

BACHELOR OF ARCHITECTURE

**OBJECTIVES, EXAMINATION SCHEME
AND
SYLLABUS**



BACHELOR OF ARCHITECTURE

**HIMACHAL PRADESH TECHNICAL UNIVERSITY,
HAMIRPUR 177 001 (H.P.)**

BACHELOR OF ARCHITECTURE

Himachal Pradesh Technical University, Hamirpur (HP) - 177 001

OBJECTIVE OF B. ARCH. FIVE YEAR PROGRAM

The Bachelor of Architecture (Five Year Degree Program) has a broad scope, not only of self-employment but creating job opportunities for a large number of people who will be working with the Architects. There are ample opportunities for employment in Central, State and Private Sector organizations, where the positions of Architects and Town Planners remain vacant due to less number of qualified persons. Program is intended to prepare students for professional practice in the field of Architecture. Today, there is an increasing recognition of Architecture as an intellectual discipline, both as an Art and as a Profession. In India, there are complexities of different social, cultural, geographical, economical and technical domains. These complexities are unique and typical for every region of our country. Therefore the architects make a vital role in solving these complexities and thereby contribute towards shaping our environment and society.

This program has been started with an idea to provide qualified professionals in the field of Architecture, to the country and to the Himachal region in particular. The emphasis will be on the development personality of students with the aid of both the objective information and subjective attitude based on reasons.

An Architect supposed to act as a team leader and coordinator of the inputs of the various specific disciplines. The need to possess a sound knowledge of all aspects (modern building technology, technological and engineering) has been incorporated in the curriculum. The program aims at attaining a high level of excellence in Architectural Education and program is intended to reinforce intellectual capabilities and develop proficiency in professional scheme to enable graduates to completely pursue alternative career with-in the broad spectrum of Architecture.

COURSE STRUCTURE

The course consists of five years out of which 4.5 years will be of formal contact instructions and six months will be devoted to professional training in a recognized professional office/industry. Basic course areas are scheduled as:

- Architectural Design
- Building Construction & Materials
- Building, Structures- Analysis & Designs
- Hill Architecture

In addition to these the other courses such as Building Sciences, Services, Architectural Drawing and Presentation, Computers, Humanities, History & Management have been suitably incorporated in the curriculum. Some elective courses have been introduced to impart specialized training for some of the subjects from 3rd year onwards.

The weightier of credits as per Energy Conservation Building Code guidelines of Council of Architecture, New Delhi is as under

1. 01 Lecture hour shall have 1 credit.
2. 02 Labs/workshops/seminar hours shall have 1 credit.
3. 01 Design studio/construction studio/project/thesis period hour shall have 1.5 credits.

4. Credits for internship/Practical training can vary from 12-15 and the architecture design thesis can vary from 15-18.
5. Lecture (L)/Tutorial (T)/Studio(S)/Practical (P) are expressed in hours.

SEMESTER –I

S. N.	Catego	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR-111	Architectural Design-I	0	0	6	0	9	-	60	60	40	100
2	MC	AR-112	Building Material & Construction-I	1	0	2	2	5	-	60	60	40	100
3	MC	AR-113	History of Architecture-I	3	0	0	0	3	20	20	40	60	100
4	MC	AR-114	Architectural Drawing and Graphics-I	1	0	2	2	5	20	40	60	40	100
5	FC	AR-115	Applied Mathematics	2	1	0	0	3	20	20	40	60	100
6	FC	HS-101	Communication Skills	2	0	0	0	2	20	20	40	60	100
Labs:									FW	LP	Total	ESV	Sub. Total
7	FC	HS -111	Communication Lab	0	0	0	4	2	10	20	30	20	50
Total				9	1	10	8	29					

Note:-

- The 50% of TA component will be evaluated by subject teacher and 50 % by external examiner in respect of subject AR-111 and AR-112.
- Site Visits/Tours may be conducted within the semester as per requirement of the subjects.

Legend:

L - Lecture	ESE - End Semester Examination
T - Tutorial	FW - Documentation/ File work and presentation
P - Practical	TA- Teacher Assessment
S- Studio	LP - Lab performance
CT - Class Test	ESVE - End Semester Exam/viva-voce Exam.
IA - Internal Assessment	MC- Mandatory Course
FC- Foundation Course	

SEMESTER – II

S. N	Catego	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR-121	Architectural Design-II	0	0	6	0	9	-	60	60	40	100
2	MC	AR-122	Building Material & Construction -II	1	0	2	2	5	-	60	60	40	100
3	MC	AR-123	History of Architecture-II	3	0	0	0	3	20	20	40	60	100
4	MC	AR-124	Architectural Drawing and Graphics-II	1	0	2	2	5	20	40	60	40	100
5	MC	AR-125	Structural Design-I	2	1	0	0	3	20	20	40	60	100
Lab									FW	LP	Total	ESVI	Sub. Total
6	FC	AR-126	Workshop Technology-I	0	0	0	4	2	10	20	30	20	50
			Total	7	1	10	8	27					

Note:-

- The 50% of TA component will be evaluated by subject teacher and 50 % by external examiner in respect of subject AR-121 and AR-122.
- Site Visits/Tours may be conducted within the semester as per requirement of the subjects.

Legend:

L - Lecture	ESE - End Semester Examination
T - Tutorial	FW - Documentation/ File work and presentation
P - Practical	TA- Teacher Assessment
S- Studio	LP - Lab performance
CT - Class Test	ESVE - End Semester Exam/viva-voce Exam.
IA - Internal Assessment	MC- Mandatory Course
FC- Foundation Course	

SEMESTER-III

S. I	Categor	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR- 211	Architectural Design-III	0	0	6	0	9	-	60	60	40	100
2	MC	AR- 212	Building Material & Construction –III	1	0	2	2	5	-	60	60	40	100
3	MC	AR- 213	History of Arch-III	3	0	0	0	3	20	20	40	60	100
4	MC	AR-214	Environmental Science	3	0	0	0	3	20	20	40	60	100
5	MC	AR- 215	Structural Design-II	2	1	0	0	3	20	20	40	60	100
6	MC	AR- 216	Climate and Built Environment	3	0	0	0	3	20	20	40	60	100
7	MC	AR-217	Surveying and Levelling	1	0	0	4	3	20	20	40	60	100
Lab									FW	LP	Total	ESVI	Sub. Total
8	FC	AR-218	Workshop Technology-II	0	0	0	2	1	10	20	30	20	50
Total				13	1	8	8	30					

Note:-

- The 50% of TA component will be evaluated by subject teacher and 50 % by external examiner in respect of subject AR-211 and AR-212.
- Site Visits/Tours may be conducted within the semester as per requirement of the subjects.

Legend:

L - Lecture	ESE - End Semester Examination
T - Tutorial	FW - Documentation/ File work and presentation
P - Practical	TA- Teacher Assessment
S- Studio	LP - Lab performance
CT - Class Test	ESVE - End Semester Exam/viva-voce Exam.
IA - Internal Assessment	MC- Mandatory Course
FC- Foundation Course	

SEMESTER-IV

S. I	Categor	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR-221	Architectural Design-IV	1	0	6	0	10	-	60	60	40	100
2	MC	AR-222	Building Material & Construction -IV	1	0	2	2	5	-	60	60	40	100
3	MC	AR-223	History of Architecture-IV	3	0	0	0	3	20	20	40	60	100
4	MC	AR-224	Building Services-I	3	0	0	0	3	20	20	40	60	100
5	MC	AR-225	Structural Design-III	3	0	0	0	3	20	40	60	40	100
6	MC	AR-226	Building Estimation, Costing & Specification	3	0	0	0	3	20	20	40	60	100
Lab									FW	LP	Total	ESVI	Sub. Total
7	FC	AR-227	Workshop Technology-III	0	0	0	4	2	10	20	30	20	50
Total				14	0	8	6	29					

Note:-

1. The 50% of TA component will be evaluated by subject teacher and 50 % by external examiner in respect of subject AR-221 and AR-222.
2. Site Visits/Tours may be conducted within the semester as per requirement of the subjects.

Legend:

L - Lecture	ESE - End Semester Examination
T - Tutorial	FW - Documentation/ File work and presentation
P - Practical	TA- Teacher Assessment
S- Studio	LP - Lab performance
CT - Class Test	ESVE - End Semester Exam/viva-voce Exam.
IA - Internal Assessment	MC- Mandatory Course
FC- Foundation Course	

SEMESTER – V

S. No	Category	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR- 311	Architectural Design-V	1	0	6	0	10	-	60	60	40	100
2	MC	AR- 312	Building Material & Construction -V	1	0	2	2	5	-	60	60	40	100
3	MC	AR-313	Site Planning and Landscape Design	3	0	0	0	3	20	20	40	60	100
4	MC	AR- 314	Building Services-II	3	0	0	0	3	20	20	40	60	100
5	MC	AR- 315	Structural Design-IV	2	1	0	0	3	20	20	40	60	100
6	MC	AR- 316	Disaster Mitigation and Management	3	0	0	0	3	20	20	40	60	100
Labs:									FW	LP	Total	ESVI	Sub. Total
7	MC	AR-317	Computer Applications in Architecture-I	0	0	0	4	2	10	20	30	20	50
Total				13	1	8	6	29					

Note:-

- The 50% of TA component will be evaluated by subject teacher and 50 % by external examiner in respect of subject AR-311 and AR-312.
- Site Visits/Tours may be conducted within the semester as per requirement of the subjects.

Legend:

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|--------------------------|--|
| L - Lecture | ESE - End Semester Examination |
| T - Tutorial | FW - Documentation/ File work and presentation |
| P - Practical | TA- Teacher Assessment |
| S- Studio | LP - Lab performance |
| CT - Class Test | ESVE - End Semester Exam/viva-voce Exam. |
| IA - Internal Assessment | MC- Mandatory Course |
| FC- Foundation Course | |

SEMESTER – VI

S. No.	Category	Paper Code	Subject	L	T	S	P	Credits	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR- 321	Architectural Design-VI	1	0	6	0	10	-	60	60	40	100
2	MC	AR- 322	Building Material & Construction -VI	1	0	2	2	5	-	60	60	40	100
3	MC	AR-323	Ekistics	3	0	0	0	3	20	20	40	60	100
4	MC	AR-324	Earthquake Resistant Design	3	0	0	0	3	20	20	40	60	100
5	MC	AR- 325	Hill Architecture	3	0	0	0	3	20	20	40	60	100
6	EC	AR-326**	Elective-I	3	0	0	0	3	20	20	40	60	100
Labs:									FW	LP	Total	ESVI	Sub. Total
7	MC	AR-327	Computer Applications in Architecture-II	0	0	0	4	2	10	20	30	20	50
Total				14	0	8	6	29					

**ELECTIVE – I

S. No.	Cat.	Subject Code	Title	Teaching Hours Per Week			Credits	Examination		
				L	T	P/D		IA Marks	ESE Marks	Total Marks
1	EC	AR-326A	Art and Architecture	3	0	0	3	40	60	100
2	EC	AR-326B	Building Economics and Sociology	3	0	0	3	40	60	100
3	EC	AR-326C	Sustainable Architecture	3	0	0	3	40	60	100
4	EC	AR-326D*	Online course	3	0	0	3	40	60	100

Note:-

1. The 50% of TA component will be evaluated by subject teacher and 50 % by external examiner in respect of subject AR-321 and AR-322.
2. Site Visits/Tours may be conducted within the semester as per requirement of the subjects.
3. “*” – Student should enrol for any one online course.
4. “**” – Students have to select at least one Elective subject.

Legend: L - Lecture
T - Tutorial

ESE - End Semester Examination
FW - Documentation/ File work and presentation

P - Practical
 S- Studio
 CT - Class Test
 IA - Internal Assessment
 FC- Foundation Course

TA- Teacher Assessment
 LP - Lab performance
 ESVE - End Semester Exam/viva-voce Exam.
 MC- Mandatory Course
 EC- Elective Course

SEMESTER – VII

S. I	Categor	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESVI	Sub. Total
									FW	TP	Total		
Lab:													
1	MC	AR-411	Internship/Practical Training	0	0	0	26	13	20	30	50	50	100
			Total					13					

Note:-

- The internal assessment component will be evaluated by Training firm/organisation and ESVE/viva-voce will be conducted by the department at the end of internship. The student will undergo Office Training with COA Registered/Affiliated Architect.
- Training of one semester duration shall start after end of 6th semester examination.
- Head School of architecture will formulate the necessary guidelines for Internship/Training.

Legend: L - Lecture
 T - Tutorial
 P - Practical
 S- Studio
 CT - Class Test
 IA - Internal Assessment
 FC- Foundation Course

ESE - End Semester Examination
 FW - Documentation/ File work and presentation
 TA- Teacher Assessment
 LP - Lab performance
 ESVE - End Semester Exam/viva-voce Exam.
 MC- Mandatory Course
 TP – Training Performance

SEMESTER – VIII

S. N.	Cat.	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR-421	Architectural Design-VII	0	0	8	0	12	-	60	60	40	100
2	MC	AR-422	Advance Construction Techniques	1	0	2	2	5	-	60	60	40	100
3	MC	AR-423	Housing	3	0	0	0	3	20	20	40	60	100
4	MC	AR-424	Energy Efficient Architecture	3	0	0	0	3	20	20	40	60	100
5	MC	AR-425	Geographic Information Systems (GIS)	1	0	0	4	3	20	20	40	60	100
6	EC	AR-426**	Elective-II	3	0	0	0	3	20	20	40	60	100
Total				11	0	10	6	29					

**ELECTIVE – II											
S. N.	Cat.	Subject Code	Title	Teaching Hours Per Week				Credits	Examination		
				L	T	S	P		I.A Marks	ESE Marks	Total Marks
1	EC	AR-426A	Vastushastra	3	0	0	0	3	40	60	100
2	EC	AR-426B	Building Bye-Laws	3	0	0	0	3	40	60	100
3	EC	AR-426C	Intelligent Building	3	0	0	0	3	40	60	100
4	EC	AR-426D*	Online course	3	0	0	0	3	40	60	100

Note:-

1. The 50% of TA component will be evaluated by subject teacher and 50 % by external examiner in respect of subject AR-421 and AR-422.
2. Site Visits/Tours may be conducted within the semester as per requirement of the subjects.
3. “*” – Student should enrol for any one online course.
4. “**” – Students have to select at least one Elective subject.

Legend: L - Lecture
T - Tutorial
P - Practical
S- Studio
CT - Class Test
IA - Internal Assessment
FC- Foundation Course
ESE - End Semester Examination
FW - Documentation/ File work and presentation
TA- Teacher Assessment
LP - Lab performance
ESVE - End Semester Exam/viva-voce Exam.
MC- Mandatory Course
EC-Elective Course

SEMESTER – IX

S. N.	Category	Paper Code	Subject	L	T	S	P	Credits	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR- 511	Architectural Design-VIII	0	0	8	0	12	-	60	60	40	100
2	MC	AR-512	Professional Practice & Ethics	3	0	0	0	3	-	60	60	40	100
3	MC	AR-513	Urban Design	3	0	0	0	3	20	20	40	60	100
4	MC	AR- 514	Project Management	3	0	0	0	3	20	20	40	60	100
5	MC	AR-515	Building Information Modelling (BIM)	1	0	0	4	3	20	20	40	60	100
6	EC	AR-516*	Elective- III	3	0	0	0	3	20	20	40	60	100
Total				13	0	8	4	27					

*ELECTIVE – III													
S. N.	Cat .	Subject Code	Title	Teaching Hours Per Week				Credits	Examination				
				L	T	S	P		IA Marks	ESE Marks	Total Marks		
1	EC	AR-516A	Architectural Conservation	3	0	0	0	3	40	60	100		
2	EC	AR-516B	Appropriate Building Technologies	3	0	0	0	3	40	60	100		
3	EC	AR-516C	Building Maintenance	3	0	0	0	3	40	60	100		
4	EC	AR-516D	Architecture Journalism	3	0	0	0	3	40	60	100		

Note:-

1. The 50% of TA component will be evaluated by subject teacher and 50 % by internal and external examiner in respect of subject AR-421 and AR-422.
2. Site Visits/Tours may be conducted within the semester as per requirement of the subjects.

<p>Legend:</p> <p>L - Lecture T - Tutorial P - Practical S- Studio CT - Class Test IA - Internal Assessment FC- Foundation Course</p>	<p>ESE - End Semester Examination FW - Documentation/ File work and presentation TA- Teacher Assessment LP - Lab performance ESVE - End Semester Exam/viva-voce Exam. MC- Mandatory Course</p>
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SEMESTER – X

S. N	Category	Paper Code	Subject	L	T	S	P	Credi	Evaluation Scheme (Marks)				
									Internal Assessment (IA)			ESE	Subject Total
									CT	TA	Total		
Theory:													
1	MC	AR-521	Architectural Design Thesis	0	0	8	6	15	40	20	60	40	100
2	MC	AR-522	Research Methodology	3	0	0	0	15	20	20	40	60	100
			Total	3	0	8	6	18					

Note:-

Head School of architecture will formulate the necessary guidelines for AR-521.

SEMESTER-I
AR-111: ARCHITECTURAL DESIGN-I

Teaching Scheme				Credits	Marks			Duration of End Semester Examination
L	T	S	P		Sessional	End Semester Exam	Total	
0	0	6	0	9	60	40	100	6hrs

COURSE OBJECTIVE:

- *To introduce the architectural design language and design process.*
- *To understand the nature of built environment and its determinants.*

COURSE CONTENT:

UNIT	CONTENT
I	Introduction to the Concept of Design in everyday life, Objectives of design, Primary elements of design such as point- Line- Form- Space- Texture- Colour etc. Detailed study of color theory and its applications through geometric compositions. Two Dimensional Compositions of simple geometric shapes (triangles, rectangles, circles etc.) Volumetric Study of Platonic Solids like Cube, Cuboids, Cylinder, Pyramid, Sphere etc. in simple positions.(Making models)
II	Principles of Design such as Scale- Balance- Proportion- Rhythm- Harmony- Contrast- etc. Application of the same through exercises in two and three dimensional compositions; using single and multiple types of elements. Anthropometric Studies : Average measurements of human body in different postures, its proportion and graphic representation, application in design of simple household and street furniture.
III	Space Study: Basic human functions and their implications for space requirements. Minimum and optimum areas for various functions such as living, dining, sleeping, cooking, study, storage, toilet etc. including furniture layout, circulation spaces.
IV	Time Problem: Design of single storey Small Residence.

Course Outcome:

- *Upon completion of the course, the student shall have achieved a comprehensive understanding of technical drawing techniques and architectural presentation.*
- *The course shall prepare students to gain an understanding into the fundamental issues in architectural design and develop skills to create architectural solutions for simple problems.*

Reference Books:

1. ***“Design through Discovery”***, M.E. Bevlín, Holt, Rinehart, and Winston.
2. ***“Drawing and Perceiving”***, Douglas Cooper, John Wiley & Sons.
3. ***“Principles of Design in Architecture”***, K.W. Smithies, Van Nostrand Reinhold.
4. ***“Architectural Drawing Masterclass”***, Tom Porter, Charles Scribner's.
5. ***“Time-saver Standards for Architectural Design Data: The Reference of Architectural Fundamentals”***, Donald Watson, McGraw-Hill.

6. ***“Time Saver Standards for Building Types”***, John Hancock Callender, Joseph De Chiara, McGraw-Hill, New York.
7. ***“Architectural Graphic Standards”***, Charles George Ramsey, Harold Reeve Sleeper, Bruce Bassler John Wiley & Sons.
8. ***“Form Space & Order”***, 4th Ed., Francis DK Ching, John Wiley & Sons, New Jersey
9. ***“Design in Architecture”***, Geoffrey Broadbent John Wiley and Sons, 1973.
10. ***“Rendering in Pen and Ink”***, Arthur L. Guphill and Susan E. Meyer, Watson-Guphill, 1997
11. ***“Neuferts”***, Architect's Data
12. ***“Architectural Graphics”***, Francis D. K. Ching, Wiley, 2009.

AR-112: BUILDING MATERIALS AND CONSTRUCTION-I

Teaching Scheme				Credits C	Marks			Duration of End Semester Examination
L	T	S	P		Sessional	End Semester Exam	Total	
1	0	2	2	5	60	40	100	4hrs

Course Objective:

- *To introduce the elementary building materials, their applications and construction methods.*
- *To familiarize the students with building components and their role.*
- *To understand vernacular/ traditional building materials and practices.*
- *To understand prevailing BIS specifications.*

COURSE CONTENT:

UNIT	CONTENT
I	Basic components of a ‘building’. Role of Construction in Architecture.
II	Basic building materials- brick, stone, lime, cement, sand, concrete: Application, properties and defects. Effects of sun, rain, wind and other climatic and environmental conditions on building materials and built environment. Introduction to paints and varnishes. Detailed studies such as manufacturing, types and application of the same. Introduction to popular brand names.
III	Brick Masonry: Detail drawings of various types of bonding in walls such as Stretcher bond-English bond-Single & Double Flemish bond etc. These bonds are to be explained with respect to varying wall thickness such as ½ brick-1 brick- 1½ brick etc. and various types of junctions such as L junction- T junction- Cross junction etc. Brick Jallies, Brick Arches
IV	Stone masonry Detail drawings of various types such as Rubble walling, Polygonal walling, Flint walling, Ashlars walling, Masonry joints, Stone arches, Maintenance etc.

Course Outcome:

- *Upon completion of the course, the student shall be familiar with basic components of a building.*
- *The course shall prepare students to gain an understanding of the basic building material like brick, stone, Lime etc.*
- *Students shall be familiar with the applications of paints and varnishes.*
- *Students shall get exposure of various bonds in bricks and stone masonry.*

Note: Site Visits to ongoing related construction projects.

References:

1. Harry Parker, '*Materials and Methods of Architectural Construction*', John Wiley & Sons. Canada, limited, 1958.
2. W B McKay, '*Building Construction*', Orient Longman 21.
3. Robin Barry, '*The Construction of buildings (Vol.I-V)*', Blackwell publishing, 2000.
4. Olin, Harold & Schmidt, '*Building Construction – Principles, Material & Methods*', American Savings and Loan Institute Press, 1970.
5. Francis Ching, '*Building Construction Illustrated*', John Wiley, 1991.
6. Relevant BIS codes.

AR-113: HISTORY OF ARCHITECTURE-I

Teaching Scheme				Credits	Marks			Duration of End Semester Examination
L	T	S	P		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- *To appreciate the importance of history of architecture and its relationship to the development of any region.*
- *To create awareness of the precious architectural past and how to interpret the future development based on that tradition, wisdom and technical knowledge.*

COURSE CONTENT:

UNIT	CONTENT
I	<p>Factors influencing the architectural character of any place; Geographic, Climatic, Socio-cultural, Religious, Economic, etc.</p> <p>Prehistoric architecture of the West, Middle East and East: General characteristics of the earliest Human Settlements: GobekliTepe, CatalHuyuk, Jericho, Jomon culture; Shoji walls, Pagoda, etc.</p> <p>Early Settlements in India: Mehargarh, Early Harappan.</p>
II	<p>Ancient Mesopotamia: History, evolution and characteristics. Example: Ziggurat (Sumerian), Palace of Sargon (Assyrian), Ishtar Gate (Babylonian).</p> <p>Ancient Egypt: History, evolution and characteristics. Example: Mastabas, Pyramid of Giza and Temple of Amon at Karnak.</p> <p>Indus Valley Civilisation: City Planning. Domestic Architecture. Building materials and construction techniques. Example: Great Bath, Mohenjo- daro.</p> <p>Ancient Greece: History, evolution and characteristics. Example: Classical Orders, Optical corrections, Parthenon, Acropolis, Agora, Theatre.</p> <p>Ancient Rome: History, evolution and characteristics. Example: Roman engineering skills- Pantheon, Colosseum, Basilica.</p>
III	<p>Vedic Period: Vedic Village. City Planning in later Vedic period. Building materials and construction techniques.</p> <p>Buddhist & Jain: History, evolution and characteristics. Major typologies; Stupa, Chaitya hall, Vihara.</p>
IV	<p>North Indian: Evolution of architectural style, major influences on the development of form and other architectural elements. Gupta Period.</p> <p>Central & South Indian: Chalukya&Pallava Architecture.</p> <p>Dravidian Temple Architecture: Principles of Design and Construction</p>

Course Outcome:

- *Knowledge about the history of a culture, its building art and construction techniques helps an architecture student to develop designs that are rooted in the country.*

- *Upon completion of the course, the student will be able to develop a keen appreciation of our heritage buildings leading to the understanding that architecture is the product of a particular culture, time and place.*

Note:

1. Analysis of architectural style/building typology must include functional, constructional and Architectural, ornamental aspects.
2. Study Tour/Visit shall be arranged by the class teacher of any nearby important historical monument.

Reference Books:

1. Percy Brown, '*Indian Architecture: Buddhist and Hindu Periods*', D. B. Taraporevala, 1965.
2. Satish Grover, '*The Architecture of India: Buddhist and Hindu*', Vikas, 1980.
3. Christopher Tadgell, '*The History of Architecture in India*', Phaidon, 1994.
4. Satish Chandra, '*History of Architecture and Ancient Building Materials in India*', Tech Books International, 2003.
5. James C. Harle, '*The Art and Architecture of the Indian Subcontinent:*' Second Edition, Yale University Press, 1994.
6. Banister Fletcher, '*Dan Cruickshank Sir, Banister Fletcher's a history of architecture: A History of Architecture*', Architectural Press, 1996.
7. Dora P. Crouch, June G. Johnson, '*Traditions in Architecture: Africa, America, Asia, and Oceania*', Oxford University, 2000.
8. Michael Raeburn, '*Architecture of the Western World*', Rizzoli, 1982.
9. Ilay Cooper, '*Barry Dawson, Traditional Buildings of India*', Thames and Hudson, 1998.
10. Ching, Francis, Vikramadithya Prakash, Mark M Jarzombek, '*A Global History of Architecture*', John Wiley & Sons, 2011

AR-114: ARCHITECTURAL DRAWING & GRAPHICS – I

Teaching Scheme				Credits	Marks			Duration of End Semester Examination
L	T	S	P	C	Sessional	End Semester Exam	Total	
1	0	2	2	5	60	40	100	3hrs

COURSE OBJECTIVE:

- To familiarize the student with basic knowledge of drafting, lettering techniques and visualization of geometric forms.

COURSE CONTENT:

UNIT	CONTENT
I	<p>Graphics Studio: Types of Pencils, Instruments; Different paper sizes. Types of Lines and there significance of lettering. Types of Lettering, Dimensioning, Geometrical Constructions of Lines , Polygons. Division of Line in equal number of parts.</p> <p>Scales: Plane scale and Diagonal Scale.</p> <p>Construction of Conic Section</p> <p>Singificance of Architecture Drawing</p>
II	Understanding objects, colours, shades, shadow and textures.
III	<p>Projections: Introduction to Orthographic projections of points, lines, planes and solids.</p> <p>Sections of Solids</p>
IV	Introduction and Importance: Method of drawing, Sciography of points, lines, planes and solids followed by illustrative example in each case.

Course Outcome:

- *Upon completion of the course, the student shall have the knowledge of basic tools of drawings and construction methods of forms.*
- *Students shall know the application of colors and textures .*
- *Student shall appreciate the importance of orthographic projections and sciography.*

Reference Books:

1. “*A Textbook of Engineering Drawing*”, Prof. P.J. Shah, S. Chand Publishing.
2. “*Engineering Drawing*”, K. Venugopal.
3. “*Engineering Drawing with an Introduction to AutoCAD*”,Dhananjay A. Jolhe, Tata McGraw Hill.
4. “*Architectural Graphics*”, Francis D. K. Ching, Wiley; 5th Edition.
5. “*Architectural Shades and Shadows*”, Henry McGoodwin, Nabu Press.
6. “*Rendering with Pen and Ink*”, Robert W. Gill, Thames & Hudson Ltd.
7. “*Architectural Drawing*”, Tom Porter, Hamlyn.

AR-115: APPLIED MATHEMATICS

Teaching Scheme				Credits C	Marks			Duration of End Semester Examination
L	T	S	P		Sessional	End Semester Exam	Total	
2	1	0	0	3	40	60	100	3hrs

Course Objective:

- *To develop basic Mathematical skills for Architecture students to understand structural concepts complex form and geometry.*
- *To inculcate understanding of the application of matrices, differential calculus, & analytical geometry in the study of architecture.*

COURSE CONTENTS:

UNIT	CONTENT
I	Differentiation, maxima and minima, integration, menstruation, simple differential equations
II	Centroids and moment of inertia
III	Matrix algebra, vector algebra
IV	Probability, Independent events, Probability Distribution, Expectation, Mean and Variance of a random variable, Binomial distribution, Poisson distribution

Course Outcome:

- *Upon completion of this course, students will be able to understand and apply the concepts of geometry and differential calculus to solve problems in different areas of architecture.*

References books:

1. Kreyszig E., *Advanced Engineering Mathematics*, 9/e , Wiley India,2013.
2. Veerarajan Y, *Engineering Mathematics for first year*, 2/e, Tata McGraw Hill, 2002.
3. Chandra Mohan and Varghese Philip, *Engineering Mathematics I&II*
4. Babu Ram, *Engineering Mathematics –II*, 2/e, Pearson.
5. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publisher
6. Bali N.P. and Manish Goel, *A Text Book of Engineering Mathematics*, Lekshmi Publications

HS-101: COMMUNICATION SKILLS

Teaching Scheme				Credits	Marks			Duration of End Semester Examination
L	T	S	P	C	Sessional	End Semester Exam	Total	
2	0	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

- To make students familiar with the communication and writing skills.

COURSE CONTENTS:

Unit	Contents
I	Communication: Need for effective communication, process of communication, The Seven Cs of Effective Communication - Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness; Barriers to communication - miscommunication, physical noise; Overcoming measures.
II	Essentials of Grammar: Sentence structure; Sentence formation, Use of appropriate diction, Tenses, articles and prepositions; English Phonetics: International phonetic alphabets - Production of sounds, Classification of consonant and vowel sounds.
III	Writing Skills: Letter writing - Formal, informal and demi-official letters; Business letters - quotations, supply orders, complaints, sales, adjustment letters, etc.; Resume writing: Difference between bio-data, CV and resume, Cover letter, Application for job.
IV	Soft skills: Classification of soft skills, soft skills for personality development & career growth; Capturing audience, Tone, Behavior and telephone etiquette - Good practice when making and receiving a call; Becoming a good leader and team-player, Personal SWOT analysis.

Course Outcome:

- Students shall be trained to find out the correct pronunciation of the words.
- Students shall be able to use grammar properly.

Reference Books:

- R.W. Lesikar and John.D. Pettit, *Business Communication: Theory and Application*, All India TravellerBookseller.
- Francis Soundaraj, *Speaking and Writing for Effective Business Communication*, Macmillan.
- Ronald B. Adler and George Rodman, *Understanding Human Communication*, Oxford University Press: New York.

HS-111: COMMUNICATION LAB

Teaching Scheme				Credits	Marks			Duration of End Semester Examination
L	T	S	P	C	Sessional	End Semester Exam	Total	
0	0	0	4	2	30	20	50	3 hrs

NOTE: Practice sessions as per the topics in the syllabus for the course “**ENGLISH COMMUNICATION**” will be conducted in the laboratory class. Following is the suggested list of exercises that must be performed during the semester:

I	Phonetic transcription: Students will be trained to find out the correct pronunciation of words with the help of a dictionary, to enable them to monitor and correct their own pronunciation.	
	(a)	transcription of words and short sentences in normal English orthography (writing) into their IPA equivalents;
	(b)	transcription of words presented orally;
	(c)	conversion of words presented through IPA symbols into normal orthography;
	(d)	Syllable division and stress marking (in words presented in IPA form).
2.	Listening: listening with a focus on pronunciation (ear-training), segmental sounds, stress, weak forms, and intonation; the students should be exposed, if possible, to the following varieties of English during listening practice: Standard Indian, British and American.	
3.	Speaking: pronunciation practice (for accent neutralization), particularly of problem sounds, isolated words as well as sentences, practising word stress, rhythm in sentences, weak forms, intonation; reading aloud of dialogues, poems, excerpts from plays, speeches etc. for practice in pronunciation;	
4.	Grammar and usage: The focus will be on the elimination of common errors. Some writing activities (e.g. writing of short paragraphs on assigned topics) can be used to identify these errors.	
5.	Project Work: Students will be required to produce and submit by the end of Semester a 350-500 word project report on a topic of their choice. The project should involve data collection, analysis and reporting.	

Recommended books:

1. *English Conversation Practice* by Grant Taylor.
2. *Business correspondence and Report Writing:* by R. C. Sharma & Krishna Mohan.
3. Chrissie Wright (Ed.); *Handbook of Practical Communication Skills*; JAICO Books.
4. Veena Kumar, *The Sounds of English, Makaav Educational Software*, New Delhi.

SEMESTER-II

AR-121: ARCHITECTURAL DESIGN-II

		Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	S	P	C	Sessional	End Semester Exam	Total		
0	0	6	0	9	60	40	100	6hrs	

COURSE OBJECTIVE:

- To train the students in understanding the interdependence of form, function and structure in the process of Architectural design.

COURSE CONTENT:

UNIT	CONTENT
I	Integration of form and function in the design of single use space with simple function like florist, kiosk, gift/souvenir shop, bus shelter, milk booth, PCO, Guard cabin, cycle stand, entrance gate, traffic police kiosk, ATM centre etc.
II	Designing of space for small groups and minor activities with reference to climate, site conditions and materials. The student should be guided to achieve necessary relationship between indoor and outdoor spaces and to understand the role of elements of structure in a built form such as , Post-Office, Crèche, Dispensary etc.
III	Study of a building/monument of architectural importance in local area. Site visits, documentation through text, photography, drawings.
IV	Time Problem.

Note: Two design problems and one time problem of 01 week is to be completed in the semester. The concerned faculty is required to frame a detailed program for each of the above design problems and time problem with reference to the above contents.

Course Outcome:

- Students shall be able to analyse and design single use space.
- Students shall be made acquaintance with monuments of architectural importance

Reference Books:

- “*Building drawing with an integrated approach to Built Environment*”, M. G. Shah, C. M. Kale, S. Y. Patki, Tata McGraw-Hill Education, 2002.
- “*Site Design Graphics*”, Micheal S. Kendall, Van Nostrand Reinhold, 1989.
- “*Architectural Graphics*”, 6th Ed., Francis D. K. Ching, John Wiley & Sons, 2015.
- “*Time-saver Standards for Architectural Design Data: The Reference of Architectural Fundamentals*”, Donald Watson, McGraw-Hill, 1997.
- “*Time Saver Standards for Building Types*”, John Hancock Callender, Joseph De Chiara, McGraw-Hill, New York, 1983.
- “*Architectural Graphic Standards*”, Charles George Ramsey, Harold Reeve Sleeper, John Wiley & Sons, 13-Jan-2011.

AR-122: BUILDING MATERIALS & CONSTRUCTION – II

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
1	0	2	2	5	60	40	100	3hrs

COURSE OBJECTIVE:

- To familiarize the students with use of timber in building construction.

COURSE CONTENT:

UNIT	CONTENT
I	Timber: Variety of Indian timbers, characteristics and suitability for different uses, defects and decay, seasoning and preservation; manufactured timber products and their applications.
II	Introduction to joinery in timber, Detailed drawings and construction details of Battened-Ledged-Braced doors, Battened-Braced-Framed doors, Flush doors etc., Introduction to various types of windows in Timber. Detailed drawings and construction details of Casement windows and Bay windows in Timber, Workshop practice for carpentry joints used in “2” and “3”. Types of Wooden Staircase and their details Hardware: fixtures, locks, hinges, fastenings for doors and windows; moldings, architrave
III	Introduction to the nature and characteristics of wood floors at ground and first floor level, its advantages & Limitations.
IV	Introduction to the nature and characteristics of wood construction-roofs, its advantages and Limitations, Detailed drawings and construction details of flat roof batten & tile and various types of sloping roofs in timber such as Lean to roofs, King Post truss and Queen Post truss using AC/CGI, Mangalore tiles & slates roof coverings.

Note: Site Visits to ongoing related construction projects.

Course Outcome:

- Students shall be able to understand the different joinery details of timber construction.

Reference Books:

1. ***“The Construction of Buildings”***, Vol. 1-2, R Barry, Wiley.
2. ***“Building Construction Metric”*** Vol. 3, W.B.Mckay, Orient Longman Private Limited, Mumbai.
3. ***“Building Construction Illustrated”***, Francis D.K. Ching, John Wiley & Sons.
4. ***“Construction Technology”*** Vol. 1-4, RoyChudley, Roger Greeno, Prentice Hall (UK).
5. ***“Workshop Practice”*** 2ndEd., H.S.Bawa, Tata McGraw-Hill Education.
6. ***“Carpentry and Joinery”***, George Mitchell, Cengage Learning EMEA.
7. ***“Arco's complete woodworking handbook”***, Jeannette T. Adams, Arco Pub.

AR-123: HISTORY OF ARCHITECTURE – II

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To understand and appreciate the evolution, development and influence of Christian architecture and Islamic Architecture on the world.

COURSE CONTENT:

UNIT	CONTENT
I	Development of Christian architecture including Early Christian, Byzantine, Romanesque and Gothic.
II	Architecture in Europe (12th to 18th century) : The birth of Renaissance in Florence in 15th century Renaissance in Italy in 16th century Renaissance and the Cult of personality in 16th century Baroque Rococo Influences of Italian Renaissance on Architecture in rest of Europe.
III	The Rise and development of Islamic architecture in the west. The advent of Islam into India
IV	Influences of Islamic ideas on secular and religious architecture in India and the Mughal period in India. 1. Rise of Islam 2. Islamic Invasions, political and social conditions in the country 3. Study of the Islamic Architecture, regions and stylewise under local influence with regard to – Northern, Central and Deccan. 4. Influence of Mughal art and architecture on India

Course Outcome:

- Knowledge about the history of a culture, its building art and construction techniques helps an architecture student to develop designs that are rooted in the country.
- Upon completion of the course, the student will be able to develop a keen appreciation of our heritage buildings leading to the understanding that architecture is the product of a particular culture, time and place.

Reference Books:

1. *“The World of Architecture”*, Paul Holberton, Chancellor Press.

2. “*A History of Architecture*”, Sir Banister Fletcher, CBS Publisher.
3. “*A History of Architecture*”, Spiro Kostof, Oxford University Press.
4. “*Encyclopedia of World Architecture*”, James Ferguson.
5. “*A Global History of Architecture*”, Mark M. Jarzombek, Vikramaditya Prakash and Francis D. K. Ching, John Wiley & Sons; 2nd Edition.

AR-124: ARCHITECTURAL DRAWING & GRAPHICS – II

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
1	0	2	2	5	60	40	100	3hrs

COURSE OBJECTIVE:

- To enable the students to have a better visualization/understanding of a three dimensional entity through Drawings: Sections- Metric views-Sciography and Sketching: Indoor-Outdoor

COURSE CONTENT:

UNIT	CONTENT
I	Development of surface Visual practices exercises - making models
II	Views isometric, axonometric Perspective exercises .
III	Architectural Presentation Techniques. Cut-away views, architectural rendering and model making in different media, colour presentation.
IV	Sketching: Introduction to Object drawing /Indoor sketching and its importance, Method of sketching simple objects/composition of objects freehand in proportion using pencils of different grades/water colours showing light/shade/shadow followed by situational exercises. Introduction to outdoor sketching through basic exercises like sketching of trees and shrubs, sketching of simple buildings with special emphasis on background and foreground and sketching of human figures using pencil of different grades/ water colors showing light/shade/shadow followed by situational exercises.

Course Outcome:

- Upon completion of the course, the student shall have the knowledge of basic tools of drawings and construction methods of forms.
- Students shall know the application of colours and textures.
- Student shall appreciate the importance of orthographic projections and sciography.

Reference Books:

1. *“A Textbook of Engineering Drawing”*, Prof. P.J. Shah, S. Chand Publishing.
2. *“Engineering Drawing”*, Dhananjay A. Jolhe, Tata McGraw Hill, .
3. *“Architectural Shades and Shadows”*, Henry McGoodwin, Nabu Press.

4. ***“Rendering with Pen and Ink”***, Robert W. Gill, Thames & Hudson Ltd..
5. ***“Architectural Drawing”***, Tom Porter, Hamlyn.
6. ***“Sketching the Concept”***, Harold Linton and Scott Sutton, Design Press.
7. ***“Drawing the Landscape”***, Chip Sullivan, John Wiley & Sons; 4th Edition.

AR-125: STRUCTURAL DESIGN – I

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
2	1	0	0	3	40	60	100	3hrs

Course Objective:

- To understand the basic principles of structural mechanics that would be pertinent to simple design elements.
- To understand the structural behaviour of building elements.

COURSE CONTENT:

UNIT	CONTENT
I	<p>Introduction to the subject and theory of structure:</p> <ul style="list-style-type: none"> • Aims, objectives and scope of study of theory of structure for architects. • Technical names and function of various structural components from foundation to roof. c. Fundamentals and mechanics. • S.I. system and units. • e. Understanding structure why things don't fall down.
II	Structural systems- ways to create inner space understanding loads of various types.
III	<p>Force and its units, Laws of forces, Resultant of a Force System, Law of Inertia, Law of action and reaction, Free body diagram, Static equilibrium & conditions of equilibrium, conditions of statically determinacy, Degree of Indeterminacy. Types of supports and support reactions, Determination of support reactions for statically determinate structures, Analysis of forces, moments and couples in structures.</p> <p>Stress, strain, Hooke's Law, stress-strain curve, stressed streams in simple and composite sections, temperature stresses, Poisson's ratio, state of simple shear, shear strain.</p>
IV	Introduction to types of loads and supports. Study of Structural system design such as Fundamental characteristics, Strength, Stability, Ability, Rigidity, Economy and Aesthetics. Determination of Centre of gravity, Moment of Inertia of square, rectangle, and I shaped cross-sections.

Course Outcome:

- Upon completion of the course, the student shall have developed the necessary skills to analyze and solve basic problems involving graphics and spatial manipulations for architectural applications.

References:

1. Tayal, "*Engineering Mechanics*", UmeshPublications , 13/e, 2006.
2. Bansal R. K., "*Engineering Mechanics*", Lakshmi Publications Pvt Ltd, 3/e,1996.
3. Vazarani, "*Mechanics of structures*", 16/e, 1995
4. Chakraborti M., "*Strength of Materials*", SK Kataria& Sons, New Delhi, 2010.
5. Abdul Mubeen, "*Mechanics of Solids*", Dorling Kindersley (India) Pvt Ltd, 2/e, 2011.
6. Kumar D.S., *Textbook of Engineering Mechanics*, S K Kataria& Sons, 3/e, 2009.
7. Rajput R.K., *Textbook of Engineering Mechanics*, Danpat Rai & Sons, New Delhi, 2002
8. Prasad I.B., *Textbook of Applied Mechanics*, Khanna Publications, 12/e, 1998.

AR-126: WORKSHOP TECHNOLOGY

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
0	0	0	4	2	30	20	50	3hrs

COURSE OBJECTIVE:

- To introduce the students to basic fabrication processes

COURSE CONTENT:

UNIT	CONTENT
I	Develop hands on approach, skills of working with different materials and the ability to choose an appropriate material as and when required for presentation or design purposes. Working with model making materials like thermocol, paper, wire etc. Basic workshop techniques for carpentry and joinery, sheet metal work, fabrication and foundry as an extension to Building Construction course.
II	Workshop in brick laying, setting-out, mud blocks, etc Workshop, in carpentry and joinery, fixing of frames in masonry, simple wall and floor finishes. Workshop in steal welding and forging, shuttering, bar bending and concreting, painting and laminating.

Course Outcome:

- Students shall appreciate the significance of various materials and their applications.

Reference Books:

1. *“Elements of Workshop Technology, Vol. I”*, Hajra Choudhury, HazraChoudhary and Nirjhar Roy, Media promoters and Publishers Pvt. Ltd.
2. *“Workshop Technology”*, W. A. J. Chapman, 1st South Asian Edition, Viva Book Pvt Ltd.
3. *”Manufacturing Technology, Vol.1, 3rd Ed.”*, P.N. Rao, Tata McGraw Hill Publishing Company.

SEMESTER-III

AR-211: ARCHITECTURAL DESIGN-III

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
0	0	6	0	9	60	40	100	6hrs

COURSE OBJECTIVE:

- To train student in design development of moderate complexity through understanding and appreciation of space and functional requirements such as circulation, facilitation and area analysis, with particular stress on techniques of graphic representation as an integrated process in architectural design.

COURSE CONTENT:

UNIT	CONTENT
I	Design of multi cellular structure like Artists Studio-cum-Residence The students shall have scientific knowledge required to design climate responsive buildings, a clear understanding of the various climate elements - radiation, air temperature , humidity and wind speed as tools of design. Due emphasis shall be given to sustainable building materials with appropriate building construction technique in design solution.
II	Design of a Primary School, Primary Health centre, etc.
III	Measure drawing of any important building/ architectural monument of local area. Site visits, documentation through text, photography, drawings.
IV	Time Problem : Restaurant, Motel, etc

Note: Two design problems and one time problem of 01 week is to be completed in the semester. The concerned faculty is required to frame a detailed program for each of the above design problems and time problem with reference to the above contents.

Course Outcome:

- Students shall appreciate the complexities and contradictions in the architectural design process.

Reference Books :

- “Building drawing with an integrated approach to Built Environment”, M. G. Shah, C. M. Kale, S. Y. Patki, Tata McGraw-Hill Education, 2002.
- “Site Design Graphics”, Micheal S. Kendall, Van Nostrand Reinhold, 1989.

- “Architectural Graphics”, 6th Ed., Francis D. K. Ching, John Wiley & Sons, 2015.
- “Time-saver Standards for Architectural Design Data: The Reference of Architectural Fundamentals”, Donald Watson, McGraw-Hill, 1997.
- “Time Saver Standards for Building Types”, John Hancock Callender, Joseph De Chiara, McGrawHill, New York, 1983.
- “Architectural Graphic Standards”, Charles George Ramsey, Harold Reeve Sleeper, Bruce Bassler John Wiley & Sons, 2008

AR-212: BUILDING MATERIALS & CONSTRUCTION – III

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
1	0	2	2	5	60	40	100	3hrs

COURSE OBJECTIVE:

- To familiarize the students with application of RCC in building construction.

COURSE CONTENT:

UNIT	CONTENT
I	Introduction to RCC, principles of design of RCC, properties of ingredients, types of concrete, different grades of concrete, Principles of foundation design, types of soils, bearing capacity of soil, types of loads Simple foundation (masonry), spread footing, types of PAD foundation, RCC footings and shallow foundations
II	Introduction to Damp-Proof course, detailing of Horizontal and Vertical DPC. Various types of flooring (brick, IPC, terrazzo, stone, wood, others), skirting, dadoing with various finishes. Industrial flooring, office building flooring and dado. Precast concrete units with in situ concrete toppings Roof finishes (over concrete slabs) with weather proofing and thermal insulation over RC roof. Market survey of various finishing materials
III	RCC stairs - types and construction details of RC cast-in situ stairs, pre-cast steps, fixing of handrails. Detailed section through a multistorey RC frame structure
IV	Timbering of trenches, shoring, underpinning, scaffolding, strutting and waling Form-work for RCC columns, beams, slabs, walls and stairs, types of formwork Reinforcement detail.

Note: Site Visits to ongoing related construction projects.

Course Outcome:

- Students shall understand various components, application of RCC in context of staircase, flooring, DPC, formwork footing etc.

Reference Books:

- Barry, R. (1986) Construction of Buildings, London, vol. 1 to 5.
- BIS (2011) National Building Code, SP 7, Bureau of Indian Standards.
- Foster, S. (1963) Mitchell's Advanced Building Construction, Allied Publishers Private Limited, Bombay.
- McKay, W. B. (1972) Building Construction (Metric), Longman, London, vol. 1 to 5.
- Punmia, B. C. (2005) Building Construction, Firewell Media, Delhi.
- Singh, G. N. (1981) Building Construction Engineering, Standard Book House, New Delhi.
- Relevant IS codes

AR-213: HISTORY OF ARCHITECTURE – III

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To understand the growth and development of architecture and appreciation of the role of the intangibles that brought this growth and development from the 18th Century to the advent of European Modernism.

COURSE CONTENT:

UNIT	CONTENT
I	Architecture in Europe – I (Late 18th to early 20th century): Industrial Revolution and its architectural Implications 19th Century Neo Classicism Development of Architecture in Victorian England Technology of Iron and Steel
II	Architecture in Europe – II (Late 18th to early 20th century): Town Planning Trends in Europe Rise of the Idea of Expositions Birth of the American Skyscraper Alternate Trends in late 19th and early 20th century in Europe
III	Architecture in Colonial India (Late 18th to early 20th century): Culture of colonialism British Response to Indian Context Early British Architecture
IV	Birth of Indo Sarcenic Architecture Princely India's Architectural response Public Works Department (PWD) Classical Revival Building of New Delhi.

Course Outcome:

- Student would appreciate the advent, growth and consequences of Industrial Revolution on architecture of the world.
- Upon completion of the course, students would be able to understand the impact of British colonialism on architecture of India.

Reference Books:

1. Archer, M. (1968) *Indian Architecture and the British*, Middlesex.
2. Curl, J. S. (1990) *Victorian Architecture*, London.
3. Davies, P. (1985) *Splendours of the Raj*, London.
4. Fletcher, Sir B. (1999) *History of Architecture—20th edn*, Dan Cruickshank ed, CBS Publishers & Distributors, New Delhi.
5. Hitchcock, H. R. et al (1963) *World Architecture: An Illustrated History*, London.
6. Irving, R. G. (1981) *Indian Summer: Lutyens, Baker, and Imperial Delhi*, London.
7. Metcalfe, T. R. (1989) *An Imperial Vision Indian Architecture and Britain's Raj*, London.
8. Morris, J. and Winchester, S. (1983) *Stones of Empire - The Buildings of the Raj*, Oxford.
9. Nilsson, S. (1968) *European Architecture in India 1750-1850*, London.
10. Risebero, B. (1979) *The Story of Western Architecture*, London.
11. Volwahren, A. (2002) *Imperial Delhi: The British Capital of the Indian Empire*, London.

AR-214: ENVIRONMENTAL SCIENCE

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- The Multidisciplinary nature of environmental studies, Definition, scope and importance. Need for Public awareness.

COURSE CONTENT:

UNIT	CONTENT
I	Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over-exploitation: deforestation, case studies, Timber exploitation, mining, dams and their effects and forests tribal people.
II	Ecosystems: <ul style="list-style-type: none"> • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids.
III	Biodiversity and its conservations: <ul style="list-style-type: none"> • Introduction – Definition: Genetic, species and ecosystem diversity. • Biogeographically classification of India.
IV	Environmental Pollution: Definition, causes, effects and control, measures of: a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal Pollution g) Nuclear hazards

Course Outcome:

- To make students understand and appreciate the value of environment

Reference Books:

- Agarwal, K.C. 2001, Environmental Biology, Nidi Pub. Ltd. Bikaner.
- Bharucha, Franch, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India .
- Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
- Clark R.S., Marine Pllution, Slanderson Press Oxford (TB).

5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai. 1195p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment @.
8. Gleick, H.P., 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford Univ., Press 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Helhi 284p.
12. McKinney, M.L. & Schoch, RM 1996, Environmental Sciences Systems & Solutions, Web enhanced Edition 639p.
13. Mhaskar A.K., Mater Hazardous, Tekchno-Sciences Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsoworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Dutta, A.K. 1987, Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p
17. Sharma, B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Sciences (TB).
20. Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II Enviro Mdiea (R).
21. Trividi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II Enviro Media (R).
22. Trividi R.K. and P.K. Goel, Introduction to air pollution, Techno Sciences Pub. (TB).
23. Wagner K.D., 1998, Environmental Management, W.B. Saunders Co. Philadelphphia, USA 499p.
24. A text bok environmental education G.V.S. Publishers by Dr. J.P. Yadav. (M) Magazine (R) Reference (TB) Textbook

AR:215 STRUCTURAL DESIGN – II

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
2	1	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

To understand evolution and development of architectural and urban built environment in context to geophysical, social and technological factors.

COURSE CONTENT:

UNIT	CONTENT
I	Bending Stress in Beams, Theory of simple bending, section modulus, design criterion, bending stresses in symmetrical and unsymmetrical sections, strength of sections. □ Shear Stress In Beams and Torsion, Shear stress in beams and torsion in symmetrical and unsymmetrical sections,
II	Fixed And Continuous Beams, Basic concepts of Bending moment and shear force, bending moment and shear force diagram for simple beams and frames for various types of loadings and support conditions, Effect of continuity, its advantages and disadvantages. Analysis of Continuous beams for two to four spans, conceptual idea about full and partial loading and fixed end moment using moment distribution method and Theorem of three moments.
III	Trusses, Definition of Truss, Perfect Truss, Imperfect truss, Types of Trusses and Suitability, Analysis of simple Trusses by Analytical method. Arches, Types and behaviour of arches with history. Introduction to three hinged arches. Frames, Indeterminacy of frames with different end conditions, Analysis of frame by portal & cantilever method
IV	Introduction of basic structural systems in architecture- Tensile structures, Compressive structures, Trusses, Shear structures, Bending structure

Course Outcome:

- Upon completion of the course, the student shall have developed the necessary skills to appreciate the significance of different structural systems and to identify and analyse the various defects in construction due to shear force and bending moment.

Reference Books

1. “Strength of Materials”, B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 2011. □
2. “Theory of Structures SMTS - II: SI Units”, B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 2011.

3. “Elements of Strength of Materials”, Stephen P. Timoshenko and Donovan H. Young, East West, 2003.
4. “Strength of Materials”, Ramamrutham S., Dhanpat Rai Publications, 2011.
5. Relevant Design Codes and Design Aids

AR: 216 CLIMATE AND BUILT ENVIRONMENT

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- The course intent to fundamentals of architectural science, climate on global and site levels, factors of thermal comfort, solar geometry, natural ventilation and climate responsive building design and site planning.

COURSE CONTENT:

UNIT	CONTENT
I	Climate and thermal comfort Global climatic factors, elements of climate, measurements and representations of climatic data Classifications of climates: Köppen classification and tropical climate classification, climatic zones of India Micro climate effects of local factors and landscape elements on site climatic elements Thermal balance of human body, physiological and environmental factors of thermal comfort indices, Bioclimatic chart, comfort zone, overheated and under heated periods Climate responsive traditional architecture in different climates.
II	<p>Air Temperature: Factors that influence air-temperature – latitude, altitude, seasons, water, trees, areas etc.; thermal conductivity and heat exchange between building and environment, thermal properties of material.</p> <p>Solar Radiation: Calculation of solar radiation on building surfaces, solar charts; Design and application of shading devices, sun machines and their uses; Opaque building elements and heat transfer through this elements, solar gain factor and sol-air temperature.</p> <p>Wind: study of diurnal and seasonal variations, heating and cooling, effect of topography: effect of wind on location of industrial areas, airports and other land-uses and road patterns, Air movement in and around buildings, wind eddies, size and position, effect of wind on design and sitting of buildings.</p> <p>Precipitation: Water-vapour. Relative-humidity, condensation, rain, fog, snow and architectural response</p>
III	<p>Day-light: glare, amount of light, sky as a source of light and day-light factor, effect of size and shape of openings in different planes with and without obstructions.</p> <p>Orientation and Application of Climatic Principles: Sitting of buildings with respect of sun, wind and view; Climatic design of indigenous shelters in response to different climatic zones in India; Use of landscape elements, evaporative cooling,</p>

	ground cooling, cavity walls, topography; Ventilation of roof spaces and controlled ventilation.
IV	Example of climate-responsive building-projects from India and abroad. Introduction to climatic design analysis and building simulation software

Course Outcome:

- Students shall appreciate the importance of climate and its impact on building design.

Reference Books

- Manual of Tropical Housing and Building: Climate Design”, O.H. Koenigsberger et.al., Madras: Orient Longman, 1984.
- “Environmental Design”, Randall Thomas, Taylor & Francis; 3rd edition, 2006.
- “Microclimatic Landscape Design”, Robert D. Brown and Terry J. Gillespie, John Wiley & Sons, 1995.
- “Energy-efficient Buildings in India”, Mili Majumdar, TERI Press,
- “Sustainable Building-Design Manual- Volume I&II”, TERI Press,
- “Thermal control in passive solar buildings”, S.C. Kaushik, G.N. Tiwari and J.K. Nayak, IBT Publishers & Distributors, 1988.

AR:217 SURVEYING AND LEVELLING

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
1	0	0	4	3	40	60	100	3hrs

COURSE OBJECTIVE:

- Introduction of basic concepts of surveying, Photogrammetry, Remote sensing and Geographical Information System

COURSE CONTENT:

UNIT	CONTENT
I	Introduction to surveying and its principles. Types of surveying, Map and Plan, its Scale and uses. Sources of errors in survey-linear measurement: accurate and approximate methods. Chain Surveying.
II	Compass Surveying, Levelling
III	Plane Table surveying, Contouring
IV	Basic concepts of Photogrammetry, Automated Surveying – Introduction to use of Digital Surveying – Instruments such as distomat – total station, Electronic Theodolite, G.P.S. Remote sensing. Geographical Information systems and their applications.

Course Outcome:

- Student will understand the importance of survey in mapping the topography with the help of latest equipments.

REFERENCE BOOKS

- “Surveying- Vol.1”, Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi; Sixteenth edition, 2005.
- “Textbook of Surveying”, C. Venkatramaiah, Orient Blackswan; Second edition, 2011.
- “A Textbook of Advanced Surveying”, R. Agor, Khanna Publishers, 2002.
- “Surveying and Levelling”, S. C. Rangwala and P. S. Rangwala, Charotar Book Stall, 6th edition, 2011.
- “Advanced Surveying”, P. B. Shahani, 2nd edition; Oxford & IBH Publishers Co., 1992

AR-218: WORKSHOP TECHNOLOGY-II

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
0	0	0	2	1	30	20	50	3hrs

COURSE OBJECTIVE:

- To introduce the students to concrete and its various types.

COURSE CONTENT:

UNIT	CONTENT
I	Develop a hands on approach, skills of working with concrete mix.
II	Workshop in application of concrete P.C.C , Flooring , Slabs and Lintels

Reference Books:

1. *“Elements of Workshop Technology, Vol. I”*, Hajra Choudhury, HazraChoudhary and Nirjhar Roy, Media promoters and Publishers Pvt. Ltd.
2. *“Workshop Technology”*, W. A. J. Chapman, 1st South Asian Edition, Viva Book Pvt Ltd.
3. *”Manufacturing Technology, Vol.1, 3rd Ed.”*, P.N. Rao, Tata McGraw Hill Publishing Company

SEMESTER-IV

AR-221: ARCHITECTURAL DESIGN-IV

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
1	0	6	0	10	60	40	100	6hrs

COURSE OBJECTIVE:

- To understand the nuances of traditional architecture in rural context of a settlement

COURSE CONTENT:

UNIT	CONTENT
I	Appreciation of traditional settlement pattern and building typology through villages. Exercises related to understanding social structure and its manifestation spatial organization and manifestation Public and private spaces, family and community spaces, Residential, Haveli.
II	Public spaces: Aganwadi, Kisan kendra, primary school, primary health centre, Kalyan kendra etc. An architectural design focused on a specific theme, for example, a material based thing such as, building only in mud/stone/timber etc. or a style based theme, for example, based on a period style, or a vernacular style, ecology - energy conservation theme, etc.
III	Time Problem : Bank, Post-Office etc.

Formulation of design criteria- application of climatic data, socio-cultural factors, behavioral aspects and structural considerations; Site analysis and design concepts, application of building services.

Note: Two design problems and one time problem of 01 week is to be completed in the semester. The concerned faculty is required to frame a detailed program for each of the above design problems and time problem with reference to the above contents.

Course Outcome:

- The students would be familiarized with vernacular terminology.
- The emphasis will be construction details as applicable to Indian climatic conditions.
- The design problem would induce students to experiment with built and open spaces.

Reference Books

- Chiara, J. D. (1984) Time Saver Standard for Site Planning, McGraw Hill Book Co., NY.

- Ching, F. D. K. (1996) *Architecture: Form, Space, and Order*, Van Nostrand Reinhold, New York, 2nd edn.
- Cohen, U. and McMurtry, R. (1985) *Museum and Children, Design Guide*, The School of Urban Planning and Architecture, University of Wisconsin, Milwaukee.
- Helper, D. and Wallach, P. (1987) *Architecture Drafting and Design*, Mc-Graw Hill Company, NY.
- Juliet, Ma. (1984) *Designing room for children*, Little Brown and Company, London.
- Neufert, E. (2000) *Neufert – Architect's Data*, Crosby Lockwood and Sons, London.

AR-222: BUILDING MATERIALS & CONSTRUCTION – IV

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P		Sessional	End Semester Exam	Total	
1	0	2	2	5	60	40	100	3hrs

COURSE OBJECTIVE:

- To understand the design and drawing of interior building elements in different materials.

COURSE CONTENT:

UNIT	CONTENT
I	Introduction to various materials like P.V.C. Fiber based product, etc. Detailed studies such as properties and application of the same in building industry. Market survey of different sections, industrial field visits to manufacturing units
II	Conventions for doors and windows, types and their uses. Aluminum doors and windows, PVC doors and windows
III	Expansion joints and construction joints Water proofing construction details Basement construction: internal and external tanking details
IV	Introduction to Cladding materials of Interior and Exterior walls in various materials such as Brick tiles, Stones, Vitreous tiles, Paneling etc. Detailed drawings of their fixing details.

Note: Site Visits to ongoing related construction projects.

Course Outcome:

Students will understand the construction system and importance of interior building components in different materials.

REFERENCE BOOKS:

- Construction Technology” Vol. 1, Roy Chudley, Roger Greeno, Prentice Hall (UK), 2005.
- “The Construction of Buildings”, Vol. 2, R Barry, Wiley, 2001.
- “Handbook of Architectural details for Commercial buildings”, Joseph De Chiara, McGraw-Hill, 1979.
- “Time Saver Standards for Building Materials and systems”, Donald Watson, McGraw-Hill, 2000.
- “Time Saver Standards for Interior Design and Space Planning”, Joseph De Chiara, Julius Panero, Martin Zelnik, McGraw Hill Professional, 2001.
- “Building Design and Construction Handbook”, Merrit, Ricketts, McGraw-Hill Prof Med/Tech, 2000.

AR-223: HISTORY OF ARCHITECTURE – IV

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To understand the growth and development of architecture and the ideas that propelled this development from the advent of the Modern Movement in the early decades of the 20th Century to contemporary trends across the world and in India.

COURSE CONTENT:

UNIT	CONTENT
I	The Western World: Early 20th century to the contemporary era: Early Modernism Post War Decades: The International Style Alternatives to the International Styles
II	Late Modernism Slick Tech Architecture Post Modernism Neo Modernism / Deconstruction
III	The Indian Scenario: Early 20th century to the contemporary era Post Independence Architecture The Arrival of Modernism in India Foreign Architects and their influence on Indian Architects Rediscovering India's Indigenous Architectural Tradition
IV	Current trends in Indian Architecture Exploring Regionalism in Indian Architecture

NOTE: Analysis of architectural style/building typology must include functional, constructional Architectural/ Structural and ornamental aspects.

Course Outcome:

- Students will be able to understand and appreciate the evolution, characteristics and salient features of various movements in field of modern world architecture.

Reference Books

1. Bill Risebero, The Story of Western Architecture, (London, 1979)
2. Charles Jencks, Modern Movements in Architecture, (New York, 1986)

3. Harry N. Abrams Inc., Architecture: From Pre-history to Post-Modernism / The Western Tradition, (New York, 1980)
4. H. R. Hitchcock et al, World Architecture: An Illustrated History, (London, 1963)
5. John Musgrove ed., Sir Bannister Fletcher's - A History of Architecture, (London, 1987)
6. Kenneth Frampton, Modern Architecture: A Critical History, (New York, 1985)
7. Le Corbusier, Towards a New Architecture, (New York, 1960)
8. Nikolaus Pevsner, An Outline of European Architecture, (London, 1945)
9. Robert Venturi, Complexity and Contradiction in Architecture, (New York, 1977)
10. Vincent Scully Jr., Modern Architecture, (New York, 1977)
11. Charles Correa and Kenneth Frampton, Charles Correa, (London, 1997)
12. G.H.R. Tillotson, The Tradition of Indian Architecture: Continuity, Controversy and Change since 1850, (Delhi, 1989)
13. Bhatia, Gautam (2003) Laurie Baker: Life, Work and Writings, Delhi.
14. James Steele, The Complete Architecture of Bal Krishna Doshi: Rethinking Modernism for the Developing World, (Delhi, 1998)
15. Jon Lang, J. Madhavi Desai, Miki Desai (1997) Architecture and Independence-The Search for Identity- India 1880 to 1980, Delhi.
16. Klaus-Peter Gast, Modern Traditions: Contemporary Architecture in India, (Berlin, 2007)
17. Vikram Bhatt and Peter Scriver, After the Masters: Contemporary Indian Architecture, (Washington, 1991)

AR-224 : BUILDING SERVICES-I

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To familiarize the students with fundamentals of water supply and drainage in building services & their integration with architectural design.

COURSE CONTENT:

UNIT	CONTENT
I	<p>Water Supply Detailed studies such as Sources and Treatment of water. Water demand & calculations, Storage & conveyance of water at municipal level. Water supply systems and various fittings. Hot and Cold water supply layouts. Water supply design of a residence: Connection with water mains, design of Underground & Overhead water tanks, pump capacity, calculations for diameter of pipe.</p> <ul style="list-style-type: none"> Introduction to water supply in a multi-storeyed building.
II	<p>Wastewater and Solid Waste management Definition of Refuse, garbage, rubbish, sullage, sub soil water, storm water, night soil, sewage- sanitary, domestic & industrial, sewer, sewerage & waste water. Various drainage & sanitary fixtures & fittings, traps - role of water seal, sizes, materials and their space requirements, Water efficient and waterless fixtures. Types of pipes and drains in different materials and their usage, diameter of pipes, slope standards. Inspection and Intercepting chambers, manholes etc. Sewage and Effluent treatment- Innovative and cost effective sanitation concepts.</p>
III	<p>Electrical services Thermal, Mechanical & Electrical energy and its generation Electrical distribution systems and safety devices Types of wiring systems, advantages and disadvantages, safety and precautions.</p>
IV	<p>Illumination & Lighting Design</p> <ul style="list-style-type: none"> Introduction to Illumination, studies of the same such as various types of artificial lighting. Various Terms in lighting, standards of illumination for illumination levels, Types of artificial lighting sources, types of luminaires & fixtures Comparitive efficiency of lighting fixtures . Methods and calculation for lighting design- Inverse Square Law, Cosine Law& Coefficient of Utilization Method.

Course Outcome:

- Student would understand the importance of services as an integral part of building design.

REFERENCE BOOKS

- “Water Supply Engineering”, Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 2003.
- “Design & Practical Handbook on Plumbing”, Cr Mohan and Vivekanand, Standard Publishers Distributors, 2014.
- “Wastewater Engineering”, Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 1998.
- “Environmental Education and Solid Waste Management”, A. Nag and K. Vizayakumar, New Age International, 2005.
- “Water and Wastewater Calculations Manual”, Shun Dar Lin and C. C. Lee, McGraw-Hill Professional; 2nd edition, 2007.
- “Advances in Water Supply Management: Proceedings of the CCWI '03 Conference, London, 15-17 September 2003”, Cedo Maksimovic, David Butler and Fayaz Ali Memon, 2003.

AR:225 STRUCTURAL DESIGN – III

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
2	0	0	1	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To understand the basic design principle involved in RCC design.

COURSE CONTENT:

UNIT	CONTENT
I	Introduction:- Materials, basic properties of concrete and steel, Reinforcement, standard loading, characteristics strength, permissible stresses in Concrete and steel as per Indian Standard, Design Philosophies- Working Method, Ultimate Load, Method and Limit state Method.
II	Limit State Design Method: Safety and serviceability requirements, limit states, characteristics material strength and loads and Partial safety factors. □ Design of Beams: Design of singly and doubly reinforced beams including L & T beams for flexure shear, bond and torsion. □ Design of Compression members: Design of short and slender columns. □ Design of RCC one way & two way slab
III	Proportioning of footings: - Square, Rectangular, Circular, Trapezoidal and combined.
IV	Introduction to pre-stressed concrete.

Course Outcome:

- The students shall be able to design various RCC structural members with respect to the Limit state method of design.

Reference Books

1. “R.C.C. Designs (Reinforced Concrete Structures)”, Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi; Tenth edition, 2006.
2. “Reinforced Concrete, 6th Edition”, S.K.Mallick and A.P.Gupta, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, 1996.
3. “Limit State Design of Concrete Structures”, Dr. Ramchandra and Virendra Gehlot, Scientific Publishers, 2007.
4. “Comprehensive RCC Design”, Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi; Tenth edition, 2006.

AR: 226 BUILDING ESTIMATION, COSTING & SPECIFICATION

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
3	0	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To familiarize the student with the commonly used methods of preparing estimates of Architectural Projects.

COURSE CONTENT:

UNIT	CONTENT
I	Preparation of project estimate; types of estimates Thumb rules used in estimating Costing and valuation Introduction to different types of specification and their uses. Writing specification for civil works of the design project done during the previous Semester starting with excavation, earth work, foundations, damp proof course, brick masonry work, concreting, flooring, plastering, painting, doors and windows, painting, varnishes, sanitary fixtures, electric fixtures etc. Importance of specification as part of contract documents.
II	Bill of Quantities (BOQ) Methods of preparing BOQ Taking out quantities of work items, long wall – short wall method, centre line method
III	Quantity estimation for finishes Principles of economics in building planning Price rise mechanism in tenders
IV	Abstract of cost of estimate of Project Various forms of tenders in building civil works Rate analysis of different work items, factors affecting rate of an item

Course Outcome:

- Students shall be familiar with the latest schedule of rates.
- Students would further be able to prepare basic building estimates.

Reference Books

1. Text Book of Estimating and Costing (Civil Engineering)", G.S.Birdie, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2015
2. Dutta, B. N. (2002) Estimating and Costing (ed.20), Sangam Books.
3. Rangawala, S.C. (1984) Estimating and Costing, Charotar Publishing Co
4. Relevant I.S. Codes for Material Specifications.
5. CPWD Specifications manual
6. HPWD Specifications
7. Cost Planning of Buildings", Douglas J. Ferry, Peter S. Brandon and Jonathan D. Ferry, WileyBlackwell; 7th editions, 1999.
8. Building Construction Estimating", Stephen D. Schuette and Roger W. Liska, Mcgraw-Hill College, 1994.

AR-227: WORKSHOP TECHNOLOGY-III

L	Teaching Scheme			Credits C	Marks			Duration of End Semester Examination
	T	S	P/D		Sessional	End Semester Exam	Total	
0	0	0	4	2	30	20	50	3hrs

COURSE OBJECTIVE:

To introduce the students to Aluminium and PVC joinery system.

COURSE CONTENT:

UNIT	CONTENT
I	Develop hands on fixing of PVC Doors and Windows.
II	False ceiling, Paint and fixing of cladding tiles (Dry and Wet).

Reference Books:

1. “*Elements of Workshop Technology, Vol. I*”, Hajra Choudhury, Hazra Choudhary and Nirjhar Roy, Media promoters and Publishers Pvt. Ltd.
2. “*Workshop Technology*”, W. A. J. Chapman, 1st South Asian Edition, Viva Book Pvt Ltd.
3. “*Manufacturing Technology, Vol. I, 3rd Ed.*”, P.N. Rao, Tata McGraw Hill Publishing Company.