.
9. A. Watts. (2014). Modern Construction Envelopes. Birkhäuser / Springer.

ADDITIONAL RESOURCES

Site visits or online videos of installation work.

AP2273 | Landscape and Site Planning Practice | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the practical aspects of the theoretical course AP2103 learnt in the previous semester.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) familiar with approaches for handling a landscape project in specific cases in connection with planning, management and financial involvement; and,

(ii) able to develop landscape solutions for residential/commercial/recreational uses.

COURSE EVALUATION

Continuous internal assessment of students' work executed through drawing sheets etc. will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Documentation and Design Solution for an Existing Landscape	9
2	Design of a Roof Garden	10
3	Landscape Design for a Commercial Setting	10
4	Landscape Design for a Recreational Setting	10

REFERENCE READINGS

1. C.W. Harris and N.T. Dines. Time-saver Standards for Landscape Architecture, 2nd Ed. McGraw-Hill Publishing Co.
2. Urban Greening Guidelines, 2014. http://www.indiaenvironmentportal.org.in/content/388807/urban-greening-guidelines-2014.

ADDITIONAL READINGS

1. IRC 103-2012: Guidelines for Pedestrian Facilities (First Revision). The Indian Road Congress.
2. IRC SP-12-2015: Guidelines for Parking Facilities in Urban Roads" (First Revision). The Indian Road Congress.
3. RC SP-21-2009: Guidelines on Landscaping and Tree Plantation. The Indian Road Congress.

CE2287 | Surveying Practice | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 practical classes per week	100

COURSE OBJECTIVE

To provide the students with a basic understanding of principles of field surveying procedures and practices for engineering applications.

COURSE OUTCOME

In this course, students will gain applied understanding of surveying principles and practices. The course learning outcome are:

(i) Measurement of distance using tape or EDM and angle using compass and theodolite
(ii) Profile levelling and contouring using levelling instruments
(iii) Principles and practices used in triangulation, traversing and surveying through Total Station equipment

COURSE EVALUATION

Continuous internal assessment of students' work will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments at the start of the semester.

SYLLABUS

Introduction, chain triangulation, traversing with prismatic compass, profile levelling with dumpy level, contouring, theodolite traverse, total station and measurements, setting out buildings, setting out highway curves.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME AND TOPICS	NO. OF PERIODS
1	Introduction - surveying equipment - basic measurement	3
2	Types of Surveys – Chaining – Compass – Levelling - Theodolite surveying - Surveying through Total Station equipment	21
3	Setting out building - Setting out highway curve	12
4	Viva and examination	3

AP2291 | Educational Tour – I | 2 credits

Field Trip	Full Marks	Credit
12 days	50	2

COURSE OBJECTIVE

Educational Tour is an integral part of architectural education in India and abroad. By undertaking the Tour in different parts of the country, the course is able to make the students, coming from different geographical and socio-economic backgrounds of India and abroad, aware of the architectural styles, materials used, and the context for the architectural developments of different buildings of historical and contemporary interest through first-hand experience.

COURSE OUTCOME

On successful completion of this course, the students will have a fair idea of translation of design philosophies to actual projects and thereby supplement the theoretical lectures to some extent.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	DURATION
1	Field work	During Field Trip
2	Tour Report	After returning from Field Trip
3	Seminar and Viva-Voce	After returning from Field Trip

DETAIL COURSE CONTENT

Module 1 Field Work

The students are required to undertake an Educational Tour in places of architectural interest of approximately 12 days duration including the days of journey, under the supervision of faculty-in-charge(s) nominated by the Departmental Faculty Committee (DFC). The Tour is to take place immediately after completion of the Third Semester Examinations and to be completed preferably before the starting of the Fourth Semester. The tour itinerary, as adopted by the DFC on the recommendation of the faculty-in-Charge(s), needs to be approved by the competent authority.

The students are to undertake field trips under supervision of Faculty-in-Charge(s) at places of historic and contemporary architectural interest. They are required to carefully observe, analyse and document what they study through mapping, hand-sketching, measured-drawings, photography etc. The Field Work will be assessed based on the participation, background study, quality of primary documentation etc.

The itineraries of the fieldwork may be framed by the faculty-in-charge in an otherwise suitable manner, in case of any exigency, force majeure, affecting the participants of the tour.

Module 2 Tour Report

The students are required to submit a Tour Report after returning from Field Trip. It will be assessed on the basis of exhaustiveness of the documentation, quality of the submission in terms of content, presentation, references, originality etc.

Module 3 Seminar and Viva-Voce

The students will present a Seminar based on the Tour Report that they have submitted. They will be evaluated through viva-voce after the Seminar presentation.

EVALUATION SCHEME

The marks may be allotted to each module as follows:

Module 1 (Field Work): 20-30 marks
Module 2 (Tour Report): 10-15 marks
Module 3 (Seminar and Viva-Voce): 10-15 marks.

Course Structure – 3rd Year 1st Semester: Fifth Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP3101	Evolution of Architecture III	3	0	0	100	3
AP3102	Estimation and Specification	2	0	0	50	2
AP3103	Building Services II: Mechanical Installations	2	0	0	50	2
AP3104	Building Services III: Architectural Acoustics	2	0	0	50	2
CE3117	Design of Steel Structures	3	0	0	100	3
	Sub total	**12**	**0**	**0**	**350**	**12**
Practical Courses						
AP3171	Architectural Design Studio IV	0	0	12	250	8
AP3172	Working Drawing I	0	0	3	100	2
AP3173	Estimation Practice	0	0	3	100	2
	Sub total	**0**	**0**	**18**	**450**	**12**
TOTAL		**30**			**800**	**24**

Course Structure – 3rd Year 2nd Semester: Sixth Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Theoretical Courses		**L**	**T**	**S**		
AP3201	Evolution of Architecture IV	3	0	0	100	3
AP3202	Valuation of Real Properties	2	0	0	50	2
AP3203	Energy Efficient Architecture	2	0	0	50	2
AP3204	Disaster Resistant Architecture	3	0	0	100	3
	Sub total	**10**	**0**	**0**	**300**	**10**
Practical Courses						
AP3271	Architectural Design Studio V	0	0	12	250	8
AP3272	Interior Design Practice	0	0	3	100	2
AP3273	Working Drawing II	0	0	3	100	2
CE3287	Structure Project on Analysis and Design of Buildings	0	0	3	100	2
AP3291	Educational Tour II[1]	~12 days			50	2
	Sub total	**0**	**0**	**21**	**600**	**16**
TOTAL		**31**			**900**	**26**

Fundamental Courses (FC)	Departmental Core (DC)
Projects and Thesis (PR)	Educational Tour (ET)

[1]Educational Tour II will be conducted after completion of the B Arch 5th Semester Examinations and to be completed preferably before the staring of the B Arch Sixth Semester.

FIFTH SEMESTER

AP3101 | Evolution of Architecture - III | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the evolution of international architecture from the advent of industrial revolution in the mid-19th c. upto the later days of modern architecture in mid-20th c. though the different movements, phases and facets of architecture that celebrate, confront and re-define modernism in architecture.

COURSE OUTCOME

On successful completion of this course, the students will have:

(i) a fair idea about the social background and technological advances that heralded industrial revolution and the roots of modern architecture from its proto-modernist beginnings to the two dominant visions, functionalist and organic;
(ii) a reasonable idea about the artistic movements that confronted the advent of the machine-driven industrial production and its transformation to eclectic artistic styles;
(iii) fair knowledge about transformation of the modern movement into an International style in post-World War II scenario; and,
(iv) a comprehensive idea about the shifts within the modernist movement in its quest for innovation in materials, technology and form.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	The Industrial Revolution: Preparing for Modernism	3
2	Confronting the Machine	3
3	Functionalism and the Idea of a Modern Architecture	9
4	The International Style	3
5	Those who did not conform to the International Style	6
6	Triumph of the Glass Box	3
7	Shift within Modernist Ideals: Going beyond the Glass Box	9
8	Modernism with a Humanist Face	3

DETAIL COURSE CONTENT

Module 1 The Industrial Revolution: Preparing for Modernism 3 periods

Social background of the Industrial Revolution – New building materials meeting need for larger span and taller structure – Fragile iron and glass structures: Great Exhibitions of 19th c. and achievements in engineering skills, study of Sir Joseph Paxton's *Crystal Palace*, London (1851) – Artistic expression in glass and structural steel, study of Gustave Eiffel's *Eiffel Tower*, Paris (1889).

Module 2 Confronting the Machine 3 periods

Deteriorating social values and artistic quality of machine manufactured products.

2.1 ARTS AND CRAFTS MOVEMENT: English revival movement of handicrafts and reforming architecture by using traditional building crafts and local materials, study of *Red House*, Kent (1860) by Philip Webb and William Morris, and Charles Rennie Mackintosh's *Glasgow School of Art*, Glasgow (1909).

2.2 ART NOUVEAU: Late 19th c. and early 20th c. European style, departure from historical architectural expressions, study of representative works by Victor Horta and Antonio Gaudi.

Module 3 Functionalism and the Idea of a Modern Architecture 9 periods

3.1 THE CHICAGO SCHOOL**:** Office Building - the new building type, need for optimizing the use of available space, technical innovations that made high-rise buildings and skyscrapers possible, Louis Sullivan's *Form Follows Function*, the tall building artistically considered, study of *Wainwright Building*, St. Louis (1891) by Adler and Sullivan.

3.2 PRAIRIE SCHOOL**:** Roots of the Prairie School, functionalist in approach, characteristics of the low-lying American Midwest prairie houses, study of Frank Lloyd Wright's *Robie House*, Chicago (1910).

3.3 THE BAUHAUS**:** Influence of the Deutscher Werkbund, study of Peter Behrens' *AGE Turbine Factory*, Berlin (1909), use of glass and steel, study of *Fagus Factory*, Alfeld-an-der-Leine (1911) by Walter Gropius and Adolf Meyer, Formation of the Bauhaus, Gropius' manifesto of architectural rationalism, study of Gropius' *Bauhaus Buildings, Dessau* (1926).

3.4 CONSTRUCTIVISM: Development of modern architecture in Soviet Union and Eastern Europe, Illustrated through the study of examples such as *Monument to the Third International* by Vladimir Tatin (1919).

3.5 THE IDEA OF A MODERN ARCHITECTURE: General disillusionment in Europe after World War I, Interaction of ideas through the publications of Adolf Loos, Le Corbusier, Gustav Platz, Wright, Gropius, establishing an artistic language in terms of new technology, Two predominant visions: functionalist and organic.

Module 4 The International Style 3 periods

4.1 SEARCH FOR GLOBAL STANDARDIZATION: Modernism becoming a movement - CIAM, Five points of Architecture, study of Corbusier's *Villa Savoy*, Poissy (1931) — *The International Style: Architecture since 1922* exhibition at MOMA, New York (1932).

4.2 SEARCH FOR SIMPLICITY: Less is more, study of Ludwig Mies van der Rohe's *Farnsworth House*, Plano (1951) — Minimalism, study of Philip Johnson's *Glass House*, New Canaan (1949).

Module 5 Those who did not Conform to International Style 6 periods

5.1 FUTURIST ARCHITECTURE: Filippo Maniretti's *Manifesto of Futurism* (1909), Antonio Sant'Elia's *Città Nuova* exhibition (1914).

5.2 EXPRESSIONIST ARCHITECTURE**:** Artistic movement initiated in Germany, Expressionist Architecture, Brick Expressionism, study of Erich Mendelsohn's *Einstein Tower Observatory*, Postdam (1921), and Fritz Höger's *Chile Haus*, Hamburg (1924).

5.3 ART DECO**:** Style of decorative art, inspirations were eclectic in the extreme, encompassed different facets of art, Art Deco in architecture, study of William van Allen's *Chrysler Building*, New York (1929).

5.4 DEVELOPMENT OF THE ORGANIC VISION: The Great Depression of 1929, study of Wright's *Broadacre City* (1932) and Usonian Houses, relationship between man, architecture, and nature; study of Wright's *Fallingwater,* Pennsylvania (1939).

Module 6 Triumph of the Glass Box 3 periods

World War II: An opportunity for a New Beginning – Scrutinizing and experimenting with the Box: Journey from the Friedrichstrasse Project to the Glass Box, Glass sheathed skyscrapers, study of Mies' *Lake Shore Drive*, Chicago (1951) and *Seagram Building*, New York (1958), universal open space – Overview of journey from early to modern skyscrapers.

Module 7 Shift within Modernist Ideals: Going beyond the Glass Box 9 periods

Function Follows Form: Exploration of new materials and forms.

7.1 NEW FORMALISM (FEATURISM): Use of synthetic and composite materials for sophisticated surface treatment of buildings, study of suitable examples one each from abroad and India.

7.2 NEW BRUTALISM: Minimalistic constructions, emphasizing on bare materials, natural textures and construction methods over visual embellishments, study of suitable examples one each from abroad and India.

7.3 MONOLITHICISM: Three guide visions and their variations: (a) square form, (b) circular Form, (c) radical assault on traditional geometry — Illustrating different guide visions and significant forms with

representative works of Johnson, Corbusier, Wright, Oscar Niemeyer, Minoru Yamasaki, Paul Rudolph, Pier Luigi Nervi, Felix Candela, Eero Saarinen, Eduardo Catalano, Matthew Nowici, Frie Otto, Buckminster Fuller etc.

Module 8 Modernism with a Humanist Face 3 periods

Evolution of the language of architecture during modernism, interplay between variety and unity, different aspects of functionalism — Study of representative works of Louis I Kahn, Paul Rudolph, Kenzo Tange, and others.

REFERENCE READINGS

1. A World History of Architecture, Marian Moffett, Michael Fazio and Lawrence Wodehouse, McGraw-Hill.
2. The Puzzle of Architecture, Robin Boyd, Melbourne University Press.
3. The Story of Architecture: From Antiquity to the Present, Jan Gympel, Könemann.
4. Sir Banister Fletcher's A History of Architecture. Ed. Dan Cruckshank. CBS, 1999.

AP3102 | Estimation and Specification | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

The objective of this course is to provide students with the necessary technical knowledge for preparation of Specifications and Estimating for small to medium scale projects by using numerical examples in all possible cases.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) be able to link cost with specification;
(ii) have a fair idea regarding the main methods of cost estimation;
(iii) know how to write specification; and,
(iv) gain prerequisite knowledge to prepare bid and details project report.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction to Estimation and Specification	3
2	Principles of Estimating	3
3	Approximate Estimate	4
4	Detailed Specification of Buildings	8
5	Analysis of Rates	4
6	Detailed Estimate of Buildings	4

DETAIL COURSE CONTENT

Module 1 Introduction to Estimation and Specification 3 periods

Estimation: definition, purpose, types, influencing factors, key terminologies — Specification: definition, purpose, types, principles of writing

Module 2 Principles of Estimating 3 periods

General items of work – Units of measurement – Methods.

Module 3 Approximate Estimate 4 periods

Importance, methods, numerical problems.

Module 4 Detailed Specification of Buildings 8 periods

Earthwork – Concrete work – First class brickwork – Flooring – Woodwork – Finishes: plastering, pointing, painting etc.

Module 5 Analysis of Rates 4 periods

Definition – Purpose – Influencing factors – Subheads.

Module 6 Detailed Estimate of Buildings 4 periods

Detailed quantity estimate of civil work along with:
(a) doors and Windows; (b) plumbing and sanitary works and (c) electrical works and Rate analysis.

REFERENCE READINGS

1. Estimating, Costing, Specification & Valuation in civil engineering- 29th Ed., M. Chakraborti, Chakraborti, 2006.
2. CPWD / PWD Schedule of Rates – latest editions.
3. Estimating and costing in civil engineering theory and practice, B. N. Dutta, UBSPD, 2008.
4. IS: 1200 series on methods of measurement of building and civil engineering works.
5. SP 27: 1987-R1 Handbook of method of measurement of building works.

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AP3103 | Building Services II: Mechanical Installations | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

The objective of this course is to provide students with the basic understanding of major mechanical services in buildings, their functioning, system components and their applications in building.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) have a broad understanding of the major mechanical installations;
(ii) be able to link these systems with space planning;
(iii) basic working level knowledge to understand the mechanical system design; and,
(iv) gain prerequisite knowledge for whole building design.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction to Mechanical Installations	2
2	Air Conditioning	8
3	Building Transport System	8
4	Active Fire Protection	8

DETAIL COURSE CONTENT

Module 1 Introduction to Mechanical Installations 2 periods

Role in sustainability and indoor environment — Influencing factors — Relation with space planning — System selection criteria.

Module 2 Air Conditioning 8 periods

Importance — Thermal comfort — Refrigeration cycle — Simple computations — Types: residential and non-residential — Strategies for energy efficiency — Mechanical Ventilation: purpose, types, selection criteria.

Module 3 Building Transport System 8 periods

System selection of elevator, escalator and travellator — Elevators: classification, components, design criteria — Escalators: components, safety features, design criteria — Travellators: working principle.

Module 4 Active Fire Protection 8 periods

Passive vs. active fire protection — Basis of extinguishing strategies — Various strategies: detection, communication and suppression — Ancillary services — Special requirements for different categories of buildings.

REFERENCE READINGS

1. Lifts, Elevators, Escalators and Moving Walkways/Travellators, M.Y.H. Bangash and T. Bangash, Taylor and Francis, 2007.
2. Energy Conservation Building Code (ECBC) 2017, Bureau of Energy Efficiency, 2017.
3. National Building Code of India 2016, Bureau of Indian Standards, New Delhi, 2016.
4. Mechanical and electrical systems in architecture, engineering and construction, F. Dagostino and J.B. Wujek, Prentice Hall, 2010.
5. Textbook of Water Supply and Sanitary Engineering, 3rd Ed., S.K. Hussain, Oxford & IBH Publishing Co., 2019.
6. Mechanical and electrical systems in buildings. 6th Ed., R.R. Janis and W.K. Tao, Pearson, 2019.

AP3104 | Building Services III: Architectural Acoustics | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

The objective of this course is to familiarize a student of architecture with the various aspects of architectural acoustics in buildings.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) understand basic principles of sound wave and its propagation;
(ii) outline the measures for room acoustics including choice of material and construction details; and,
(iii) design various buildings like auditorium, educational, residential buildings etc. for noise control.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Sound: Nature and Principles	4
2	Environmental Acoustics	4
3	General Building Acoustics	6
4	Acoustics, Sound Insulation and Noise Control in Residential and Educational buildings	4
5	Acoustics, Sound Insulation and Noise Control in Auditoria and Theatres	4
6	Electronic Sound Systems	2
7	Assignment on design of an auditorium, theatre, movie hall etc.	2

DETAIL COURSE CONTENT

Module 1 Sound: Nature and Principles — 4 periods

1.1 Sound Waves, Sound Levels - Power, Intensity and Pressure
1.2 Auditory Range- thresholds of hearing and pain, Decibel scale, Sound Effects on Human, Noise and its sources
1.3 Incidence of Sound- reflection, absorption and transmission
1.4 Air-borne and structure-borne sound
1.5 Direct and reverberant components of sound, reverberation time using Sabine's formula (dead and live room), echo, and resonance

Module 2 Environmental Acoustics — 4 periods

2.1 Sound in Open Air- effects of wind flow and temperature gradients, acoustic shadow
2.2 Sources of outdoor noise; Planning Against Noise- zoning, distancing and screening, green belts and landscaping, noise barriers
2.3 Outdoor Noise Regulations in India
2.4 Design principles of an Open Air Theatre

Module 3 General Building Acoustics — 6 periods

3.1 Acceptable Indoor Noise Levels.

3.2 Transmission Loss and insulation against air-borne sound.

3.3 Noise Control by absorption, resilient surface materials, applications in building construction.

3.4 Noise Control in Construction: hollow and composite wall, floating floor construction for concrete and wooden floors, suspended ceiling, acoustic treatment of skirting, windows and ventilators.

3.5 Noise problems in the tropics: In hot-dry climates, In warm-humid climates, In composite climates.

Module 4 Acoustics, Sound Insulation and Noise Control in Residential and Educational Buildings 4 periods

4.1 Sources of Noise in residential buildings: outdoor and indoor – Recommendations: site planning, internal planning, noise reduction within rooms, sound insulation.

4.2 Sources of Noise in educational buildings: outdoor and indoor – Recommendations: site planning, internal planning, noise reduction within rooms, sound insulation.

Module 5 Acoustics, Sound Insulation and Noise Control in Auditoria and Theatres 4 periods

5.1 Theatre Forms: arena stage, thrust stage, end stage, flexible stage – Total Theatre by Walter Gropius.

5.2 Directivity contours for speech, audience seating, sight line layout.

5.3 Sound paths in auditorium, Echo-control treatment.

5.4 Sources of noise in auditorium buildings: outdoor and indoor – Recommendations: Site planning, internal planning, geometry, shape and volume, sound absorption/ reflection by side & rear walls and ceilings, furnishing, audience factor.

Module 6 Electronic Sound Systems 2 periods

6.1 Basic elements of electronic sound systems.

6.2 Various loudspeaker systems – Central, distributed, seat-integrated etc.

6.3 Signal delay for loudspeaker systems.

Module 7 Assignment on design of an auditorium, theatre, movie hall etc. 2 periods

One assignment on conceptual design of auditoria/ theatres/ movie halls etc. will be undertaken by the students.

REFERENCE READINGS

1. Architectural Acoustics, M. David Egan, J. Ross Publishing.
2. Manual of Tropical Housing and Building Part 1 Climatic Design, O. H. Koenigsberger, T. G. Ingersoll, A. Mayhew, S. V. Szokolay, Orient Longman.
3. National Building Code of India 2016, Part 8 Building Services, Section 4: Acoustics, Sound Insulation and Noise Control, Bureau of Indian Standards, New Delhi, 2016.

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CE3117 | Design of Steel Structures | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

1. To equip the students with basic design methods of elementary steel structures.
2. To enable the students to understand behaviour of steel structural systems and failure modes.
3. To make them familiar with advanced steel structural systems for cost-effective planning

COURSE OUTCOME

At the end of the course, the students will be able to:

(i) Design elementary steel structural elements;
(ii) Gain knowledge of modern steel structural systems for effective use in architectural planning; and,
(iii) Visualize the behaviour and failure modes of steel structures.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

SYLLABUS

Design and drawing of elementary steel structural elements (tension member, compression member, connection, beam, column, base plate), Introduction to plate girder, bracing and Vierendeel girder.

MODULE NO.	MODULE NAME AND TOPICS	NO. OF LECTURES
1	Limit state method and working stress method for design of steel structures, various cross-sectional forms of steel structures, section-classifications.	4
2	Design of truss members, tensile and compressive strength, buckling of column.	7
3	Design of axially loaded welded and bolted connections, Introduction to eccentric connections, truss-end connections and beam-end connections.	7
4	Design of simple laterally supported beams, laterally unsupported beams	7
5	Design of column, base plate under axial load; Introduction to design of beam-column and gusseted base subjected to axial force and moment	8
6	Introduction to design of plate girder, lacing, batten, bracing, Vierendeel girder	6

RELEVANT IS CODES

1. IS 800 (2007). "Indian Standard. GENERAL CONSTRUCTION IN STEEL — CODE OF PRACTICE." Bureau of Indian Standards.
2. SP 6-1 (1964), "ISI Handbook for Structural Engineers -Part- 1 Structural Steel Sections." Bureau of Indian Standards.

SUGGESTED READINGS

1. Design of Steel Structures / N. Subramanian / Oxford Higher Education (2015).
2. Design of steel structures / S.K. Duggal / Tata McGraw Hills (2014).

AP3171 | Architectural Design Studio - IV | 8 credits

Course Duration	Contact periods	Full Marks
13 weeks	12 studio classes per week	250

COURSE OBJECTIVE

The objective of this course is to undertake design development of a moderate complex nature with the areas of emphasis being: design for special user groups with behavioural considerations, barrier free environments, and building services etc.

COURSE OUTCOME

On successful completion of this course, the students will acquire skills to design any two sub-occupancies from amongst the following: senior secondary schools and training institutions; medium level custodial institutions; business buildings like libraries, electronic data processing centres etc.; and mercantile buildings of moderate complexity.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Design Assignment 1	72 (6 weeks)
2	Time Sketch	12 (1 week)
3	Design Assignment 2	72 (6 weeks)

DETAIL COURSE CONTENT

The students are required to undertake two architectural design assignments and one time-sketch (without repetition) from amongst the following broad topics representing different sub-occupancies of the National Building Code of India 2016:

- Different types of schools from senior secondary level and above, training institutions etc.
- Diagnostic laboratories, outpatient clinics, nursing homes, etc.
- Homes for the aged and infirm, convalescent homes, quarantine centres, orphanages, facilities for special user groups including the differently abled etc.
- Library etc.
- Electronic data processing centres, computer installations, information technology (IT) parks, information technology enables services (ITeS), etc.
- Shops, stores, departmental stores, markets at suitable scale.

The minimum duration of a design assignment, other than the time sketch, shall not be less than five weeks. The final submission of drawings will generally consist of site plan, different floor and roof plans, relevant elevations/sections, necessary details, model(s) and./or views, along with a sheet(s) showing landscaping in any one or part of one assignment.

EVALUATION SCHEME

Preferably 3 reviews shall be organized for each assignment excluding the time sketch. The reviews should preferably involve the practicing Architects and allied professionals as external examiners. Marks of each review shall be communicated to the students on regular basis as a part of continuous evaluation. Indicative evaluation scheme of an assignment may be as follows:

(a) Study and design programming (10-20%),

(b) Concept and design development (30-40%),

(c) Final Submission (30-40%), and,

(d) Studio performance (10-20%).

The marks allotted to each module may be as follows:

Module 1: 100 marks | Module 2: 50 marks | Module 3: 100 marks.

However, the faculty-in-charge may change the marks allocated to different modules, if it is required to give more emphasis to one module than the other.

REFERENCE READINGS

1. National Building Code of India 2016, Bureau of Indian Standards, New Delhi, 2016.
2. Time-Saver Standards for Building Types, 3rd Ed. J de Chiara and J. Callender. McGraw-Hill.
3. Time-Saver Standards for Architectural Design Data. D. Watson, M.J. Crosbie, and J. Callender. McGraw-Hill.
4. Architects' Data, 3rd Ed. Ernst and Peter Neufert. Blackwell Science.

AP3172 | Working Drawing - I | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of the course is to make the students familiar with the various aspects of Working Drawing for building construction.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) familiar with the construction techniques for foundation, floor and roof, stairs, etc.;
(ii) able to coordinate building construction with various building services; and,
(iii) able to prepare details in Working Drawing for building construction.

COURSE EVALUATION

Continuous internal assessment of students' works will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Working Drawing of a Small Load Bearing Structure	9
2	Working Drawing of a Framed Structure	30

DETAIL COURSE CONTENT

Module 1 Working Drawing of a Small Load Bearing Building Structure 9 periods

Preparing a set of working drawings of a small load bearing structure in 1:50 scale (unless otherwise mentioned) consisting of the following:

(i) Foundation plan,
(ii) Floor plan,
(iii) Roof plan,
(iv) Elevations, and,
(v) Sectional elevations.

Module 2 Working Drawing of a Framed Building Structure 30 periods

Preparing a set of working drawings of a framed structure, ground floor plus at least upto five stories, in 1:50 scale (unless otherwise mentioned) consisting of the following:

(i) Foundation plan (including layout of tie-beam),
(ii) Beams, Columns, and slab layout with schedule,
(iii) Floor plans (with door and window schedule),
(iv) Roof plan,
(v) Elevations,
(vi) Sectional elevations, and
(vii) Appropriate construction details (including details of staircase).

REFERENCE READINGS

1. Best practices guide to residential construction: Materials, finishes, and details, S. Bliss, Wiley, 2005.
2. Building Construction Handbook, 10th ed., R. Chudley and R. Greeno, Routledge, 2014.
3. Building Construction Illustrated, F.D.K. Ching, John Wiley & Sons, Inc.
4. Complete Building Construction, Mark Miller, Rex Miller and Eugene Leger, John Wiley & Sons, Inc.

AP3173 | Estimation Practice | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 laboratory classes per week	100

COURSE OBJECTIVE

The objective of this practical course is to complement the theoretical course Estimation and Specification (AP3102) by providing hands-on experience of detailed estimation of a typical building.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) use the main methods of cost estimation;
(ii) interpret the project specification; and,
(iii) undertake detailed estimate of small to medium size buildings.

COURSE EVALUATION

Continuous internal assessment of students' works will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Estimation of a Load Bearing Structure	6
2	Estimation of a RCC-framed Structure	33

DETAIL COURSE CONTENT

Module 1 Estimation of a Load Bearing Structure 6 periods

Detailed estimate of a single room with balcony upto plinth.

Module 2 Estimation of a RCC-framed Structure 33 periods

Detailed estimate of civil work of an apartment building — Rough estimate of sanitary works and electrical installation to be preferably included.

REFERENCE READINGS

1. Estimating, costing, specification and valuation in civil engineering- 29th Ed. (2006), M. Chakraborti.
2. CPWD / PWD Schedule of Rates – latest editions.
3. Estimating and costing in civil engineering theory and practice, B. N. Dutta, UBSPD, 2008.
4. IS: 1200 series on methods of measurement of building and civil engineering works.
5. SP 27: 1987-R1 Handbook of method of measurement of building works.

SIXTH SEMESTER

AP3201 | Evolution of Architecture – IV | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the evolution of international architecture from the later days of modern architecture upto the contemporary times though the different movements, with special reference to the architecture of post-independent India and that of contemporary South Asia.

COURSE OUTCOME

On successful completion of this course, the students will have:

(i) a fair idea about the development of mainstream architecture in India since its independence till the present post-liberalized scenario amidst the enormous challenge of assimilating global architectural trends with that of the subcontinent having its root in its craft traditions and ritualistic link to heritage, and also about the alternative role that architecture can play in the social context of the developing economy;

(ii) a reasonable idea about the post-modern movement in architecture with particular reference to deconstructivism and its different contemporary trends; and,

(iii) fair knowledge about the design approach from the view point of critical regionalism with particular reference to South Asian trends.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].

(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Modern Architecture and Independent India	3
2	After the Masters: Roots and Modernism in India	6
3	Post-modern Movement	5
4	Alternatives for a Developing India	4
5	Critical Regionalism	7
6	Tradition and Deconstructivism	5
7	Indian Architecture Post- Liberalization and Globalization	6
8	Architectural Trends of the New Millennium	3

DETAIL COURSE CONTENT

Module 1 Modern Architecture and Independent India 3 periods

Nehru's allegiance to the Western industrial model, invitation to European and American Masters — Study of Corbusier's Capital Complex Buildings, Chandigarh (1956-60), and Kahn's IIM, Ahmedabad (1974).

Module 2 After the Masters: Roots and Modernism in India 6 periods

Challenge of assimilating modernism and global architectural trends with the Indian craft traditions and ritualistic link with heritage — Illustration with representative works of Indian architects such as Achyut Kanvinde, C. P. Kukreja, Hasmukh C Patel, Anant D. Raje, Raj Rewal, Joseph Allen Stein etc., followers of leading western architects of the time.

Module 3 Post-modern Movement 5 periods

Demolition of Pruitt-Igoe Social Housing: Symbolic end of modernist urban planning and the era of CIAM — Robert Venturi's *Less is Bore* — Post-modernism formally defined by Charles Jenks in the early 1970s — Study of representative works of architects such as Charles Moore, Michael Graves, Mario Botta, Renzo Piano, Richard Rogers, James Stirling etc.

Module 4 Alternatives for a Developing India 4 periods

Architecture and planning placed in the social context as active agents of change in the developing nation — APPROPRIATE TECHNOLOGIES**:** Alternate building materials and structures, vernacular building technology and aesthetics, study of Laurie Baker's *Centre for Developing Studies*, Trivandrum (1975) — SOCIAL HOUSING INTERVENTIONS**:** Incremental Housing, study of Charles Correa's *Artiste's Village*, Belapur (1986) — 'Site-and-Services' scheme, study of B V Doshi's *Aranya Township*, Indore (1988).

Module 5 Critical Regionalism 7 periods

Kenneth Frampton's approach to design, mediating between the global and the local languages of architecture, studying Aalvar Aalto's *Säynätsalo Town Hall*, Finland (1952) and Jørn Utzon's *Bagsværd Church*, Copenhagen (1976) — Study of representative works of different architects with particular reference to South Asia.

Module 6 Tradition and Deconstructivism 5 periods

Bernhard Tschumi's *Form Follows Fantasy*, influenced by Jacques Derrida — Peter Eisenman: Apparent fragmentation of building forms and geometric explorations — General reversal/ questioning of normative principles of conventional design and construction — Study of representative works of Tschumi, Frank Gehry, Rem Koolhaas, Zaha Hadid, Daniel Libeskind etc.

Module 7 Indian Architecture Post- Liberalization and Globalization 6 periods

The complexity of India's contemporary architectural scene over a crucial period marked by economic liberalization and forces of globalization – Study of Rewal's *Asiad Village*, New Delhi (1982), Correa's *Kanchenjunga Apartments*, Bombay (1983), and representative works of the following decades.

Module 8 Architectural Trends of the New Millennium 3 periods

Energy efficient design (e.g. climate based façade design, sky courts in green skyscrapers etc.) — Parametricism: Heuristic approaches based on advanced computational techniques — Tall structures as regulated by bodies such as Council on Tall Buildings and Urban Habitat etc.

REFERENCE READINGS

1. A World History of Architecture, Marian Moffett, Michael Fazio and Lawrence Wodehouse, McGraw-Hill.
2. The Story of Architecture: From Antiquity to the Present, Jan Gympel, Könemann.
3. After the Masters: Contemporary Indian Architecture, Vikram Bhatt and Peter Scriver, Mapin Publishing Ltd., 1990.
4. The Language of Postmodern Architecture, Charles Jencks, Wiley-Academy, 1977.
5. Towards a Critical Regionalism: Six points for an architecture of resistance in "Anti-Aesthetic. Essays on Postmodern Culture", Kenneth Frampton, Seattle: Bay Press, 1983.
6. Sir Banister Fletcher's A History of Architecture. Ed. Dan Cruckshank. CBS, 1999.

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AP3202 | Valuation of Real Properties | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

The objective of this course is to impart students the necessary technical knowledge for valuation of properties for various purposes such as investment, rent, lease, mortgage, tax calculation etc.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) understand various forms of valuation;
(ii) have a fair idea of annual budget allocation for sinking fund;
(iii) be able to carry out valuation using different method for various purposes; and,
(iv) know how to write valuation reports.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction	4
2	Common Concepts	4
3	Valuation of Buildings	8
4	Lease and Rent	8
5	Current Acts and Regulations	2

DETAIL COURSE CONTENT

Module 1 Introduction **4 periods**

Key terminologies – Purposes – Influencing factors.

Module 2 Common Concepts **4 periods**

Income – Value: depreciation, obsolescence, different forms – Gilt-edged securities – Annuity – Sinking fund – Year's purchase – Capitalized value.

Module 3 Valuation of Buildings **8 periods**

Methods of calculating depreciation – Methods of valuation – Valuation report.

Module 4 Lease and Rent **8 periods**

Forms of property – Concepts of lease, mortgage and easement – Rent: definition, types, fixation rule for government buildings.

Module 5 Current Acts and Regulations **2 periods**

Brief overview of salient current acts relevant to valuation of properties.

REFERENCE READINGS

1. Estimating, costing, specification and valuation in civil engineering- 29th Ed. (2006), M. Chakraborti.
2. Estimating and costing in civil engineering theory and practice, B. N. Dutta, UBSPD, 2008.
3. Valuation of Real Properties, 10th Ed., A. Rangawala, Charotar Publishing House, 2020.

AP3203 | Energy Efficient Architecture | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	2 lectures per week	50

COURSE OBJECTIVE

The objective of this course is to explain students the relationship between climate, comfort and energy efficiency. This course will enable them to implement this acquired knowledge in architectural design to create a sustainable built environment with comfortable living experience.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) be able to understand the interaction between comfort conditions, energy efficiency and architecture;
(ii) be able to design a building or plan a group of buildings in a climate sensitive manner;
(iii) have a fair idea about energy generation, reduction in energy demand and improve energy performance of a building; and,
(iv) be introduced to different energy and green rating systems.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction to Energy Efficient Architecture	4
2	The Comfort Conditions	4
3	Energy and Buildings	12
4	Rating Systems	6

DETAIL COURSE CONTENT

Module 1 Introduction to Energy Efficient Architecture **4 periods**

Sustainability and Energy Efficiency — Key concepts: User comfort, Global Climate Change, Embodied and Operational Energy, Net Zero and Net Positive Buildings etc.

Module 2 The Comfort Conditions **4 periods**

Factors affecting indoor and outdoor thermal comfort conditions — Quantification and measurement of environmental parameters — Introduction to thermal comfort indices.

Module 3 Energy and Buildings **12 periods**

Active and Passive systems and strategies — Simulation Tools: Ecotect Analysis, Design Builder, ENVI-met etc.; their advantages and limitations — Heat exchange process and steady state, Periodic heat flow — Introduction to Building Energy Management System in Intelligent Buildings — Overview of Energy Audit of buildings.

Module 4 Rating Systems **6 periods**

Energy Conservation: relevant acts, rules, codes (ECBC, NBC etc.), and bylaws — Energy rating systems — Building Rating systems.

REFERENCE READINGS

1. Man, Climate and Architecture, B. Givoni, Applied Science Publ., 1976.
2. Mark DeKay, G. Z. Brown, Sun, Wind, and Light: Architectural Design Strategies, John Wiley & Sons., 2013.

3. B. Givoni, Climate Considerations in Building and Urban Design, John Wiley & Sons, 1998.
4. Introduction to Architectural Science: The Basis of Sustainable Design, S.B. Szokolay, Architectural Press (Elsevier), 2008.
5. Manual of tropical housing and building. Climatic design, O.H. Koenigsberger, T.G. Ingersoll, A. Mayhew, S. V. Szokolay, Universities Press (India) Private Limited, Hyderabad, 1974.
6. National Building Code of India 2016, Vol. 2, Bureau of Indian Standards, New Delhi, 2016.
7. Energy Conservation Building Code, GoI.

AP3204 | Disaster Resistant Architecture | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the different types of hazards that affect built environment with special reference to earthquake, cyclone, and fire hazards.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) a fair idea about the earthquake resilience in the built environment with reference to building performance, and best practices for earthquake resistant masonry and RCC buildings;

(ii) a reasonable idea about cyclones with reference to occurrence of tropical cyclones and their effect on buildings; and,

(iii) a comprehensive idea about fire hazards with special reference to safety measures that are to be taken during the architectural design process.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].

(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction to Disaster Resistant Architecture	3
2	Fire Resistant Architecture	9
3	Earthquake Resistant Architecture	21
4	Cyclone Resistant Architecture	6

DETAIL COURSE CONTENT

Module 1 Introduction to Disaster Resistant Architecture — 3 periods

Classification of disasters: natural and man-made — Impact of disasters in world and India with special reference to built-environment —.the Disaster Mitigation Cycle.

Module 2 Fire Resistant Architecture — 9 periods

2.1 BASIC TERMINOLOGIES: Consumable material — Fire load, Fire resistance — Occupancy or use group, fire zones, overlapping fire zone — Types of construction — Components of means of egress, Escape lighting and exit signage, Travel distance, Fire door, Fire wall, Fire compartment, Refuge area, Fire tower, Fireman's lift, Roof exit — Fire suppression systems: gas based systems, water based systems.

2.2 LIFE SAFETY: General requirements of all individual occupancies — General exit requirements — Occupant load — Egress components: number of exits, arrangements of exits, capacities of means of egress, staircases & ramps — Minimum requirements for firefighting installations.

2.3 FIRE PROTECTION: Fire extinguishers, Static water storage tanks and pumps, Automatic sprinkler installation.

2.4 SPECIAL REQUIREMENTS: Additional requirements for high rise buildings, Atrium requirements.

Module 3 Earthquake Resistant Architecture — 21 periods

3.1 EARTHQUAKES - A GEOLOGICAL PERSPECTIVE: structure of the Earth — basic concepts in plate tectonics — causes of earthquakes, elastic rebound theory, faulting — distribution of global seismic zones, evolution of the Indian subcontinent, development of seismic zone map in India.

3.2 EARTHQUAKE BASICS: focus, epicentre, focal depth, epicentral and hypocentral distances — shocks, peak ground acceleration, seismic waves, period of an earthquake wave, fundamental natural period of

vibration of buildings, mode of vibration — measuring earthquake: instrument, magnitude and intensity — liquefaction.

3.3 PERFORMANCE OF BUILDINGS DURING EARTHQUAKES: Seismic effect on structures: inertia forces in structures, effect of deformation, flow of seismic inertia forces through structural components — Building configuration: overall aspect ratio in horizontal and vertical planes, re-entrant corners, torsional irregularities, staggered grid lines, vertical setback, soft and weak storey, sloped ground, hanging or floating columns, discontinuity of load transfer path, pounding, allowable levels of asymmetry — Philosophy of seismic design: Earthquake resistant buildings, ductile and brittle materials, importance of flexibility — Survival of non-engineered vernacular buildings — Learning through case studies.

3.4 Design of Earthquake Resistant Buildings: Indian seismic codes for different materials — Brick masonry buildings: out-of-plane and in-plane failure mechanisms, interlocking of courses at the junctions, horizontal bands at various levels, sizes of openings and vertical reinforcement, aspect ratio of walls, quality of mortar and brick bonding — RCC buildings: role of floor slab and infill wall, strength hierarchy between beams, columns and foundations, role of RCC beams and columns.

Module 4 Cyclone Resistant Architecture 6 periods

4.1 OCCURRENCE OF TROPICAL CYCLONES: Blowing if wind, global wind pattern — Formation of tropical cyclones — Intensity classification of cyclones — North Indian Ocean Basin — Indian wind code zones.

4.2 EFFECT OF CYCLONES ON BUILDINGS: Velocity of wind, Basic wind speed — Design wind speed, effect of classes of structures, terrain roughness and height, topography and importance of structures — Interaction between wind and building: air flow around buildings, air flow through buildings — Learning through case studies.

REFERENCE READINGS

1. Earthquake Tips. CVR Murty. IIT Kanpur, Kanpur, India and Building Materials and Technology Promotion Council, New Delhi, India.
2. Earthquake Design Concepts. CVR Murty and Andrew W Charleson. National Information Centre of Earthquake Engineering, IIT Kanpur, Kanpur, India.
3. Improving Earthquake and Cyclone Resistance of Structures: Guidelines for the Indian Subcontinent. S C Dutta and P Mukhopadhyay. TERI, New Delhi India.
4. Seismic design for architects: Outwitting the quake. Andrew Charleson. Routledge
5. National Building Code of India 2016, Bureau of Indian Standards, New Delhi, 2016.

AP3271 | Architectural Design Studio - V | 8 credits

Course Duration	Contact periods	Full Marks
13 weeks	12 studio classes per week	250

COURSE OBJECTIVE

The objective of this course is to undertake design development of a complex nature with emphasis on climate responsive sustainable architecture, barrier free environments, building services, and response to socio-cultural issues etc.

COURSE OUTCOME

On successful completion of this course, the students will acquire skills to design any one sub-occupancy from amongst the following: starred hotels of four star and above categories; institutional buildings like hospitals and sanatoria; and assembly buildings like theatrical or motion picture facilities.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Design Assignment	132 (11 weeks)
2	Time Sketch	24 (2 week)

DETAIL COURSE CONTENT

The students are required to undertake one architectural design assignments and one time-sketch (without repetition) from amongst the following broad topics representing different sub-occupancies of the National Building Code of India 2016:

- Starred hotels (four star and above category) etc.
- District level hospitals, etc.
- Auditorium, theatres, concert halls, cinema halls, multiplex, etc.

The final submission of drawings will generally consist of site plan, different floor and roof plans, relevant elevations/sections, necessary details, model(s) and./or views, along with a sheet(s) showing mechanical installations.

EVALUATION SCHEME

Preferably three reviews shall be organized for the design assignment and another one for the time sketch. The reviews preferably involve the practising architects and allied professionals as external examiners. Marks of each review shall be communicated to the students on regular basis as a part of continuous evaluation. Indicative evaluation scheme of an assignment may be as follows:

(a) Study and design programming (10-20%),
(b) Concept and design development (30-40%),
(c) Final Submission (30-40%), and,
(d) Studio performance (10-20%).

The marks allotted to each module may be as follows:
Module 1: 200 marks | Module 2: 50 marks.

However, the faculty-in-charge may change the marks allocated to different modules, if it is required to give more emphasis to one module than the other.

REFERENCE READINGS

1. National Building Code of India 2016, Bureau of Indian Standards, New Delhi, 2016.
2. Time-Saver Standards for Building Types, 3rd Ed. J de Chiara and J. Callender. McGraw-Hill.
3. Time-Saver Standards for Architectural Design Data. D. Watson, M.J. Crosbie, and J. Callender. McGraw-Hill.
4. Architects' Data, 3rd Ed. Ernst and Peter Neufert. Blackwell Science.

AP3272 | Interior Design Practice | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of this course is to equip the students with the necessary skill sets to design interior spaces based on theoretical constructs and applications.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) gain an understanding of inventory and pricing of interior design products available in the market;
(ii) understand client needs and develop design schemes for activity settings;
(iii) be able to develop appropriate design details; and,
(iv) be able to represent interior design solutions through technically complete drawings.

COURSE EVALUATION

Continuous internal assessment of students' works will be undertaken by the course instructor, who will inform the students about the weightages of evaluation for different assignments.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Market Survey and Case Study	12
2	Designing an Interior Space	27

DETAIL COURSE CONTENT

Module 1 Market Survey and Case Study 12 periods

1.1 Market survey of interior materials used for flooring, wall finishes, false ceiling, lighting, interior fixtures and furniture and interior landscaping elements.

1.2 Case study of an designed interior space to understand design themes and their implementation, through the use of appropriate materials, finishes, furnishings, and lighting, their installation and fixing details, and costing.

Module 2 Designing an Interior Space 27 periods

The design assignment may be chosen from a range of settings such as residential (bungalows, apartments, etc.), hospitality sector (tourist cottages, hotel lounge and lobby areas, retaurants, banqueting facilities, etc.), retail establishments (shopping malls, stand alone stores, etc.), healthcare facilities (clinic, hospital waiting rooms, diagnostic facilities, OPD areas, etc.), and other activity settings.

REFERENCE READINGS

1. Time Saver Standards for Interior Design and Space Planning, Joseph De Chiara et al.
2. A History of Interior Design, John Pile and Judith Gura.

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AP3273 | Working Drawing - II | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of this course is to make the students familiar with the various aspects of Working Drawing for building construction.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) familiar with the construction techniques for foundation, floor and roof, stairs, etc.;
(ii) able to coordinate building construction with various building services; and,
(iii) able to prepare details in Working Drawing for building construction.

COURSE EVALUATION

Continuous internal assessment of students' works will be undertaken by the studio instructor, who will inform the students about the weightages of evaluation for different assignments.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF PERIODS
1	Sanction Drawing of a Framed Structure	9
2	Detailed Working Drawing of Building Plumbing Services	12
3	Detailed Working Drawing of Building Electrical Services	9
4	Detailed Working Drawing of Building Mechanical Services	9

DETAIL COURSE CONTENT

Module 1 Sanction Drawing of a Framed Structure 9 periods

Preparation of Sanction Drawing of a framed structure, ground floor plus at least upto five stories:

A set of drawings for getting the permission of building construction from local authorities with specific focus on the building bylaws of that area/(s).

Module 2 Detailed Working Drawing of Building Plumbing Services 12 periods

Working drawing containing Building Services details of a framed structure, ground floor plus at least upto five stories:

(a) A set of working drawings of rooms, toilet and kitchen in 1:50 scale (unless otherwise mentioned);
(b) Site level and building level details of Water Supply and Sewerage layout of any building including the details of storm water drainage, rainwater harvesting and sewage treatment.

Module 3 Detailed Working Drawing of Building Electrical Services 12 periods

Preparation of drawings of whole or part of any building deemed appropriate by the studio supervisor(s) containing the details of the following in accordance with the local building bylaws or the National Building Code 2016:

(a) Site Level Electrical Layout containing the details of Substation/ Transformer room, Distribution box, Generator Room/ Electrical Storage for PV etc.;
(b) Building Level Electrical Layout containing the details of Main Switch, Meter box, MCB, Wiring layout, Switch board and electrical appliances.

Module 4 Detailed Working Drawing of Building Mechanical Services 12 periods

Preparation of drawings of whole or part of any building deemed appropriate by the studio supervisor(s) containing the details of the following in accordance with the local building bylaws or the NBC 2016:

(a) Lift or elevator,
(b) HVAC System,
(c) Fire safety measures.

REFERENCE READINGS

1. Best practices guide to residential construction: Materials, finishes, and details, S. Bliss, Wiley, 2005.
2. Building Construction Handbook, 10th ed., R. Chudley and R. Greeno, Routledge, 2014.
3. Building Construction Illustrated, F.D.K. Ching, John Wiley & Sons, Inc.
4. Complete Building Construction, Mark Miller, Rex Miller and Eugene Leger, John Wiley & Sons, Inc.

CE3287 | Structure Project on Analysis and Design of Buildings | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 practical classes per week	100

COURSE OBJECTIVE

1. To train the students with modern software tools for structural analysis and design.
2. To impart a comprehensive idea to the students about estimation of various load effects on structures.
3. To train the student about detailing of structural elements with ductile detailing with and without software.

COURSE OUTCOME

At the end of the course, the students will be able to:

(i) Analyse and design structural systems using contemporary software.
(ii) Produce detailing of structure with and without using contemporary software.

SYLLABUS

Estimation of load, hands-on training on structural analysis and design using contemporary software, Detailing of structural members.

MODULE NO.	MODULE NAME AND TOPICS	NO. OF PERIODS
1	Estimation of dead load, live load, wind load and earthquake load on a multi-storied building.	10
2	Computer aided analysis and design of the multi-storied building.	19
3	Detailing of structural elements of the building including ductile detailing	10

RELEVANT IS CODES

1. IS: 456 (2000), "Plain and Reinforced Concrete - Code of. Practice", BIS.
2. SP 16 (1980) "Design Aids for Reinforced Concrete to IS 456:1978", BIS.
3. IS: 875 part I, II, and III (1987) "Code of Practice for Design Loads (Other Than Earthquake) For Buildings and Structures. Part 1: Dead Loads, Part 2: Live load, Part 3: Wind load", BIS.
4. SP: 34(1987) "Handbook on Concrete Reinforcement and Detailing", BIS.
5. IS 1893-Part I (2016) "CRITERION FOR EARTHQUAKE RESISTANT. DESIGN OF STRUCTURES. Part 1 General Provisions and Buildings. (Sixth Revision)", BIS.
6. IS 13920 (2016) "Indian Standard. DUCTILE DETAILING OF REINFORCED. CONCRETE STRUCTURES", BIS.

AP3291 | Educational Tour – II | 2 credits

Field Trip	Full Marks	Credit
12 days	50	2

COURSE OBJECTIVE

Educational Tour is an integral part of architectural education in India and abroad. By undertaking the Tour in different parts of the country, the course is able to make the students, coming from different geographical and socio-economic backgrounds of India and abroad, aware of the architectural styles, materials used, and the context for the architectural developments of different buildings of historical and contemporary interest through first-hand experience.

COURSE OUTCOME

On successful completion of this course, the students will have a fair idea of translation of design philosophies to actual projects and thereby supplement the theoretical lectures to some extent.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	DURATION
1	Field work	During Field Trip
2	Tour Report	After returning from Field Trip
3	Seminar and Viva-Voce	After returning from Field Trip

DETAIL COURSE CONTENT

Module 1 Field Work

The students are required to undertake an Educational Tour in places of architectural interest of approximately 12 days duration including the days of journey, under the supervision of faculty-in-charge(s) nominated by the Departmental Faculty Committee (DFC). The Tour is to take place immediately after completion of the Fifth Semester Examinations and to be completed preferably before the starting of the Sixth Semester. The tour itinerary, as adopted by the DFC on the recommendation of the faculty-in-Charge(s), needs to be approved by the competent authority.

The students are to undertake field trips under supervision of Faculty-in-Charge(s) at places of historic and contemporary architectural interest. They are required to carefully observe, analyse and document what they study through mapping, hand-sketching, measured-drawings, photography etc. The Field Work will be assessed based on the participation, background study, quality of primary documentation etc.

The itineraries of the fieldwork may be framed by the faculty-in-charge in an otherwise suitable manner, in case of any exigency, force majeure, affecting the participants of the tour.

Module 2 Tour Report

The students are required to submit a Tour Report after returning from Field Trip. It will be assessed on the basis of exhaustiveness of the documentation, quality of the submission in terms of content, presentation, references, originality etc.

Module 3 Seminar and Viva-Voce

The students will present a Seminar based on the Tour Report that they have submitted. They will be evaluated through viva-voce after the Seminar presentation.

EVALUATION SCHEME

The marks may be allotted to each module as follows:

Module 1 (Field Work): 20-30 marks
Module 2 (Tour Report): 10-15 marks
Module 3 (Seminar and Viva-Voce): 10-15 marks.

Course Structure – 4th Year 1st Semester: Seventh Semester

Course Code	Course Title		Contact Periods/ Week			Marks	Credit
Theoretical Courses			**L**	**T**	**S**		
AP4101	Theories of Architecture		3	0	0	100	3
AP4102	Professional Practice and Entrepreneurship Development		3	0	0	100	3
AP4103	Principles of Human Settlements		3	0	0	100	3
AP4121	Architecture and Human Behaviour	Elective I	3	0	0	100	3
AP4122	Design of Everyday Things						
AP4123	Real Estate Development						
AP4124	Vernacular Architecture						
HU4101	Finance, Economics and Management for Engineers		3	0	0	100	3
	Sub total		**15**	**0**	**0**	**500**	**15**
Practical Courses							
AP4171	Architectural Design Studio VI		0	0	12	300	8
AP4172	Built-environment Monitoring Laboratory		0	0	3	100	2
	Sub total		**0**	**0**	**15**	**400**	**10**
TOTAL			**30**			**900**	**25**

Course Structure – 4th Year 2nd Semester: Eighth Semester

Course Code	Course Title	Contact Periods/ Week	Marks	Credit
Practical Courses				
AP4291	Professional Training	24 weeks duration	100	4
AP4292	Training Report	Examination only	50	2
AP4293	Training Viva-Voce	Examination only	50	2
TOTAL			**200**	**8**

Fundamental Courses (FC)	Departmental Core (DC)
Departmental Electives (DE)	Projects and Thesis (PR)
Internship (IN)	

SEVENTH SEMESTER

AP4101 | Theories of Architecture | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The course objective is to familiarize the students with an insight into the theoretical constructs and socio-cultural paradigms that surround the production of architecture.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) be able to identify potential, scope and limitation of different paths of evolution of theories of Architecture;
(ii) have a reasonable skillset to frame critical questions about architectural concepts; and,
(iii) understand Architecture as a system of knowledge.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	LECTURE PERIODS
1	About Fundamentals: What is Architecture?	7
2	Architecture as a Product of Cultural Narratives	7
3	The Deterministic Universe	7
4	The Building has 'Meaning'	9
5	Critiquing the Narrative	9

DETAIL COURSE CONTENT

Module 1 About Fundamentals: What is Architecture? 7 periods

1.1 Perspectives: Various 'definitions' of architecture — Design - An Overview — Architecture as 'a subset of Design'
1.2 UTILITY AND SIGNIFICANCE: Aesthetics - An Overview — Building vs. Architecture — The design of utility as an act of problem solving — Architecture as Art — Overview of the 'spectrum' within which various positions situate themselves.

Module 2 Architecture as a Product of Cultural Narratives 7 periods

2.1 'Paradigms' and Culture.
2.2 Histories as Cultural Narratives and Cultural Memory.
2.3 Meaning/significance as a product of culture.
2.4 Buildings as products of cultural narratives – Narratives of faith and manifestations in architectural expression.
2.5 Political narratives as generators of cultural paradigms – Buildings as anchors of narratives of power.

Module 3 The Deterministic Universe 7 periods

3.1 The Renaissance, The Enlightenment, and the Industrial Revolution : A Brave New Spirit.
3.2 Determinism: The scientific revolution and its impact on cultural narratives.
3.3 Modernism and Architecture: Modernism as a way of thinking - The building is a machine.
3.4 Modernism and Cities: Haussmann's Paris - Cities of the New World.
3.5 Utility over Significance: The death of 'meaning'.

Module 4 The Building has 'Meaning' 9 periods

4.1 The futility of utility, Early reactions.
4.2 Postmodernism as an approach, Humans seek meaning.
4.3 Semiotics and Architecture.
4.4 Historicism: The problem of tradition.
4.5 An Overview of Phenomenology.

Module 5 Critiquing the Narrative 9 periods

5.1 The Limits of Historical Knowledge – Paradigms are 'constructed' – Narratives as institutionalized products of power.
5.2 Looking beyond the Canon: Critical Regionalism – Postcolonialism – Gender.

REFERENCE READINGS

1. Heskett, J. (2002). Design: a very short introduction. Oxford University Press.
2. Parker, D. H. (1920). Principles of Aesthetics. Silver Burdett & Company.
3. Ballantine, A. (2002). Architecture: A Very Short Introduction. Oxford University Press.
4. Vale, L.J. (2008). Architecture, Power and National Identity, 2nd Ed. Routledge.
5. Loos, A. (1908). Ornament and Crime. Adolf Loos. Ariadne Press.
6. Le Corbusier. (1986). Towards a New Architecture. Dover Publications.
7. Conrads, U. (1971). Programs and Manifestos of 20th Century Architecture. MIT Press.
8. Jacobs, J. (1961). The Death and Life of Great American Cities. Vintage Books.
9. Jenks, C. (2009). What then is postmodernism? John Wiley & Sons.
10. Broadbent, G. (1977). A Plain Man's Guide to the Theory of Signs in Architecture. Architectural Design.
11. Colquhoun, A. (1983). Three Kinds of Historicism. Architectural Design
12. Norberg Schulz, C. (1976). The Phenomenon of Place. Architectural Association Quarterly.
13. Rudofsky, B. (1964). Architecture Without Architects: A Short Introduction to Non-Pedigreed Architecture. MoMA, NYC.
14. Tzonis, A. and Lefaivre, L. (1990). Why Critical Regionalism Today. Architecture and Urbanism.
15. Hosagrahar, Jyoti. (2012). Interrogating difference: Postcolonial perspectives in architecture and urbanism. In *The Sage handbook of architectural theory* , The Sage Publications, 70-84.
16. Rendell, J., Penner, B. and Borden, I. eds. (2000). Gender Space Architecture: An interdisciplinary introduction. Psychology Press.

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AP4102 | Professional Practice and Entrepreneurship Development | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to understand the issues pertaining to an architect's duties and responsibilities in the profession and towards the society in general, as well as about exploring new avenues and expanding the horizon of the profession being an entrepreneur.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) able to understand the statutory framework for the profession along with responsiblities and liabilties;
(ii) conversant with the general principles of contract and means to deal with situation arising thereof;
(iii) able to have an idea of entrepreneurship and diversification opportunities in the profession;
(iv) aware of the functioning of a consultancy firm prior to taking up internship.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	LECTURE PERIODS
1	The Architects Act and the Regulations	6
2	Professional Services, Appointment and Liabilities	9
3	Tender and Contract	6
4	Arbitration	6
5	Entrepreneurship in Profession	6
6	Office organization and Functioning	6

DETAIL COURSE CONTENT

Module 1 The Architects Act and the Regulations 6 periods

Organization of Sections of the Act, Relevant provisions of the Act and Regulations on Minimum Standards of Education and Professional Conduct.

Module 2 Professional Services, Appointment and Liabilities 9 periods

2.1 Comprehensive Architectural Services – Scope of work, schedule of services, Conditions of Engagement and Scale of Charges, Letter of Appointment, Schedule of Payment, Architectural Competition Guidelines.
2.2 Client's Role and Responsibilities, Indemnification, Termination of Agreement, Interpretation.
2.3 Architects' Professional liabilities, Professional negligence and Deficiency in Services, Disciplinary action under the Architects Act, Civil and Criminal action in the Courts of Law.

Module 3 Tender and Contract 6 periods

3.1 Tender and relevant documents; Work Order; Earnest money, Security Deposit; Duties and liabilities of Owner, Engineer and Contractor.
3.2 Contract – Essential clauses, various types for execution of construction works with their applicability, advantages and disadvantages.

Module 4 Arbitration 6 periods

Arbitration Act, Need for arbitration, Essential qualifications of Arbitrator, Procedure of settlement of dispute by Arbitration, Advantages of Arbitrations over Court decision.

Module 5 Entrepreneurship in Profession 6 periods

Fundamentals of Management Principles, Entrepreneurial opportunities in Architecture and allied fields, Intellectual Property Rights and its protection, Nature of emerging practices - BPO, KPO, Sustainability etc., Social obligations of an Architect as professional, Professional Ethics, Future Professional directions.

Module 6 Office organization and Functioning 6 periods

Office Organization and Business Management for small and medium Architectural enterprises – Types of Offices and their Structure, Roles of various personnel at different levels, Proprietorship and Partnership, Expenses and Tax liabilities – Role of Professional bodies like IIA.

REFERENCE READINGS

1. Council of Architecture. (2020). Handbook of Professional Documents 2020. COA, New Delhi.
2. Chakraborti. M. (2006). Estimating, Costing, Specification & Valuation in Civil Engineering, 29th Ed. Chakraborti, Kolkata.
3. Official website of the Council of Architecture <http://www.coa.gov.in>.

AP4103 | Principles of Human Settlements | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce the students to the various issues related to human settlements from a historical perspective leading to the present-day scenario, including the post-pandemic city, through an examination of the historical evolutions of settlements, principles of land use planning, and studies of case examples from India and world.

COURSE OUTCOME

Upon successful completion of this course, the students will be equipped to understand the issues and divers of human settlement design, and to critically analyse the works of eminent theoreticians and practitioners in the field of settlement planning.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction	9
2	Technological Challenges and Settlement Patterns	6
3	Land Use and Zoning	9
4	Physical Planning Mechanisms	9
5	Case Studies and Projects	6

DETAIL COURSE CONTENT

Module 1 Introduction — 9 periods

1.1 Concept of settlements in human history: Origin of early human settlements.
1.2 Historical determinants; Mobility, Socio-cultural Beliefs, Climate, Technology, Political situation, Geographic location contributing to development of human settlement system during different periods.
1.3 Urbanism concerning ancient cities, the Classical Cities, Medieval Town, Renaissance and Post-Renaissance cities.

Module 2 Technological Challenges and Settlement Patterns — 6 periods

2.1 Industrial Era – Impact of industrialization and technological developments in modifying settlement system.
2.2 Contributions and illustrative projects of important thinkers in Human Settlement Planning and Urbanism such as Ebenezer Howard, Patrick Geddes, Lewis Mumford, Clarence Perry, F. L. Wright, Le Corbusier, C. A. Doxiadis, Camillo Sitte, Jane Jacobs, Christopher Alexander, Paul Davidoff, BV Doshi, Charles Correa and others.
2.3 Post-Pandemic Cities-interventions to deal with pandemic situations in urban settings.

Module 3 Land Use and Zoning — 9 periods

3.1 The Von Thunen model of agricultural land use (location theory).
3.2 Land use and different types of land uses in a town or city.
3.3 Morphology of a town according to types of land uses.
3.4 Classical theories on Land use.
3.5 Density patterns in settlements.

3.6 Concept and purpose of zoning.

Module 4 Physical Planning Mechanisms 9 periods

4.1 Indian Scenario: National, State, and local level plans.

4.2 Different Plan preparation mechanisms: Perspective Plan, Structure Plan, Development Plan, Action Plan.

Module 5 Case Studies and Projects 6 periods

5.1 Illustrative case studies of old cities: London, Paris, Old Delhi, Jaipur etc.

5.2 Illustrative case studies of new towns: Singapore, Raipur, New Town Kolkata etc.

REFERENCE READINGS

1. The Urban Pattern: Arthur. B. Gallion and Simon Eisner, John Wiley & Sons, Inc.
2. The Origins of Town Planning: Leonardo Benevolo, M.I.T Press.
3. Cities of Tomorrow: An Intellectual History of Urban Planning and Design Since 1880: Peter Hall, Wiley-Blackwell.
4. Town Planning in Hot Climates: A. Rimsha, Mir Publication.
5. Town Planning Techniques: Lewis Keeble.
6. Town Planning: Rangwala, Ahmedabad.

AP4121 | Architecture and Human Behaviour | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to introduce students to the relationship between human behaviour and the physical environment.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) have a basic understanding of environment-behaviour transactions and its application in design;
(ii) be familiar with the theory and research practice of the field of architectural psychology;
(iii) be able to apply psychological research methods to improve the functioning of physical settings; and,
(iv) be more aware of the impact of physical surroundings on behaviour and be able to design guidelines for supportive environments.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction	2
2	Methods in Architecture-Behaviour Interactions	7
3	Environmental Perception	3
4	Environmental Cognition	5
5	Privacy, Territoriality and Personal Space in Architectural Settings	9
6	Crime Prevention through Design	5
7	Applications	8

DETAIL COURSE CONTENT

Module 1 Introduction **2 periods**

1.1 The Human Dimension in Architecture
1.2 The Nature and Scope of Environmental Psychology
1.3 Reciprocal relationship between the environment and human behaviour, and its translation into the design process.

Module 2 Methods in Architecture-Behaviour Interactions **7 periods**

2.1 Transactional research: examples and strategies
2.2 Spatial structure of architecture and behaviour
2.3 Behavioural based architectural programming
2.4 Post-occupancy evaluation: issues and implementation.

Module 3 Environmental Perception **3 periods**

3.1 Theories of environmental perception
3.2 Functions of environmental perception
3.3 Applications to the built environment.

Module 4 Environmental Cognition **5 periods**

4.1 Nature of Environmental Cognition

4.2 Cognitive maps
4.3 Wayfinding and Legibility in the Built Environment.

Module 5 Privacy, Territoriality and Personal Space in Architectural Settings 9 periods

5.1 Psychological functions of privacy in architectural settings
5.2 Theoretical perspectives on privacy
5.3 Defining territoriality
5.4 Functions of territoriality
5.5 Designing for territoriality
5.6 Personal Space definition
5.7 Applications in architectural planning.

Module 6 Crime Prevention through Design 5 periods

6.1 Defensible Space Theory
6.2 Case studies in Crime Prevention through Environmental Design (CPTED)

Module 7 Applications 8 periods

7.1 Women and environment: gendered spaces
7.2 Children's environments
7.3 Design for the elderly
7.4 Design of special settings (e.g., therapeutic, leisure and entertainment, etc.)

REFERENCE READINGS

1. Handbook of Environmental Psychology. R.B Bechtel & A. Churchman (Eds.) John Wiley & Sons
2. Personal Space The Behavioural Basis of Design. Prentice Hall, Inc.
3. Inquiry by Design. John Zeisel. Cambridge University Press
4. Image of the City. Kevin Lynch. MIT Press
5. Creating Defensible Space. O Newman. United States: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

AP4122 | Design of Everyday Things | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this elective course is to give the students an overview of the broad domain of Product Design.

COURSE OUTCOME

On successful completion of this course, the students will:

(i) have an understanding of the evolution of Product Design as a profession;
(ii) a basic idea about the principles of product styling;
(iii) be able to comprehend the fundamental design principles and the process of design thinking; and,
(iv) be familiar with the inter-disciplinary approach of Service Design.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	LECTURE PERIODS
1	Evolution of Product Design	7
2	The Principles of Product Styling	6
3	The Psychology of Everyday Actions	8
4	Design Thinking	6
5	Service Design	6
6	Design Tools and Techniques	6

DETAIL COURSE CONTENT

Module 1 Evolution of Product Design — 7 periods

1.1 THE BEGINNINGS OF DESIGN: classical antiquity, emerging design centres during renaissance, pattern books.
1.2 THE INDUSTRIAL AGE: industrial revolution, the great exhibitions, utilitarianism.
1.3 ORIGINS OF MODERN DESIGN: from Werkbund to Bauhaus, the Ulm School of Design, Dieter Rams.
1.4 MODERN DESIGN IN THE UNITED STATES: initiation, Raymond Loewy, Charles & Ray Eames.
1.5 FROM GOOD DESIGN TO THE ART OF DESIGN: it all began with Sullivan, the radical sixties, the first ecological approaches, the eclecticist countermovement.
1.6 DESIGN SINCE THE 1980S: design industry, design specialization.

Module 2 The Principles of Product Styling — 6 periods

2.1 PRODUCT STYLING: superficial and ephemeral.
2.2 VISUAL PERCEPTION OF PRODUCTS: process of visual perception, two stages of visual processing, primary global precedence, the primal sketch.
2.3 THE RULES OF VISUAL PERCEPTION: general rules – Gestalt rules of visual perception, the issues of visual simplicity, Berlyne's model; specific rules – perception of faces, the fabulous Fibonaccis, Bisociative attraction.
2.4 THE FOUR FACES OF ATTRACTIVENESS: meaning of being attractive, prior-knowledge attractiveness, semantic attractiveness, symbolic attractiveness, inherent attractiveness.

Module 3 The Psychology of Everyday Actions — 8 periods

3.1 HOW PEOPLE DO THINGS: the gulfs of execution, the gulfs of evaluation.

3.2 THE SEVEN STAGES OF ACTION: goal, plan, specify, perform, perceive, interpret, compare.
3.3 HUMAN THOUGHT: subconscious and conscious.
3.4 HUMAN COGNITION AND EMOTION: visceral, behavioural, reflective, three levels of processing, people as storytellers.
3.5 THE SEVEN FUNDAMENTAL DESIGN PRINCIPLES: discoverability, feedback, conceptual model, affordances, signifiers, mappings, constraints.

Module 4 Design Thinking 6 periods

4.1 SOLVING THE CORRECT PROBLEM: the five whys, root cause analysis.
4.2 THE DOUBLE-DIAMOND MODEL OF DESIGN: Research - discover, define; Design - develop, deliver.
4.3 THE HUMAN-CENTRED DESIGN PROCESS: observation, ideation, prototyping, testing, iteration, activity-centred design versus human-centred design, iterative design versus linear stages.
4.4 THE DESIGN CHALLENGE: products have multiple conflicting requirements, the stigma problem, complexity is good, it is confusion that is bad.
4.5 Standardization and Technology.

Module 5 Service Design 6 periods

5.1 Service Design as an Inter-Disciplinary Approach
5.2 Five principles of service design thinking.
5.3 How does Service Design Work?: the iterative process
5.4 Becoming AT-ONE with Your Customers

Module 6 Design Tools and Techniques 6 periods

6.1 IDEA GENERATION AND SELECTION: Mind-mapping, S.W.O.T. analysis, Six Thinking Hats.
6.2 SERVICE DESIGN: Stakeholder map, Customer journey map, Personas, Storyboards.

REFERENCE READINGS

1. Baxter, Mike. (1995). Product Design: a practical guide to systematic methods of new product development. CRC Press.
2. Bürdek, Bernhard E. (2005). History, Theory and Practice of Product Design. Birkhäuser.
3. Clatworthy, Simon. (2017). Service design thinking. 10.4337/9781785369483.00020.
4. Lidwell, W., Holden, K. and Butler, J. (2003). Universal Principles of Design: a cross-disciplinary reference. Rockport Publishers, Massachusetts.
5. Norman, Donald A. (2004). Emotional Design: why we love (or hate) everyday things. Basic Books.
6. Stickdorn, Mark and Schneider, Jacob (Ed.). (2011). This is Service Design Thinking: Basics - tools - cases. BIS Publishers, Amsterdom.

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AP4123 | Real Estate Development | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to make the students familiar with the various aspects of real estate development.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) aware of the real estate terminologies, types, development models, financing sources, acts etc.;
(ii) able to carry out financial analysis for investment in real estate; and,
(iii) able to customize development strategies for various types of projects.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction	6
2	Cash Flow	6
3	Development Budget	9
4	Investment Maths	6
5	Tax	6
6	Project	6

DETAIL COURSE CONTENT

Module 1 Introduction **6 periods**

Definition and key terminologies; Importance; Classification of properties and their characteristics; Overview (Uniqueness, development models and strategies).

Module 2 Cash Flow **6 periods**

Role in investment decisions; Effects of cash flow — Net operating income or NOI (calculation; importance, applications) — Other financial indicators: Capitalization rate, Loan-to-value ratio, Debt service coverage ratio, EBITDA.

Module 3 Development Budget **9 periods**

Budget types and Cost heads; Sources of funding (conventional, unconventional, personal savings); Govt. subsidy and schemes; Current acts.

Module 4 Investment Maths **6 periods**

Future value; Effective annual yield; Present value; Annuity; Sinking fund; Internal rates of return; Net present value; Payback period etc.

Module 5 Tax **6 periods**

Direct and indirect tax associated with RE; Tax effect of depreciation; After tax cash flow; Low-income housing tax credit; Ownership and managing entities; Future benefits of RE ownership.

Module 6 Project **6 periods**

Assignment on study of a real world situation and simulating real estate development project.

REFERENCE READINGS

1. Ariyawansa, R.D. (2009). Management of real estate principles of real estate development & management, University of Sri Jayewardenepura. Sri Lanka.
2. Brueggeman, W. B., & Fisher, J. D. (2011). Real estate finance and investments -14th Ed. New York, NY: McGraw-Hill Irwin.
3. Das, P., Sah, V., Sharma, D., Singh, V., and Galuppo, L. (2013). Real estate development process in India. Journal of Real Estate Literature, 21(2), 271-292.
4. Haight. G.J. & Singer, D. (2005). The real estate investment handbook, Wiley.
5. Income Tax Dept., GoI, www.incometaxindia.gov.in
6. Jacubus, Charles, J. (2009). Real estate principles , 11th Ed.
7. NY University Stern School of Business (n.d.). A Primer on Financial Statements.
8. Poorvu, W.J. (2003). Financial Analysis of Real Property Investments, Harvard business School.
9. Tayari, F. (n.d.) . EME 460 Geo-Resources Evaluation and Investment Analysis, Penn State Uni.

AP4124 | Vernacular Architecture | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of the course is to develop knowledge on various aspects and principles of indigenous architecture which has evolved over time in response to human needs. The course provides a detailed vocabulary in terms of classification, documentation and analysis of traditional built-spaces primarily in the context of Indian subcontinent but also touches global vernacular architecture through selected examples. The overall knowledge of vernacular architecture reinforces further study of sustainable architecture.

COURSE OUTCOME

On successful completion of this course, the students will**:**

(i) be able to develop knowledge on various aspects and principles of vernacular architecture;
(ii) have fair knowledge about approaches of study, classifications and documentations;
(iii) get exposure on global vernacular architecture;
(iv) gain knowledge on indigenous in various regions of Indian Subcontinent; and,
(v) be able to acquire knowledge on contemporary architectural practices as an adaptation of vernacular architecture.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction to Vernacular Architecture	3
2	Theories and Principles of Study	6
3	Glimpses of Vernacular Architecture in the World	6
4	Study of Vernacular Architecture in the Indian Subcontinent	21
5	Adaptation of Vernacular Architecture in Contemporary Works	3

DETAIL COURSE CONTENT

Module 1 Introduction to Vernacular Architecture 3 periods

Definitions and classifications – understanding of factors (e.g., geographical, climatic, anthropological, material of construction, cultural and technological) as determinants of shaping architectural characters – Aspects of sustainability - Explanation through examples - Process of survey and documentations.

Module 2 Theories and Principles of Study 6 periods

Introduction to the pioneers those theorized Vernacular Architecture - Various approaches for studying vernacular architecture (e.g., aesthetic, anthropological, architectural, behavioural, semiotic, spatial, structuralist etc.) – Studies on aspects like typologies, environment, symbolism, materials, technologies and services in classifying vernacular architecture.

Module 3 Glimpses of Vernacular Architecture in the World 6 periods

Glimpses of global vernacular architecture based on broad zones classified as Asia (east and central), Asia (Mediterranean), Europe, Sub-Saharan Africa, North and Latin America, and, Australia and Oceania – selective examples to explain influence of climate, material, technology and culture.

Module 4 Study of Vernacular Architecture in the Indian Subcontinent 21 periods

4.1 WESTERN AND CENTRAL INDIA: *Bhunga* houses of Kutch – *Pol* houses of Ahmadabad – *Bohra* mansions (*Havelis*) of Gujarat – *Havelis* of Rajasthan – Traditional Goan houses (Portuguese influence) – *Wada* architecture of Maharashtra – Tribal architecture of Madhya Pradesh.

4.2 NORTHERN AND NORTH-WESTERN INDIA: Vernacular architecture of western Himalayan region spread over India, Pakistan and Nepal: features of *Kath-Khuni*, *Dhajji Dewari*, *Taq* and *Koti Banal* architecture – *Dhoongas* (boat-houses) of Kashmir.

4.3 EASTERN AND NORTH-EASTERN INDIA: *Chala* and *Dalan* houses of West Bengal and Bangladesh, coastal houses of Odisha, *Ikra* houses of Assam – Sample study of vernacular settlements and houses of Bhutan and north-eastern states of India.

4.4 SOUTHERN INDIA: Houses of *Nair* & *Namboothiri*'s, house boats, *Padmanabhapuram* Palace in Kerala; *Toda* huts and Chettinad Palace in Tamil Nādu; Settlements and buildings of Pondicherry (French influence); Vernacular architecture of Sri Lanka.

Module 5 Adaptation of Vernacular Architecture in Contemporary Works 3 periods

Glimpses of contemporary works in Indian subcontinent as an adaptation of vernacular systems and concepts – sample examples.

REFERENCE READINGS

1. Blackburn, S. and Kolkman, R. (2014). Tribal Architecture in Northeast India. Brill, Boston.
2. Brunskil, R.W. (2000). Vernacular Architecture – An illustrated handbook. Faber.
3. Handa, O.C. (2018). Panorama of Indian Indigenous Architecture. Pentagon Press.
4. Jain, K. and Jain, M. (1992). Mud Architecture of the Indian Desert. Aadi Centre, Ahmedabad.
5. Kagal, K. (Ed.) (1986). VISTARA – The Architecture of India. The Festival of India.
6. Muthiah, S. et al. (2000). The Chettiar Heritage. Chettiar Heritage.
7. Oliver, P. (1997). Encyclopaedia of Vernacular Architecture of the World. Cambridge University Press.
8. Rapoport, A. (1969). House, Form and Culture. Prentice Hall Inc.
9. Pramar, V. S. (1989). Haveli: Wooden Houses and Mansions of Gujarat. Mapin Publishing Pvt. Ltd., Ahmedabad.
10. Tillotsum, G. H. R. (1989). The tradition of Indian Architecture Continuity, Controversy – Change since 1850. Oxford University Press, Delhi..
11. Weber, W. and S. Yannas, S. (Ed.) (2013). Lessons from Vernacular Architecture. Routledge.

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HU4101 | Finance, Economics and Management for Engineers | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The purpose of the course is to provide elementary and fundamental concepts of Finance, Economics and Management to the Budding Engineers. The course also aims at making the Engineering students aware of the method of ascertainment and estimation of Cost, market mechanism, economic decision making under constraints and basic management principles..

COURSE OUTCOME

After attaining the course, the students are expected to become conversant with basic costing method and principles, working of economic system and management functions.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES	NO. OF CREDITS
1	Finance	13	1
2	Economics	13	1
3	Management	13	1

DETAIL COURSE CONTENT

Module 1 Finance — 13 periods

1.1 Introduction – definition of Financial Management – objective and scope –role of Finance Manager – finance goal : profit maximization versus maximization of the value of the firm or shareholder's wealth – concept of Assets and Liabilities.
1.2 Over view of the sources of Long Term Finance –Cost of Capital –Capital Structure.
1.3 Long Term Financial Decision Making – Capital Budgeting Decisions with special emphasis on Net Present Value Method.
1.4 Concept of Cost and its classifications: Element wise, Functional, Behaviour wise, Traceability wise.
1.5 Concept of Methods of Costing for computation and estimation with the help of Cost Sheet.

Module 2 Economics — 13 periods

2.1 Basic Terminologies.
2.2 Theory of Consumer of Behaviour: Utility Analysis, Consumer equilibrium, Demand Curve.
2.3 Theory of the production and Costs: Production function, Laws of Returns, Cost-Total Cost, Average cost, Marginal Cost.
2.4 National Income: National Income Accounting –GDP, GNP, Real and Nominal Income.
2.5 Simple Income Determination Model: Simple Keynesian Model, the Multiplier.
2.6 Money and Banking: Demand for and Supply of Money, Commercial and Central Bank.
2.7 Fiscal Policy: Government Revenue, Expenditure and Financing.
2.8 Inflation and Unemployment.

Module 3 Management — 13 periods

3.1 Introduction to Management.
3.2 Need for Management.
3.3 Various types of Management styles.

3.4 Vision, Mission, Corporate Objectives, various types of Corporate Strategies including Generic Product-Market Grid strategies for CM & IM or B2C&B28.
3.5 Business level strategies and its importance.
3.6 Functional level strategies and its importance in creating value for the customer.
3.7 Communication Process.
3.8 Development of cases by students; Corporate Planning and implementation requirements.

REFERENCE READINGS

1. Financial Management by I M Pande
2. Financial Management and Policy by J.C. Van Home
3. Financial Management : Theory and Practice by Prasanna Chandra
4. Principles and Practice of Cost Accounting by Asish K. Bhattacharya
5. Cost Accounting for Business Managers by Asish K. Bhattacharya
6. Cost Accounting by Jain and Narang
7. Managers who Make a Difference – T.V. Rao
8. Management by Stoner and others, 6th edition
9. Principles of Management by Cgarles W.L. Hill and Steven Meshave
10. Principles of Management by Neeru Vasishth and Vibhuft Vasishth, 5th edition.
11. Strategic Management – Formulation, Implementation and Control by John Pearce, Richard Robinson.
12. Intermediate Micro-economics A Modern Approach, Hal R. Varian
13. Principles of Economics, Lipsey and Chrystal
14. Macroeconomics , Rudiger Dornbusch and Stanley Fischer and Richard Startz.

AP4171 | Architectural Design Studio VI | 8 credits

Course Duration	Contact periods	Full Marks
13 weeks	12 studio classes per week	300

COURSE OBJECTIVE

The objective of this course is to undertake architectural design problems integrating building/group of buildings with highest level of hierarchy considering complexity of detailed design, varied user groups, advanced structural systems, intelligent building techniques, complex building services etc. emphasizing on sustainability and energy-efficient philosophies.

COURSE OUTCOME

On successful completion of this course, the students will acquire skills to design any one sub-occupancy from amongst the following: institutional buildings like referral hospitals, penal and mental institutions, and assembly buildings providing recreational, cultural and community facilities.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	STUDIO PERIODS
1	Design Assignment	132 (11 weeks)
2	Time Sketch	24 (2 weeks)

DETAIL COURSE CONTENT

The students are required to undertake one architectural design assignment and one time-sketch (without repetition) from amongst the following broad topics representing different sub-occupancies of the National Building Code of India 2016:

- Referral hospitals etc.
- Penal and mental institutions like jails, prisons, mental hospitals, mental sanatoria, reformatories etc..
- Cultural and community facilities like art galleries, museums, cultural centres, commercial complexes etc. at higher levels of hierarchy.
- Recreational facilities like amusement parks, stadia, arenas, grand stands etc.

The studio work will involve physical surveys, data collection, and analysis. The final submission of drawings will generally consist of site plan, different floor and roof plans, relevant elevations/sections, necessary details, model(s) and./or views, along with sheet(s) showing sustainability and energy-efficient philosophies adopted.

EVALUATION SCHEME

Preferably 3 reviews shall be organized for the design assignment and another one for the time sketch. The reviews should normally involve the practicing architects and allied professionals as external examiners in the Jury. Marks of each review shall be communicated to the students on regular basis as a part of continuous evaluation. Indicative evaluation scheme of an assignment may be as follows:

(a) Study, concept and design programming (10-20%),

(b) Design development along with relevant services (30-40%),

(c) Final Submission (30-40%), and,

(d) Studio performance (10-20%).

The marks allotted to each module may be as follows:

Module 1A (Design): 200 marks | Module 1B (Services): 50 marks | Module 2 (Time Sketch): 50 marks

However, the faculty-in-charge may modify the marks allocated to different modules, if it is required to give more emphasis to one module/ sub-module than the other.

REFERENCE READINGS

1. National Building Code of India 2016,Bureau of Indian Standards, New Delhi, 2016.
2. Time-Saver Standards for Building Types, 3rd Ed. Joseph de Chiara and Michael Crosbie. McGraw-Hill.
3. Architects' Data, 3rd Ed. Ernst and Peter Neufert. Blackwell Science.

AP4172 | Built-environment Monitoring Laboratory | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of the course is to understand the individual climatic parameters of built-environment which were learnt in the corresponding theoretical courses and the combined effect of these parameters on human comfort.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) able to understand the interaction between climate, architecture and human being;
(ii) able to perform quantitative assessment of environmental parameters;
(iii) able to quantify human comfort and assess the comfort levels;
(iv) acquainted with prognostic evaluation and simulation modelling of built environment;
(v) able to propose alleviation and improvement measures for sustainable built environment.

COURSE EVALUATION

Continuous evaluation of students' works will be undertaken by the course teacher, who will inform the students about the weightages of evaluation for different assignments.

Internal Assessment: 100.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	STUDIO PERIODS
1	Assessment of Thermal Comfort	21
2	Assessment and Optimization of Energy Consumption	18

DETAIL COURSE CONTENT

Module 1 Assessment of Thermal Comfort 21 periods

The students will learn to measure the five Essential Climatic Variables for assessing the comfort in and around built environment. Half of the students will conduct any two experiments and the other half will conduct rest of the experiments listed in Modules 1.1 to 1.4, below. The last Module 1.5 will be carried out by all the students. However, the course instructor(s) may adjust the number of assigned experiments to be carried out by each student.

1.1 MEASUREMENT OF CLIMATIC VARIABLE – TEMPERATURE: Students will learn the concepts of Ambient Air Temperature and Mean Radiant Temperature and their influence on comfort sensation.

Experiments to be conducted:

(1) Assessment of temporal variation in room temperature in conditioned and naturally ventilated spaces; and,
(2) Assessment of spatio-temporal variation of temperature in outdoor condition and investigating correlation among AAT and MRT.

1.2 MEASUREMENT OF CLIMATIC VARIABLE – HUMIDITY: The students will learn to measure the presence of water vapour in air both inside and outside of an enclosed (conditioned or non-conditioned) space.

Experiment to be conducted:

(3) Assessment of spatio-temporal variation in humidity for indoor and outdoor conditions.

1.3 MEASUREMENT OF CLIMATIC VARIABLE – WIND MOVEMENT: The students will learn how to measure the changes in wind speed and direction in both indoor and outdoor environment, with introduction to seasonal and diurnal changes.

Experiment to be conducted:

(4) Assessment of wind movement pattern for indoor and outdoor conditions.

1.4 MEASUREMENT OF CLIMATIC VARIABLE – SURFACE RADIATION BUDGET: The students will learn to measure solar radiation in both indoor and outdoor environment, with introduction to seasonal and diurnal changes. The students will be inducted with the concept of Sky View Factor (SVF) and its relation with ambient air temperature, MRT and human thermal sensation – major parameters related to the urban heat island effect.

Experiment to be conducted:

(5) Assessment of incoming shortwave radiation during day and outgoing longwave radiation during night.

1.5 STUDIO ASSIGNMENT:

(6) Assessment of thermal comfort in both indoor and outdoor contexts may be carried out by the students as an implementation of the knowledge acquired through Modules 1.1 to 1.4. Climatic data collected by different experiment groups and data from other sources can be collaborated through this studio assignment with an aim to give an overview of the relationship between human thermal sensation and built environment, if seems suitable by the course instructor(s).

Module 2 Assessment and Optimization of Energy Consumption 18 periods

Students will learn to assess and optimize the energy consumption by built environment.

2.1 QUANTITATIVE ASSESSMENT OF ENERGY CONSUMPTION

Experiment to be conducted

(7) Monitoring of building energy consumption for different building operations (HVAC, Illumination etc.), and correlate the electrical consumption with season, occupancy load etc.

2.2 SIMULATION OF BUILT ENVIRONMENT

Experiment to be conducted

(8) Prediction of the influence of design decisions on human thermal comfort level (indoor and outdoor) and energy consumption of building through the use of available simulation software tools (e.g., Design Builder, E-quest, Envi-met etc.).

REFERENCE READINGS

1. Bureau of Indian Standards (2016). National building code of India 2016 Part II, New Delhi.
2. DeKay, M., & Brown, G. Z. (2013). *Sun, wind, and light: architectural design strategies*. John Wiley & Sons.
3. Givoni, B. (1976). Man, climate and architecture, Applied Science Pub.
4. Givoni, B. (1998). *Climate considerations in building and urban design*. John Wiley & Sons.
5. Koenigshberger, O. H., Ingersoll, T. G., Mayhew, A., & Szokolay, S. V. (2010). *Manual of tropical housing and building: Climatic design*. Universities Press.
6. Szokolay, S. V (2008) Introduction to architectural science: The basis of sustainable design. Elsevier/Architectural Press.

EIGHTH SEMESTER

AP4291 | Professional Training | 4 credits

Course Duration	Full Marks
24 weeks	100

COURSE OBJECTIVE

The objective of this course is to introduce a student to the professional world under the supervision of an architect.

COURSE OUTCOME

On successful completion of this course, the students will be oriented towards the process of development of conceptual ideas, presentation skills, involvement in office discussions, client meetings, development of the concepts into working drawings, tendering procedure, site supervision during execution and coordination with the agencies involved in the construction process and to facilitate the understanding of the evolution of an architectural project from design to execution.

DETAIL COURSE CONTENT

Professional Training shall be undertaken for a period of 24 weeks in the office of an architect or an organization operating in an allied field of practice or research, duly approved by the Department, under mentorship of an architect, registered with the Council of Architecture, having experience of at least 5 years. Training in a foreign country shall be done under an architect of that country and to be approved and monitored by the Department.

EVALUATION SCHEME

The Departmental Faculty Committee (DFC) will nominate one of its members to act as the Faculty-in-Charge of the Course, who shall coordinate with the students ensuring they start the Course in time, and will also coordinate with the mentoring architect, as and when required.

The DFC will also prepare a format for recording weekly work progress of the students, which the Faculty-in-Charge will provide the student. The professional training shall be supervised and evaluated through periodic assessment by the mentoring architect against the following five assessment criteria:

Assessment Criteria	Marks
(1) Regularity and general conduct	20
(2) Creativity and originality	20
(3) Ability to work independently and follow directions	20
(4) Ability to work in teams	20
(5) Quality of work	20

While evaluating the students, the mentoring architect will award marks in each of the assessment criteria, stated above, keeping in mind the six grade scale as under:

Grade	Marks (%)
A+	90-100%
A	80-89%
B	70-79%
C	60-69%
P	50-59%
F	Less than 50%

AP4292 | Training Report | 2 credits

Examination	Full Marks
Only	50

COURSE OBJECTIVE

The objective of this course is to prepare the students with the necessary skills to document the professional jobs undertaken during Professional Training.

DETAIL COURSE CONTENT

Faculty-in-Charge of the Course AP4291 will also act as the Faculty-in-Charge of this Course. Each student is required to prepare a Training Report depicting various aspects of the training undertaken every week during the course Professional Training (AP4291) in a format received from the Faculty-in-Charge.

EVALUATION SCHEME

Evaluation of this examination shall be undertaken by a Board of Examination comprising three examiners, out of whom one shall be the Faculty-in-Charge for Professional Training, and the other two will be nominated by the DFC from amongst its members. The Faculty-in-Charge will chair the Board.

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AP4293 | Training Viva-Voce | 2 credits

Examination	Full Marks
Only	50

COURSE OBJECTIVE

The objective of this course is to prepare the student for oral presentation of the jobs undertaken during professional training, explaining roles, responsibilities and challenges.

DETAIL COURSE CONTENT

Each student is required to make a presentation of the various aspects of Professional Training that he/ she has undertaken in front of a Board of Examination.

EVALUATION SCHEME

The Board of Examination will be same as was constituted for AP4292.

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Course Structure – 5th Year 1st Semester: Ninth Semester

Course Code	Course Title		Contact Periods/ Week			Marks	Credit
Theoretical Courses			**L**	**T**	**S**		
AP5101	Housing		3	0	0	100	3
AP5102	Urban Design and Architectural Conservation		4	0	0	100	4
AP5121	Construction Management	Elective II (Departmental) OR Open Elective	3	0	0	100	3
AP5122	Sustainable Architecture						
AP5123	Transportation Planning and Logistics						
	Sub total		**10**	**0**	**0**	**300**	**10**
Practical Courses							
AP5171	Architectural Design Project		0	0	12	300	8
AP5172	Architectural Thesis Programming		0	0	3	100	2
AP5173	Minor Research Project		0	0	3	100	2
AP5191	Comprehensive Viva-Voce		Examination Only			100	2
	Sub total		**0**	**0**	**18**	**600**	**14**
TOTAL			**28**			**900**	**24**

Course Structure – 5th Year 2nd Semester: Tenth Semester

Course Code	Course Title	Contact Periods/ Week			Marks	Credit
Practical Courses		**L**	**T**	**S**		
AP5271	Architectural Thesis I	0	0	16	450	12
AP5291	Architectural Thesis II	Examination only			300	8
AP5292	Architectural Thesis Viva-Voce	Examination only			150	4
TOTAL					**900**	**24**

Departmental Core (DC) | Departmental Electives (DE)
Projects and Thesis (PR) | Comprehensive Viva-Voce (CV)

NINTH SEMESTER

AP5101 | Housing | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to enable the students to understand the concepts, processes, dynamics, determinants, planning and design parameters, and policies in housing.

COURSE OUTCOME

On successful completion of this course, the students will develop:

(i) awareness about the difference between house and housing, housing as a process and public domain of housing;
(ii) awareness about factors/parameters influencing the process and outcome of housing; and,
(iii) understanding about informal settlements, housing policies and institutions in developing countries.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Housing: Concepts and Overview	6
2	Housing Determinants – I	9
3	Housing Determinants – II	5
4	Planning and Design Parameters	7
5	Urban Housing – Case Studies	6
6	Housing Policies and Institutions	6

DETAIL COURSE CONTENT

Module 1 Housing Concepts and Overview **6 periods**

House, housing and human settlements – Housing and its importance in Architecture – Housing and its relationship with neighbourhood and city – Global and national housing scenario – Housing demand in India.

Module 2 Housing Determinants – I **9 periods**

Housing typologies – Density factors – Housing norms and standards – Slums and informal settlements – Economic and social imperatives of housing.

Module 3 Housing Determinants – II **5 periods**

Land and infrastructure considerations – Sustainable housing principles – Elements of Housing costs and cost sensitivity – Low cost and alternative technologies and materials – Building Centre movement..

Module 4 Planning and Design Parameters **7 periods**

Housing design approaches – Housing layout, road and other services in housing – Redevelopment and urban renewal in housing sector – Rural housing.

Module 5 Urban Housing – Case Studies **6 periods**

Public Private Partnerships – Cooperative housing – Gated communities/condominiums – Slum Improvement Models.

Module 6 Housing Policies and Institutions 6 periods

National Housing Policy –Organizations in housing sector – Finance and management of housing – Disaster and housing – Rental housing.

REFERENCE READINGS

1. Golland, A. and Blake, R. (2004). Housing development: theory, process and practice. Routledge.
2. Hamish Main, and Stephen Wyn Williams (Ed.) (1994). Environment and Housing in Third World Cities.
3. Jain, A.K. (2009). Urban Housing & Slums. Readworthy Publications.
4. Mumford, L. (1972). The City in History: Its Origins, Its Transformations, and Its Prospects.
5. Robert M. B. (1997). Housing Finance in Developing Countries.
6. Turner John F.C. (1976). Housing by People: Towards Autonomy in Built Environments. Patheon Books.

AP5102 | Urban Design and Architectural Conservation | 4 credits

Course Duration	Contact periods	Full Marks
13 weeks	4 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to enable a student to understand the basic elements and theories of urban design and architectural conservation, and the principles and techniques of different levels of interventions in cities.

COURSE OUTCOME

On successful completion of this course, the students will have**:**

(i) developed an awareness of the principles and methods of urban design and architectural conservation;
(ii) developed an understanding of the multi-disciplinary and cross-disciplinary aspects of urban design and conservation;
(iii) acquired a visual and verbal design vocabulary which allows a more articulate description and discussion of design issues;
(iv) acquired conceptual tools necessary to assess design proposals, and/or consider the implications of design decisions, and to conduct urban design surveys for evaluating urban design projects; and,
(v) acquired understanding about the scales and principles of conservation interventions for individual buildings and historic precincts.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction to Urban Design	2
2	Brief History of Contemporary World Urbanism (20th and 21st c.)	9
3	Urban Design Vocabulary	3
4	Urban Design Theories	10
5	Urban Design Tools and Techniques	1
6	Case Studies in Urban Design	2
7	Concepts and Theories of Conservation	4
8	Conservation Charters	4
9	Conservation Interventions	4
10	Conservation of Traditional Materials	2
11	Conservation of Individual Buildings	4
12	Conservation of Historic Precincts	4
13	Legal Instruments and Incentives for Conservation	3

DETAIL COURSE CONTENT

Module 1 Introduction to Urban Design — 2 periods

1.1 Emergence of urban design as a discipline: Definitions and interrelationships with architecture, planning and other disciplines-scope and objectives of urban design as a discipline and profession.
1.2 Components of a City: Urban solids and voids, streets, squares, public spaces.

Module 2 Brief History of Contemporary World Urbanism (20th and 21st c.) — 9 periods

2.1 Modern Urban Design and Modern Cities

2.2 Post Modern Design
2.3 Sustainable Urban Design
2.4 Landscape Urbanism
2.5 Cities of the Future: AI and Smart Cities

Module 3 Urban Design Vocabulary 3 periods

Urban form, spaces, structure, pattern, fabric, texture, grain, etc.

Module 4 Urban Design Theories 10 periods

4.1 MORPHOLOGICAL APPROACH TO URBAN DESIGN: Figure Ground, Linkage and Place – Theories of Urban Design with reference to Roger Trancik – Urban solids and Voids – Fumihiko Maki's classification of urban space organization – Importance of public spaces, Placemaking.
4.2 PERCEPTUAL APPROACH TO URBAN DESIGN: Imageability - Elements of the City with reference to Kevin Lynch.
4.3 SOCIO-CULTURAL AND BEHAVIOURAL ISSUES IN URBAN DESIGN: Territoriality, Safety and Defensible Space, Manifest and Latent functions of Urban spatial elements with reference to Jane Jacobs, Oscar Newman, Edward Hall, Amos Rapoport, others.

Module 5 Urban Design Tools and Techniques 1 periods

Development controls—FAR, densities and building bye laws.

Module 6 Case Studies in Urban Design 2 periods

Illustrative case studies.

Module 7 Concepts and Theories of Conservation 4 periods

7.1 Definitions of historic buildings and study parameters.
7.2 Values and Ethics.

Module 8 Conservation Charters 4 periods

8.1 Charters and their relevance, Roles of international institutions like UNESCO, ICOMOS etc.
8.2 Athens Charter, Venice Charter, World Heritage Convention and Outstanding Universal Value.
8.3 Burra Charter, Florence Charter and Nara Document of Authenticity.

Module 9 Conservation Interventions 4 periods

9.1 Scale and intensity of interventions, influencing factors
9.2 Preservation, Restoration, Adaptive Reuse, Infill Design
9.3 European and Indian conservation examples and principles.

Module 10 Conservation of Traditional Materials 2 periods

10.1 Characteristics and conservation of traditional building materials, adobe, brick, wood, stone, metal, plastering, etc.
10.2 Conservation chemistry.

Module 11 Conservation of Individual Buildings 4 periods

11.1 Conservation values and study parameters.
11.2 Damage assessment and investigations.
11.3 Conservation and restoration techniques.

Module 12 Conservation of Historic Precincts 4 periods

12.1 Historic urban landscape, Tangible, and intangible heritage.
12.2 Integrated approach of conservation and development.
12.3 Cultural, environmental, and built heritage.

Module 13 Legal Instruments and Incentives for Conservation 3 periods

13.1 AMASAR Act, prohibited and regulated zones
13.2 Grading of heritage structures
13.3 Incentives for conservation

13.4 Role of various institutions like INTACH etc.

REFERENCE READINGS

1. Bucher, Ward. Dictionary of Building Preservation. John Wiley and Sons.
2. Correa, Charles. The New Landscape.
3. Fieldon, Bernard M. Conservation of Historic Buildings. Butterworth-Heinmann Ltd.
4. Fieldon, Bernard M. Guidelines For Conservation: A Technical Manual. INTACH.
5. Fitch, James Marston. Historic Preservation: Curatorial Management of the Built World. University of Virginia Press.
6. Jacobs, Jane. The Death and Life of Great American Cities. John Wiley and Sons.
7. Lynch, Kevin. The Image of the City.
8. Price, Nicholas. Historic and Philosophical Issues in the Conservation of Cultural Heritage. Getty Publications.
9. Raburn, Stanley. Building Evaluation for Adaptive Reuse and Preservation.
10. Rob Krier: Elements of Architecture.
11. Stubbs, John. Time honoured: A Global View of Architectural Conservation: Parameters, Theory and Evaluation of an Ethos. John Wiley and Sons.
12. Urban Design Since 1945: A Global Perspective.
13. Whitzman, G. R., and Whitzman, C. Safe Cities: guidelines for planning, design and management.
14. Young, Robert. Historic Preservation Technology: A primer. John Wiley and Sons.

AP5121 | Construction Management | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to make the students familiar with the various aspects of construction projects and managing the same.

COURSE OUTCOME

On successful completion of this course, the students will be:

(i) familiar with the traits of construction projects, it lifecycle phases and related managerial activities
(ii) able to plan and manage the schedule, cost and resources; and,
(iii) able to handle basic risk and safety issues encountered in construction projects.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction	3
2	Overview of the Construction Industry	3
3	Project Delivery Systems	3
4	Estimation and Budgeting	6
5	Project Planning and Scheduling	9
6	Project Optimization and Cost Control	9
7	Risk Management	3
8	Safety Management	3

DETAIL COURSE CONTENT

Module 1 Introduction — 3 periods

Overview of a project; Uniqueness of construction project; Project lifecycle- phases and sub-phases; Importance of construction management; Role of a project manager.

Module 2 Overview of the Construction Industry — 3 periods

Scales of a project; Sectors of construction industry; Key players and their relations; Common forms of organisations; Majors success factors.

Module 3 Project Delivery Systems — 3 periods

Owner provided, Traditional DBB, ACM, CMAR, DB and its variations, PPP, IPD.

Module 4 Estimation and Budgeting — 6 periods

Definition and difference, Cost heads, Components of construction cost, Adjustment factors; Design estimates and Bid estimates.

Module 5 Project Planning and Scheduling — 9 periods

GNATT chart, CPM, PERT, Other methods.

Module 6 Project Optimization and Cost Control — 9 periods

6.1 Optimization: Crashing, scheduling with resource constraints

6.2 Cost control: Importance and objectives; Earned value management; forecasting; To complete performance index (TCPI), Network based cost control.

Module 7 Risk Management **3 periods**

7.1 Risk and issue; Why projects are risky; Common risks in construction

7.2 Steps of risk management: identification, assessment, response, monitoring.

Module 8 Safety Management **3 periods**

8.1 Terminologies; impacts of accidents; Causes of accident; Common hazards.

8.2 System components (policy, budget, organisation, training, planning etc).

REFERENCE READINGS

1. Jha, K.N. (2015). Construction project management: Theory and practice, 2nd Ed., Pearson.
2. Kanda, A. (2011). Project management: A life cycle approach. PHI Learning Pvt. Ltd..
3. Mubarak, S.A. (2015). Construction Project Scheduling and Control, 3rd Ed. Wiley.
4. PMI: Project Management Institute (2017). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – 6th ed., Newtown Square: PMI.
5. Wiest J. D. & Levy F.K. (2008). A management guide to PERT/ CPM with GERT/PDM/ DCPM and other networks, 2nd Ed., New Delhi: Prentice Hall of India.
6. Relevant NPTEL lectures..

AP5122 | Sustainable Architecture | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to expose the students to an advanced level of sustainability concept based on their prior knowledge of climatology, energy efficient architecture and building services.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) understand various aspects of sustainability;
(ii) make architectural design schemes with material specifications addressing sustainability in a holistic way; and,
(iii) self-train themselves to obtain professional certifications.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction to Sustainable Architecture	6
2	Challenge of Sustainable Development	6
3	Strategies for Sustainability	9
4	Materials and Methods of Construction	9
5	Technical Standards and Certification Systems	9

DETAIL COURSE CONTENT

Module 1 Introduction to Sustainable Architecture — 6 periods

1.1 Introduction: Definition of sustainable architecture, Need, scope and study of sustainable architecture, Natural resources & their interrelationships.
1.2 Historical Perspective: Natural & Physiological factors influencing human civilizations & Settlements.

Module 2 Challenge of Sustainable Development — 6 periods

2.1 Introduction to sustainability, its historical precedence global and local relevance - its correlation to population growth & consumption patterns.
2.2 Human Impact on Earth sustainability: Impact of human civilization on the earth's major ecosystem forests, oceans, & atmosphere.

Module 3 Strategies for Sustainability — 9 periods

3.1 Principles of conservation & efficiency as applied to space, energy and material resources; Global treaties & action plans; sustainable role models such as eco-villages; environmental education.
3.2 Sustainability applications to Architecture and Planning: Sustainable Architecture and Planning. Preserving and improving the human settlement in harmony with nature. Conservation of natural resource for improving the quality of life on earth and attempting to ensure its continuity for the future of humanity. Eco cities, eco-communities and eco buildings. Designing settlements and other man-made eco-systems. Ecological and environmental cities for sustainable future.

Module 4 Materials and Methods of Construction — 9 periods

4.1 Use of sustainable materials in interiors, Green materials and construction technology: Insulation, paint, wiring; Smart building systems.

4.2 Sustainable design Principals: Principles and strategies - site design, energy management, renewable energy, Sustainable material selection, water management, indoor air quality and alternative Energy.

Module 5 Technical Standards and Certification Systems 9 periods

5.1 Energy Simulation: energy calculation using any suitable simulation software or manual methods.

5.2 Certification systems: GRIHA, ECBC, Eco-Niwas Samhita etc.

REFERENCE READINGS

1. Abbasi, Shahid A. et al. (2004). Renewable Energy Sources and Their Environmental Impact, PHI Learning Pvt. Ltd.
2. Givoni, B. (1994). Passive and Low Energy Cooling of Buildings. New York : Van Nostrand Reinhold.
3. Hawkes D and Wayne Forster (2004). Energy efficient buildings: architecture, engineering and environment, W.W. Norton & Company, 2002.
4. Keith, M. J. (1996). Energy Management and Operating Costs in Buildings. London: E & FN Spon.
5. Krishnan, A., and Others. (2001). Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings. New Delhi : TAT A McGraw-Hill.
6. O'Callaghan, Paul, W. (1980). Buildings for Energy Conservation. London: Pergamon Press.
7. Ursulla, E. (2003). Solar technologies for Buildings.
8. Energy-efficient Buildings in India, The Energy and Resources Institute (TERI), 2001.
9. Energy Conservation Building Code Manual, GoI.
10. GRIHA Manuals, The Energy and Resources Institute (TERI), 2011.
11. Indian Energy Conservation Act 2001, GoI.

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AP5123 | Transportation Planning and Logistics | 3 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 lectures per week	100

COURSE OBJECTIVE

The objective of this course is to make the students familiar with the various aspects of transportation planning and logistics.

COURSE OUTCOME

On successful completion of this course, the students will be able to:

(i) understand basic principles of transportation planning and logistics;
(ii) understand the public passenger transportation systems; and,
(iii) design road network and road stretches including pedestrian, bicycle and other facilities.

COURSE EVALUATION

(a) Internal Assessment: 50% [Mid-Semester Examination - 30%; Teacher's Assessment: 20%, having the components class tests, quizzes, assignments, viva-voce, presentations etc. as per teachers' discretion].
(b) End-Semester Examination: 50%.

MODULAR DIVISION OF THE SYLLABUS

MODULE NO.	MODULE NAME	NO. OF LECTURES
1	Introduction	3
2	Fundamentals of Traffic Engineering	9
3	Road Network Planning	9
4	Public Transport Systems	6
5	Planning for Pedestrian and Bicycle Facilities	6
6	Logistics and Parking	6

DETAIL COURSE CONTENT

Module 1 Introduction **3 periods**

1.1 Transportation planning – definition, scope, objective.
1.2 Historical background.
1.3 Steps in typical transportation planning exercise.
1.4 Levels in transportation planning.

Module 2 Fundamentals of Traffic Engineering **9 periods**

2.1 Stream variables, fundamental equation of traffic flow.
2.2 Traffic flow: Uniform stream and real world scenario.
2.3 Shock waves in traffic stream.
2.4 Queuing models – deterministic approach.

Module 3 Road Network Planning **9 periods**

3.1 Road network development – An overview.
3.2 Road classification.
3.3 Fundamentals of geometric design.

Module 4 Public Transport Systems **6 periods**

4.1 Definition and typology of public transport systems.
4.2 Level of Service.
4.3 Operational characteristics.

Module 5 Planning for Pedestrian and Bicycle Facilities **6 periods**

5.1 Need and scope of planning.
5.2 Level of Service.
5.3 Planning issues.

Module 6 Logistics and Parking **6 periods**

6.1 Overview of planning of transport terminals and logistics.
6.2 Planning of parking facilities.

REFERENCE READINGS

1. Traffic Engineering and Transport Planning / L. R. Kadiyali / Khanna Publishers.
2. Traffic Engineering and Planning / C. S. Papacostas & P. D. Prevedouros / Pearson.
3. Transportation Engineering: An Introduction / C. Jotin Khisty & B. Kent Lall / PHI.
4. Highway Engineering / S. K. Khanna & C. E. G. Justo/ Nem Chand & Bros.
5. Airport Engineering / Rangwala / Charotar Publishing House.

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AP5171 | Architectural Design Project | 8 credits

Course Duration	Contact periods	Full Marks
13 weeks	12 studio classes per week	300

COURSE OBJECTIVE

The first objective of this course is to undertake architectural design problems with emphasis on integrating the building and group of buildings with uses at varied levels of hierarchy within the community, and surrounding context with special emphasis on socio-economic considerations, varied user groups etc. The second objective is to prepare the students with the necessary skills to prepare an architectural project report.

COURSE OUTCOME

On successful completion of this course, the students will acquire skills to design any one of the sub-occupancies from amongst the following: housing projects, institute level educational facilities and assembly buildings acting as passenger terminals; and also to be familiar with the technique of writing architectural project reports.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	STUDIO PERIODS
1	Design Project	132 (11 weeks)
2	Project Report	24 (2 weeks)

DETAIL COURSE CONTENT

The students are required to undertake a design project (without repetition) from amongst the following broad topics representing different sub-occupancies of the National Building Code of India 2016:

- Large housing projects for various socio-economic groups of society like apartment houses (HIG/ MIG/ LIG), mansions, and chawls (Slum Renewal/ Site & Services Scheme etc.)
- Institute level educational facilities like university campuses etc.
- Terminal transport facilities like airports, docks, underground and elevated mass rapid transit system etc.

The Design Project shall include solutions for structural systems, sewage treatment system, water management system, solid waste management system, power supply, communication system, fire alarm systems, energy efficiency, etc. The final submission will consist of a Project Report along with the architectural drawings, model(s) and./or views.

EVALUATION SCHEME

Preferably 4 reviews shall be organized generally involving practicing architects and allied professionals as external examiners in the Jury. Marks of each review shall be communicated to the students on regular basis as a part of continuous evaluation. Indicative evaluation scheme of the assignment may be as follows:

(a) Study and design programming (10-20%),

(b) Concept and initial design development (15-25%),

(c) Integrating design development with services (20-30%),

(d) Final Submission (20-30%), and,

(e) Studio performance (10-20%).

The marks allotted to each module may be as follows:

Module 1A (Design): 200 marks | Module 1B (Services): 50 marks | Module 2 (Project Report): 50 marks

However, the faculty-in-charge may modify the marks allocated to different modules, if it is required to give more emphasis to one module/ sub-module than the other.

REFERENCE READINGS

1. National Building Code of India 2016,Bureau of Indian Standards, New Delhi, 2016.
2. Time-Saver Standards for Building Types, 3rd Ed. Joseph de Chiara and Michael Crosbie. McGraw-Hill.
3. Architects' Data, 3rd Ed. Ernst and Peter Neufert. Blackwell Science.

AP5172 | Architectural Thesis Programming | 2 credits

Course Duration	Contact periods	Full Marks	Prerequisite
13 weeks	3 studio classes per week	100	Passing AP4291, AP4292, AP4293

COURSE OBJECTIVE

Architectural Thesis is culmination of undergraduate studies and hence the objective of undertaking the Thesis is to display the capability of a student to conceive/formulate an individual architectural design project and provide solution, aptly demonstrated through supporting research. This is to be undertaken and evaluated over four courses, one in the Ninth Semester, viz. AP5172 – Architectural Thesis Programming; and the other three in the Tenth Semester, viz. AP5271 – Architectural Thesis I, AP5291 – Architectural Thesis II, and AP5292 – Architectural Thesis Viva-Voce.

COURSE OUTCOME

On successful completion of this course, a student will be able to finalize the thesis title, formulate the objective and methodology of the thesis, and complete studies related to pertinent building typology(s) and relevant standards and codes.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	STUDIO PERIODS	MARKS ALLOTTED
1	Topic Selection	1 week	10
2	Objective and Methodology	3-4 weeks	30
3	Study 1 and Design Programming	8-9 weeks	60

DETAIL COURSE CONTENT

Each student is required to work under the supervision of a Thesis Supervisor as decided by the DFC, well before the commencement of the Ninth Semester. Work undertaken in each module is to be presented through a submission and each student needs to defend his/her work during the corresponding Interim Review.

Module 1 Topic Selection – Interim Review 1 — 1 week

Within one week of the beginning of the Ninth Semester, a student is required to present the topic of his/her proposed Thesis work through a slide show presentation program, to be reviewed by a Board of Examination. A draft tittle of the Thesis needs to be presented that must be finalized, latest during Interim Review 3.

Module 2 Objective and Methodology – Interim Review 2 — 3-4 weeks

Each student is required to finalize the objective(s) and methodology(s) of the proposed Thesis and present the same through a slide show presentation program, to be reviewed by a Board of Examination, within 3-4 weeks after Interim Review 1. The submission should include among others:

(a) the Context and draft Concept of the Thesis,
(b) the draft Brief of the Thesis,
(c) the Objective(s) of the Thesis and the Methodology(s) to be undertaken.

Module 3 Study 1 and Design Programming – Interim Review 3 — 8-9 weeks

Each student is required to undertake detailed study of the building typology(s) pertinent to his/her proposed Thesis through secondary case studies, studies of relevant standards, codes and bye-laws, and present the same through a slide show presentation program, to be reviewed by a Board of Examination, within 8-9 contact weeks after Interim Review 2. Here, undertaking primary case studies and site study are optional. The submission, in the form of a Report, should include among others:

(a) Finalised Topic of the Thesis,
(b) The Context and the Concept of the Thesis,
(c) Finalized Brief of the Thesis,
(d) Space programming achieved through studies,
(e) Design Guidelines inferred through studies.

EVALUATION SCHEME

DFC is to nominate one of its members to act as the Thesis Coordinator for each Final Year students' batch, well before the commencement of the Ninth Semester. The Thesis Coordinator shall not supervise any student of that batch.

Evaluation of the Course is a continuous process and consist of the three Interim Reviews.

The Board of Examination during each Interim Review for each student shall comprise the teachers present during that Review, the quorum being the Thesis Coordinator and the respective Faculty Supervisor. The Thesis Coordinator will chair the Board. Marks awarded by each member of the Board of Examination shall be of equal weightage, and the average marks shall be awarded.

A break-up of the full marks to be awarded against different parameters during each Interim Review will be prepared by the DFC.

AP5173 | Minor Research Project | 2 credits

Course Duration	Contact periods	Full Marks
13 weeks	3 studio classes per week	100

COURSE OBJECTIVE

The objective of this course is to give some exposure to the final year students on how to conduct the small, time-bound, guided research projects.

COURSE OUTCOME

Upon successful completion of this course, the students will be equipped with the theoretical and methodological tools for taking up independent research.

DETAIL COURSE CONTENT

The DFC will nominate one of its members to act as the Coordinator of this Course.

Proposals of research topics may come from the teachers of the Department or students. The teachers may offer courses individually or in collaboration with other member(s).

The course can be offered in several formats such as individual or group work, with or without fieldwork. Proposals may also involve collaboration with other reputed academic/ research Institutions and/or with industry.

The process of allocating research topics to student(s) is to be completed within two weeks from the commencement of the Ninth Semester.

EVALUATION SCHEME

The evaluation for different proposed research works will be undertaken as per the scheme proposed in the Research Proposal. Ordinarily, this may include two interim reviews and one final review, or as suggested by the course instructor(s).

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AP5191 | Comprehensive Viva-Voce | 2 credits

Examination	Full Marks
Only	100

COURSE OBJECTIVE

The objective of the course is to assess the breadth and depth of overall domain knowledge acquired from the beginning of the Bachelor of Architecture Programme.

COURSE OUTCOME

Preparing for this Course will give the students an opportunity to revisit and recapitulate all the courses that they undertook since their admission to the Programme including that in Ninth Semester.

DETAIL COURSE CONTENT

The viva-voce will take place at the end of Ninth Semester. The students will appear before a Board of Examination comprising all the members of the DFC, and one from the Department of Civil Engineering.

EVALUATION SCHEME

The DFC will nominate one of its members to act as the Coordinator of this Course. Marks awarded by each member of the Board of Examination shall be of equal weightage, and the average marks shall be awarded.

TENTH SEMESTER

AP5271 | Architectural Thesis I | 12 credits

Course Duration	Contact periods	Full Marks
13 weeks	16 studio classes per week	450

COURSE OBJECTIVE

The objective of this course is to develop upon the work initiated in the Ninth Semester during undertaking the course AP5172 – Architectural Thesis Programming, and to complete the architectural design of the chosen typology(s).

COURSE OUTCOME

On successful completion of this course, a student will be able to prepare presentation drawings, necessary detailed drawings, physical models, report etc. of an architectural problem of the scale and volume of an Architectural Thesis.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	STUDIO PERIODS	MARKS ALLOTTED
1	Study 2 and Design Development 1	4-5 weeks	100
2	Design Development 2	4-5 weeks	150
3	Design Development 3	4-5 weeks	200

DETAIL COURSE CONTENT

Evaluation of the Course is a continuous process and consist of the three Interim Reviews.

Module 1 Study 2 and Design Development 1 – Interim Review 1 4 - 5 weeks

Each student is required to prepare a submission as per the following requirements, in continuation of Module 3 of AP5172, viz. *Study 1 and Design Programming*:

(a) Finalizing the space programming with the aid of Primary Case studies;
(b) Site Analysis including Regional Setting, Access, Orientation, Topography, Climate etc.;
(c) Finalizing site-level and building-level design guidelines inferred through studies;
(d) Zoning; and,
(e) Design Scheme in at least 1:200 scale.

Finalised Topic of the Thesis, the Context and the Concept of the Thesis, and finalized Brief of the Thesis, presented during Module 3 of AP5172, are required to be shown at the beginning, as External Examiners will be reviewing the work for the first time.

Module 2 Design Development 2 – Interim Review 2 4 - 5 weeks

Each student is required to prepare a submission as per the following requirements:

(a) Site Plan in an appropriate scale;
(b) Plan(s), elevation(s) and section(s) of individual designed spaces in at least 1:200 scale, showing furniture layout for typical areas; and,
(c) Model etc. showing the site in the regional context.

Module 3 Design Development 3 – Interim Review 3 4 - 5 weeks

Each student is required to prepare a submission as per the following requirements:

(a) Site Plan and Elevation from approach road in an appropriate scale;
(b) All floor plans including roof plan in 1:200 scale with structural elements;
(c) At least one elevation, two sectional-elevations, and part-sections in at least 1:200 scale, as deemed required to explain the design;
(d) Fire-fighting scheme, drainage scheme, and major electrical installations in appropriate scale; and,
(e) Block Model, design details of significant elements etc.

EVALUATION SCHEME

The Board of Examination for each student during Interim Reviews I and 2 shall consist of four members comprising the following:

(a) Respective Thesis Supervisor, (b) Thesis Coordinator, and (c) two external examiners. The Thesis Coordinator will chair the Board. Marks awarded by each member of the Board of Examination shall be of equal weightage, and the average marks shall be awarded.

The Board of Examination for each student during Interim Review 3 shall consist of five members comprising the following:

(a) Respective Thesis Supervisor, (b) Thesis Coordinator, (c) one structural engineer from the Department of Civil Engineering, and (d) two external examiners. The Thesis Coordinator will chair the Board. Marks awarded by each member of the Board of Examination shall be of equal weightage, and the average marks shall be awarded.

The external examiners shall be registered with the Council of Architecture, and at least one of them is to be a practicing architect. Further, the external examiners need not be the same examiners for the three Interim Reviews in AP5271.

A break-up of the marks to be awarded against different parameters during each Interim Review will be prepared by the DFC.

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AP5291 | Architectural Thesis II | 8 credits

Examination Only	Full Marks 300

COURSE OBJECTIVE

The objective of the course is to prepare the students with necessary skills and techniques to draw and render architectural presentation drawings, fabricate models, and document the entire design process traversed during architectural thesis in the form of a Thesis Report .

DETAIL COURSE CONTENT

Architectural Thesis II (AP5291) is the examination of the final deliverables of the work related to Architectural Thesis pursued by a student through the courses AP5172 and AP5271. Each student is required to present the following components of his/ her Architectural Thesis work:

(a) Site Plan (showing regional context, open-to-sky parking, circulation within site) in appropriate scale;
(b) Design Context, Concept and Study;
(c) Design Programme;
(d) Design Proposal (presented through drawings generally in 1:200 scale, and details, views etc. in appropriate scale);
(e) Structural Scheme;
(f) Thesis Report; and,
(g) Model(s).

EVALUATION SCHEME

The Board of Examination for each student shall consist of three external examiners and one structural engineer from the Department of Civil Engineering. The Thesis Coordinator will convene the Board. The external examiners shall be registered with the Council of Architecture, and at least one of them is to be a practicing architect. Further, the external examiners need not be the same examiners as in AP5271.

The faculty member from the Department of Civil Engineering shall award out of 50 marks evaluating the Structural Scheme; and the three external examiners shall each award out of 250 marks, the average of which will be considered for awarding the students. The external examiners will award marks, on the basis of the following break-up:

(a) Quality of Designed Space: 100 marks (40%);
(b) Services: 25 marks (10%);
(c) Model: 25 marks (10%);
(d) Report: 50 marks (20%); and,
(e) Overall Presentation: 50 marks (20%).

However, the DFC may modify the above break-up of marks.

AP5292 | Architectural Thesis Viva-Voce | 4 credits

Examination	Full Marks
Only	150

COURSE OBJECTIVE

The objective of this course is to prepare the student for oral presentation of the architectural thesis undertaken by them and to defend the same in front of the Board of Examination.

DETAIL COURSE CONTENT

Architectural Thesis Viva-Voce (AP5292) is the viva-voce component of evaluation of the final deliverables of the work related to Architectural Thesis pursued by a student.

EVALUATION SCHEME

Evaluation of AP5292 shall be done by the same Board of Examination as appointed for AP5291.

Each of the three external examiners will award out of 100 marks and the average of the three marks will be considered for awarding the students; and the faculty member from the Department of Civil Engineering shall award out of 50 marks.