

PROGRAM CURRICULUM
of
Bachelor of Architecture

ACADEMIC SESSION 2019-20



DEPARTMENT OF ARCHITECTURE
VEER SURENDRA SAI UNIVERSITY OF
TECHNOLOGY, BURLA,
SAMBALPUR, ODISHA.

VISION

The Department envisions to achieve excellence in learning, research and innovation in the field of Architecture, and create an enabling environment of confidence and capability to take up academic and professional challenges by encompassing progressive technological know-how while being sensitive to the environmental and cultural ethics.

MISSION

1. To provide educational programs that promote knowledge building, skill development and scholarly enquiry to meet the professional challenges, international educational standards and needs of our diverse community.
2. To undertake applied research for creating cutting edge knowledge in areas related to human habitat and environment and develop centres of studies in allied fields.
3. To progress as a collaborative of profession and education and promote capacity building by undertaking advanced programs in emerging areas of architecture and planning, and establishing an integrated project consultancy cell.
4. To foster environmental values throughout the education program and provide resource and knowledge for promoting indigenous and innovative sustainable development principles and practices.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. To follow educational program, that has broad scope, and provides exposure to various areas of interests in the field of Architecture and Planning and enable students to discover their own directions for further development.
2. To recognise Architecture as an intellectual discipline, both in academics and profession, which would make a vital contribution in the shaping of our environment and society, in the sphere of design and technology for a diverse range of situations, in rural and urban contexts, and in complexities of different social, cultural, geographical, economic and technical nuances which are unique and typical of every region in the world.
3. To stimulate sensitivity, unveil creative talents and enhance innovative pursuit of the students.
4. To reinforce intellectual capabilities and develop proficiency in professional skills for enabling graduates to competently pursue alternative careers within the broad spectrum of architecture.
5. To infuse competency and generate interest in the students towards research and higher studies.

PEO-MISSION MATRIX

	M1	M2	M3	M4
PEO1	3	3	1	2
PEO2	2	3	3	3
PEO3	2	1	3	3
PEO4	3	2	2	1
PEO5	3	3	3	2

PROGRAMME OUTCOMES (POs)

PO1	Ability to acquire and apply knowledge of fundamentals of building engineering, building sciences, architectural principles and graphic techniques.
PO2	Ability to understand and create artistic manifestations
PO3	Attain competency in computer aided designing skills
PO4	Ability to conduct experiments and surveys using different technologies and methods, and observe and analyse on-site and offsite factors
PO5	Ability to comprehend physical, social and other environmental characteristics of places for planning and designing
PO6	Understand ecological and other inter-disciplinary domains for following sustainable development practices
PO7	Capability to create spaces and products for optimum performance
PO8	Ability to take up professional challenges as individuals and team leaders
PO9	Ability to develop entrepreneurship skills and motivation to emerge as entrepreneurs
PO10	Ability to understand social and professional ethics and learn to be committed to responsibilities
PO11	Understand the essence of continuous learning process and develop capacity to acquire higher learning
PO12	Capability and pursuit for innovation in Architecture and related discipline

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1	Ability to take up professional challenges in various capacities.
PSO 2	Develop knowledge and skill to acquire higher learning
PSO 3	Ability to develop entrepreneurship skills and motivation to emerge as entrepreneurs.

PROGRAMME OBJECTIVE

- To follow educational program, that has broad scope, and provides exposure to various areas of interests in the field of Architecture and Planning and enable students to discover their own directions for further development.
- To recognise Architecture as an intellectual discipline, both in academics and profession, which would make a vital contribution in the shaping of our environment and society, in the sphere of design and technology for a diverse range of situations, in rural and urban contexts, and in complexities of different social, cultural, geographical, economic and technical nuances which are unique and typical of every region in the world.
- To stimulate sensitivity, unveil creative talents and enhance innovative pursuit of the students.
- To reinforce intellectual capabilities and develop proficiency in professional skills for enabling graduates to competently pursue alternative careers within the broad spectrum of architecture.
- To infuse competency and generate interest in the students towards research and higher studies.

PROCESS FOR DESIGNING THE SYLLABUS

- The proposed syllabus structure was framed after several iterative processes was undertaken to plan
 - Vertical progression and horizontal
 - Integration of subjects,
 - Pedagogical approach (distribution of skill, knowledge and value)
 - Credit based system
 - Relation of credit to contact hours
 - Adherence to Council of Architecture (COA) norms
- Several national and state architectural curriculums were referred to frame the syllabus. International courses were referred for preparing the detail contents of some courses.

NORM OF THE SYLLABUS

- Keeping in view the COA Norms, and reference syllabus of School of Planning and Architecture, Bhopal and Vijayawada, IIT Kharagpur, BPUT, existing syllabus of VSSUT, the **Credit / Contact Hour** calculations have been revised as follows:
 - Lecture Hours – 1:1
 - Studio Hours – 1:1
 - Tutorial hours – 1:1
 - Workshop/Lab Hours – 1:2

- After the revision as above, the entire 5 years B.Arch Programme will be covered in ten Semesters with one semester Professional Training
 - Total Credit = **273**
 - Total Contact Hours = **267** excluding one semester of Professional Training.

SALIENT FEATURES

- Greater horizontal and vertical synergy between theory and practice –
 - to develop the knowledge and skills of the students in a progressive manner by a careful integration of the courses both vertically within the semester and horizontally across the successive academic year.
- The theory courses are organized systematically so as to serve as a strong input of conceptual knowledge, understanding and for the subsequent studio and lab courses.
 - Knowledge based theory subjects which are named as width and depth theory subjects (based on their connection with the studio subjects)
 - Studio subjects to develop attitude and help integrate knowledge and skills earned in past semesters.
- The architectural design subjects form the central-vertical of the entire curriculum along with another vertical comprising of building material, construction and techniques .
 - In design studios/construction studios/projects the students learn the processing, analysis and solving of problems of direct professional practice.
- In each Semester the syllabus of the Design Studios is framed to focus on specific areas and is carefully sequenced keeping in view the core theoretical learning and technical skills acquired prior to handling the respective design exercises.
- The studio sequence proceeds from a broad understanding of design as intentional activity to progressively complex exercises involving bigger spatial scales.
- Several newer subjects has been introduced, keeping in mind changing needs of the profession. Most of the newer subjects have been designed as electives
- to accord the students with greater flexibility and freedom to specialize in their areas of interest.
- Updating of the course content of the existing subjects, so as to provide the students with the up-to-date knowledge.
- There is scope for introducing creative and alternative teaching pedagogy methods, as Module-5 is left as a flexible slot in the content of the syllabus in few subjects.
- Along with basic theoretical understanding it is felt that practical and case studies exercises is needed to be included to better comprehend the technical concepts.
 - Presentation of case studies and assignments will be included in the theory subjects so that students get opportunities in public speaking and become more articulate in direct presentation of their ideas.

- Syllabus of History of Architecture is framed according to time line which will be covered in four semesters.
 - Architecture principles, styles and settlement pattern of different geographical regions spanning a particular period will be taught in each semester.
 - Different styles of different regions belonging to the same period can be studied in correlation
 - Regional and periodic significance and relevance can be better understood and interpreted.
- The Curriculum has included Professional Training in the Ninth Semester.
 - This will enable the students to gather most of the knowledge and skill required, prior to undergoing internship in an architecture consulting organisation.
 - On completion of Pre-thesis dissertation in the Eight Semester, the thesis topic is tentatively finalised before the training. The student gets an opportunity to explore on the thesis topic and do case studies during the training period.

GUIDELINES

- For all sessional subjects, progressive submissions at each stage will be evaluated to complete internal evaluation of 60% of the total marks. Evaluation of rest 40% of the total marks will be done through external viva voce and presentations.
- Architectural Design Studio to have one major problem as per the thematic outline, level of complexity and scale of project, one small scale pace setter problem and one time problem.
- Architectural Field Study to be made mandatory as part of Architectural Design curriculum in each semester.
 - Architectural Design Studio in each semester throughout the BArch Programme will have one week of study visit for field work and case study.
- As per the guidelines of COA, the Architectural Design will be evaluated through periodic assessment and final evaluation to be done by a jury comprising of external member outside the department and internal faculty.
- Construction site visits to be done as part of the curriculum for the Building Construction course. Site visits should be in line with the concerned studio work.

DEPARTMENT OF ARCHITECTURE
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

PROPOSED SYLLABUS STRUCTURE FOR BACHELOR DEGREE OF ARCHITECTURE (B.ARCH) COURSE TO BE
EFFECTIVE FROM JULY/AUGUST 2019

FIRST SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR01001	Introduction to Architecture	3-0-0	3	WE			
2.	BAR01002	Building Material -I	2-1-0	3	WE			
3.	BMA01001	Applied Mathematics	3-0-0	3	WE			
4.	BAR01004	Ecology and Environment	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR01005	Basic Design -I	0-0-6	6		IA	VV	TP
2.	BAR01006	Architectural Graphics- I	0-0-4	2		IA		TP
3.	BAR01007	Building Construction -I	0-0-4	4		IA	VV	TP
4.	BAR01008	Architectural Workshop	0-0-4	2		IA	VV	
TOTAL			11-1-18 = 30	26				

SECOND SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR02001	History of Architecture -I	3-0-0	3	WE			
2.	BAR02002	Advanced Building Materials and finishes	2-1-0	3	WE			
3.	BAR02003	Structural Mechanics	3-0-0	3	WE			
4.	BAR02004	Communication Skill	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR02005	Basic Design -II	0-0-6	6		IA	VV	TP
2.	BAR02006	Architectural Graphics - II	0-0-4	2		IA		TP
3.	BAR02007	Building Construction -II	0-0-4	4		IA	VV	TP
4.	BAR02008	Visual Art & Documentation	0-0-4	2		IA	VV	TP
TOTAL			11-1-18 = 30	26				

WE - Written Exam

IA - Internal Assessment

VV - Viva Voce

TP - Time Problem

THIRD SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR03001	History of Architecture -II	3-0-0	3	WE			
2.	BAR03002	Climatology	2-1-0	3	WE			
3.	BAR03003	Structural Analysis	3-0-0	3	WE			
4.	BAR03004	Water Supply and Sanitation	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR03005	Architectural Design - I	0-0-9	9		IA	VV	TP
2.	BAR03006	Surveying and Leveling	1-0-2	2		IA		TP
3.	BAR03007	Building Construction -III	0-0-4	4		IA	VV	TP
4.	BAR03008	Computer Applications - I	1-0-2	2		IA	VV	TP
TOTAL			13-1-17 = 31	29				

FOURTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR04001	History of Architecture -III	3-0-0	3	WE			
2.	BAR04002	Design of RCC Structures	3-0-0	3	WE			
3.	BAR04003	Lighting and Electrical Services	2-1-0	3	WE			
4.		Professional Elective (PE) -I	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR04004	Architectural Design - II	0-0-9	9		IA	VV	TP
2.	BAR04005	Building Construction -IV	0-0-4	4		IA	VV	TP
3.	BAR04006	Computer Applications - II	1-0-2	2		IA	VV	TP
TOTAL			12-1-15 = 28	27				

WE - Written Exam

IA - Internal Assessment

VV - Viva Voce

TP - Time Problem

FIFTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR05001	History of Architecture -IV	3-0-0	3	WE			
2.	BAR05002	Landscape Architecture	2-1-0	3	WE			
3.	BAR05003	Design of Steel Structures	3-0-0	3	WE			
4.	BAR05004	Acoustics	2-1-0	3	WE			
5.	BAR05005	Environment and Behavior	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR05006	Architectural Design - III	0-0-9	9		IA	VV	TP
2.	BAR05007	Landscape Design Studio	0-0-2	1		IA	VV	
3.	BAR05008	Working Drawing and Detailing- I	0-0-4	4		IA	VV	
TOTAL			13-2-15 = 30	29				

SIXTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR06001	Theory of Design	3-0-0	3	WE			
2.	BAR06002	Human Settlement Planning and Housing	3-0-0	3	WE			
3.	BAR06003	Estimation Valuation and Specification	3-0-0	3	WE			
4.	BAR06004	HVAC Systems	2-1-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR06005	Architectural Design - IV	0-0-9	9		IA	VV	TP
2.	BAR06006	Interior Design	1-0-4	3		IA	VV	TP
3.	BAR06007	Working Drawing and Detailing - II	0-0-4	4		IA	VV	
TOTAL			11-1-17 = 29	28				

WE - Written Exam

IA - Internal Assessment

VV - Viva Voce

TP - Time Problem

SEVENTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR07001	Introduction to Urban Design	3-0-0	3	WE			
2.	BAR07002	Advanced Building Systems and Services	2-1-0	3	WE			
3.		Professional Elective -II	3-0-0	3	WE			
4.		Open Elective -I	3-0-0	3				
SESSIONAL SUBJECTS								
1	BAR07003	Architectural Design - V	0-0-9	9		IA	VV	TP
2	BAR07004	Research Methods and Seminar	1-0-4	3		IA	VV	TP
3	BAR07005	Non-Conventional Building Technologies	0-0-4	4		IA	VV	TP
TOTAL			12-1-17=30	28				

EIGHT SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR08001	Disaster Resilient Architecture	3-0-0	3	WE			
2.	BAR08002	Professional Practice	3-0-0	3	WE			
3.		Professional Elective -III	3-0-0	3	WE			
4.		Open Elective -II	3-0-0	3				
SESSIONAL SUBJECTS								
1.	BAR08003	Architectural Design - V	0-0-9	9		IA	VV	TP
2.	BAR08004	Pre-Thesis Dissertation	1-0-4	3		IA	VV	
3.	BAR08005	Advanced Building Technology	0-0-4	4		IA	VV	TP
TOTAL			13-0-17 = 30	28				

WE - Written Exam

IA - Internal Assessment

VV - Viva Voce

TP - Time Problem

NINTH SEMESTER							
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)		
SESSIONAL SUBJECTS							
1.	BAR09001	Professional Training	3-0-0	23			VV
2.	BAR09002	Field Observation Studies	3-0-0	3			VV
TOTAL				26			

TENTH SEMESTER							
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)		
THEORY SUBJECTS							
1.	BAR10001	Building Economics and Project Management	3-0-0	3	WE		
SESSIONAL SUBJECTS							
1.	BAR10002	Architectural Design Thesis	0-0-18	18		IA	VV
2.	BAR10003	Research in Thesis	1-1-6	5		IA	VV
TOTAL			4-1-24 = 29	26			

WE - Written Exam

IA - Internal Assessment

VV - Viva Voce

TP - Time Problem

PROFESSIONAL ELECTIVE - I					
SL.NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION
1.	BARPE401	Vernacular Architecture	3-0-0	3	WE
2.	BARPE402	Barrier Free Design	3-0-0	3	WE
3.	BARPE403	Graphic and Product Design	3-0-0	3	WE
PROFESSIONAL ELECTIVE - II					
1.	BARPE701	Green building and Infrastructure	3-0-0	3	WE
2.	BARPE702	Architecture and Urbanism in South Asia	3-0-0	3	WE
3.	BARPE703	Set Design for Events	3-0-0	3	WE
4.	BARPE704	Architectural Journalism	3-0-0	3	WE
PROFESSIONAL ELECTIVE - III					
SL.NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION
1.	BARPE801	Architectural Conservation	3-0-0	3	WE
2.	BARPE802	Transportation Planning	3-0-0	3	WE
3.	BARPE803	Environmental Impact Assessment	3-0-0	3	WE

OPEN ELECTIVE - I					
SL.NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION
1.	BAROE701	Furniture Design	3-0-0	3	WE
2.	BAROE702	Art Appreciation	3-0-0	3	WE
3.	BAROE703	Industrial Architecture	3-0-0	3	
OPEN ELECTIVE - II					
SL.NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION
1.	BAROE801	Application of GIS in Urban Planning	3-0-0	3	WE
2.	BAROE802	Real Estate Management	3-0-0	3	WE
3.	BAROE803	Building Repair and Restoration	3-0-0	3	WE

WE - Written Exam

IA - Internal Assessment

VV - Viva Voce

TP - Time Problem

**FIRST SEMESTER
BARCH PROGRAMME**

FIRST SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR01001	Introduction to Architecture	3-0-0	3	WE			
2.	BAR01002	Building Material -I	2-1-0	3	WE			
3.	BAR01003	Applied Mathematics	3-0-0	3	WE			
4.	BAR01004	Ecology and Environment	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR01005	Basic Design -I	0-0-6	6		IA	VV	TP
2.	BAR01006	Architectural Graphics- I	0-0-4	2		IA		TP
3.	BAR01007	Building Construction -I	0-0-4	4		IA	VV	TP
4.	BAR01008	Architectural Workshop	0-0-4	2		IA	VV	
TOTAL			11-1-18 = 30	26				

**DETAIL SYLLABUS
FIRST SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01001	Introduction to Architecture	03	03	0	0
<p>Objective This course is introduced in the beginning of the B.Arch programme to impart an overall orientation towards Architectural course. To acquaint the students with fundamental knowledge of space and spatial organisation, basic aesthetic principles involved in architectural design, and approach to conceptualise and develop architectural design. The course can be taught through interactive discussions, audio-visual presentations and creative assignments.</p>						
<p>Module 1 ARCHITECTURE, SPACE AND MASS Introducing Architecture as a profession and role of an Architect, Definition of architecture- elements of architecture - Concept of space, Articulation of form and space (Primary forms, properties of form, transformation of forms - dimensional transformation, subtractive, additive forms, organization of additive forms), Organisation of spaces, sense of enclosure, openings in space defining elements.</p>						
<p>Module 2 AESTHETIC COMPONENTS OF DESIGN Exploration of the basic principles of design such as Proportion, scale, balance, rhythm, contrast, harmony axis, symmetry, hierarchy, datum; Golden proportion, Theories of scale and proportion, Vitruvian theory, Modular man, Relationship between Art and Design with man, space and environment. To be explained with building examples both historical as well as contemporary.</p>						
<p>Module 3 SPATIAL ORGANISATION AND CIRCULATION Different types of spatial organizations of masses linear, centralised, radial, clustered, grid organization illustrations of buildings both historical & contemporary. Building approach, building entrance, Configuration of path, Path space relationship.</p>						
<p>Module 4 DESIGN PROCESS Integration of aesthetics, function and form - Understanding of formative ideas, organization concepts, spatial characteristics. Massing and circulation in design analysis of the following buildings: Falling water house & Guggenheim museum by F. L. Wright -Villa Savoye& Chapel of Notredame Du Haut by Le Corbusier.</p>						
<p>Module 5 Case studies of historical and contemporary site and buildings (Study of spatial organisation, form, element and art).</p>						

References

1. Francis D. K. Ching, *Architecture - Form, Space and Order*, Van Nostrand Reinhold Company, 1979
2. Roger H. Clark, Michael Pause, *Precedents In Architecture*, Van Nostrand Reinhold Company, 1996
3. K.W.Smithies, *Principles of Design in Architecture*, Van Nostrand Reinhold Company, 1981
4. Sam F. Miller, *Design Process - A Primer For Architectural & Interior Design*, Van Nostrand Reinhold Company, 1995
5. Ernest Burden, *Elements of Architectural Design – A Visual Resource*, Van Nostrand Reinhold Company, 1994
6. V.S.Pramar, *Design Fundamentals in Architecture*, Somaiya Publications, New Delhi, 1973.
7. Vitruvius, *Translation: Morris, H. M. (1960). The Ten Books on Architecture.*

Course Outcomes:

CO1	Analyze the concept of space, mass and its importance in Architecture
CO2	Implement knowledge about scale and proportion
CO3	Evaluate basic knowledge about spatial organization
CO4	Express the Understanding of aesthetic with relation to form and function
CO5	Implement knowledge through case studies

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	1	2	1	3	-	-	3	-	2
CO2	2	3	-	1	2	1	3	-	-	3	-	2
CO3	2	3	-	1	2	1	3	-	-	3	-	2
CO4	2	3	-	1	2	1	3	-	-	3	-	2
CO5	2	3	-	1	2	1	3	-	-	3	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	3	-	1	2	1	3	-	-	3	-	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01002	Building Material - I	03	02	1	0
<p>Objective</p> <p>The subject objects at developing the understanding and knowledge of basic building materials regarding their typology, availability, constitution, properties, classification, uses and applications in modern as well as traditional construction practice. Also it focuses on effects of sun, rain, wind and other climatic and environmental conditions on those materials and their behaviour to them.</p>						
<p>Module 1</p> <p>CLAY PRODUCTS AND STONES</p> <ul style="list-style-type: none"> Bricks —Various types of bricks, properties of good brick, use of bricks, classification of various grades of bricks. Compressed mud blocks, hollow blocks Stones — Buildings stones, types, properties of good stone, natural bed, aggregates for concrete work, use of stones. 						
<p>Module 2</p> <p>CEMENTING MATERIALS</p> <ul style="list-style-type: none"> Cement, lime, sand, aggregate, mortar and concrete. Lime—quick lime, hydraulic lime, lime mortar mix and preparation, peeling and flaking. Cement — Composition, properties of cement, initial setting time, slow setting, quick setting and rapid hardening cement. Sand— Pit, river and sea sand, uses in mortar and concrete, properties of good sand, impurities of sand and their removal. Mortar — Various types of mortar, their mix and properties, application methods. Concrete — Various types of concrete, their mix and properties, application methods. Lime mortar and plaster - mix and properties, application methods. 						
<p>Module 3</p> <p>TIMBER AND BAMBOO</p> <ul style="list-style-type: none"> Timber of various types of quality and properties, Defects in timbers Methods of seasoning, sawing and planning, Bamboo as a building material Bi-products of bamboo 						
<p>Module 4</p> <p>METALS</p> <ul style="list-style-type: none"> Various types of Ferrous Metals- Wrought Iron, Cast Iron & Steel Various types of Non-Ferrous Metals- Aluminium, Copper, Tin, Brass, etc. Application of metals for construction of various architectural elements non-structural element Application of metals as structural elements in construction practice 						
<p>Module 5</p> <p>CHEMICALS & AGENTS</p> <ul style="list-style-type: none"> Water proofing agents, Water proofing materials and systems for basement 						

- Anti-Termite agents
- Corrosion resistant agents
- Fungi & algae resistant agents

Each module should include market surveys of the materials manufactured by different industries under various company and brand names. Construction site visits compulsorily.

References

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

Course Outcomes:

CO1	Evaluate knowledge about primary building material used for walls and other structure
CO2	Analyze information of different kind of binding agents
CO3	Apply knowledge about timber-based materials in construction practices
CO4	Demonstrate knowledge about metal-based materials in construction practices
CO5	Implement knowledge about use of different chemicals with respect to type of materials

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	1	2	-	1	-	2	2
CO2	3	2	-	-	2	1	2	-	1	-	2	2
CO3	3	2	-	-	2	1	2	-	1	-	2	2
CO4	3	2	-	-	2	1	2	-	1	-	2	2
CO5	3	2	-	-	2	1	2	-	1	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	-	2	1	2	-	1	-	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01003	Applied Mathematics	03	03	0	0
<p>Objective The course is aimed to develop basic mathematical techniques required to support architectural and engineering concepts, and is also oriented to understand and analyse practical engineering problems. The course modules cover statistics and linear programming, which will enable the students to analyse field study data and formulate mathematical models.</p>						
<p>Module I GEOMETRY AND MEASUREMENTS Proportion, golden ratio, Euclidean geometry: methods to calculate areas of various regular geometrical shapes, surface areas of solids and volumes (cube, sphere, cone, cylinder)</p>						
<p>Module 2 NUMERICAL METHODS Finding roots of equations: Bisection method, Newton's method, Secant method. Numerical integration: Newton-Cotes Integration formula (without derivation), Trapezoidal rule, Simpson's rule, Gaussian quadrature</p>						
<p>Module 3 CALCULUS & APPLICATIONS Calculus of one variable: Maxima and Minima for a function of one variable, Rolle's theorem, mean value theorem (statement only), Fundamental theorem of calculus, Calculation of areas using integrals: Area bounded by curve, Arc length of curve.</p>						
<p>Module 4 MATRICES & BASICS OF LINEAR PROGRAMMING Elementary rows & column transformation, Gauss elimination & solution of System of equations, Inverse matrix. Formulation of Linear Programming, Graphical solution, Simplex method.</p>						
<p>Module 5 STATISTICS Measures of central tendency, Mean/ Median mode, measures of dispersion (Mean derivation/ Standard Derivation, Variance), Co-relation and Regression.</p>						
<p>References</p> <ol style="list-style-type: none"> 1. Grewal B.S., Higher Engineering Mathematics, 35th edition, Khanna Publishers. 2. Kapoor, V. K. and Gupta, S. C., Fundamentals of Mathematical Statistics, Sultan & Sons 3. Kalavathy, S., Operations Research, Vikas Publishing House Pvt. Ltd., 2009 4. Boucher, J. S., Mensuration, Plane and Solid, Longman, Brown, Green, Longmans and Robert, London. 5. K.H. Rosen: Discrete Mathematics and its application, 5th edition, Tata McGraw Hill. 						

Course Outcomes:

CO1	Implement mathematical techniques required to support architectural and engineering concepts, and in particular get adequate knowledge of finding areas and volumes of various regular geometrical shapes
CO2	Demonstrate the roots of algebraic and transcendental equations
CO3	Analyze knowledge of calculus of one variable, and also able to find areas bounded by the using integrals
CO4	Apply basic principles Gauss elimination method and rank of a matrix in solving linear Equations
CO5	Express the central tendency and measures of dispersion of a given sample

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	2	-	-	2	-	-	-	-	2
CO2	3	-	-	2	-	-	2	-	-	-	-	2
CO3	3	-	-	2	-	-	2	-	-	-	-	2
CO4	3	-	-	2	-	-	2	-	-	-	-	2
CO5	3	-	-	2	-	-	2	-	-	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	2	-	-	2	-	-	-	-	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01004	Ecology and Environment	03	03	0	0

Objective

To enable the student to understand the ecosystem, effect of pollution, environmental degradation and eco sustainable development.

Module 1

INTRODUCTION TO ECOSYSTEMS AND ENVIRONMENT, ENVIRONMENTAL RESOURCES

Fundamentals of Ecosystem, our earth's Environment. Types of ecosystems, characteristics features, structure and functions of Ecosystems – Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries). Ecosystem processes in a site.

Effects of human activities on environment: Agriculture, Housing, Industry, Mining and Transportation activities

Identification of Principal Bio-geographic Zones of India and their description,

List India's important and sensitive Biodiversity areas in relation to the physio-geographic regions.

Module 2

RESOURCES AND ENVIRONMENT: LAND, FOREST, WATER AND ENERGY AS ENVIRONMENTAL RESOURCES. HUMAN IMPACT ON ENVIRONMENT AND POLLUTION:

Local and Global Issues, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Urban and Industrial wastes, Recycling and Re-use, Global warming, Acid rain and Ozone layer depletion.

Loss of wet lands, mangroves, increasing desert areas, Social issues and the environment.

Module 3

INSTITUTION AND GOVERNANCE

Institutional arrangement, Environmental legislation, Introduction to Government regulations, Introduction to Environmental Acts, (eg, Water Conservation and Control of Pollution Act, Air pollution control act, Environmental Protection Act, Wild life protection Act, Forest Conservation Act, etc.)

Module 4

ENVIRONMENTAL MANAGEMENT

Introduction to principles of sustainable development, Environmental quality and indicators, Management of environment, Introduction to Solid waste management.

Module 5

Conduct case studies and prepare report on relevant areas.

References

1. Ecology/ Principles and application ; J.L Chapman & M.J Press; Cambridge
2. Environmental Economics; Charles. D Kolstad: Oxford University Press
3. The hidden connection; F.Capra , Harper and Collins
4. Agarwal, K. C. (2001). Environmental Biology. Bikaner : Nidhi Publications Ltd.
5. Benny, J. (2005). Environmental Studies. New Delhi : Tata McGraw Hill.
6. Bharucha, E. (2005). Text book of environmental studies for undergraduates courses. New Delhi : Universities Press, UGC. .
7. Brunner, R.C. (1989). Hazardous Waste Incineration. New Delhi : McGraw Hill.
8. Kaushik, A. and Kaushik, C. P. (2010). Basics of Environment and Ecology. New Delhi : New Age International Publishers.

Course Outcomes:

CO1	Implement knowledge about ecosystem, impact of human activities on that
CO2	Express the idea about environmental issues on global and local level
CO3	Analyze the knowledge about environmental governance
CO4	Express the knowledge about environmental management
CO5	Demonstrate knowledge through case studies

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	1	1	2	1	1	-	3	2	1
CO2	3	-	-	1	1	2	1	1	-	3	2	1
CO3	3	-	-	1	1	2	1	1	-	3	2	1
CO4	3	-	-	1	1	2	1	1	-	3	2	1
CO5	3	-	-	1	1	2	1	1	-	3	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	1	1	2	1	1	-	3	2	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01005	Basic Design - I	06	0	0	6
Module 1						
LEARNING DESIGN PRINCIPLES, SKETCHING, DRAWING, AND VISUAL THINKING						
Introduction to design- importance of design, study and appreciation of design examples from natural and manmade environments; Elements of design: point, line, shape, form, space, tone & texture, value, colour and material; Colour: Colour theory, value and intensity, colour wheel, primary, secondary, tertiary colours, colour schemes, Introduction to the principles of composition: unity, balance, symmetry, proportion, scale, hierarchy, rhythm, contrast, harmony, focus.						
Module 2						
TWO-DIMENSIONAL COMPOSITION						
Application of elements of design in two dimensional compositions: Transformations in two dimensions, shapes and patterns, use of grids in creating repetitive patterns. Application of visual grammar and gestalt principles Explorative exercises in two dimensional compositions: Developing composition in two dimensional designs like- logos, cover page, collage, mural, floor patterns, grills, railings, gates etc.						
Module 3						
FORMS & SPACES						
Understanding the Elementary structural forms, Concept of space, interrelationship between spaces; Orders in Architecture; Study of solids & voids to evolve sculptural forms & spaces; Making three dimensional sculptures involving the basic platonic solids and abstract sculptures: involving various elements of design such as Shape, Colour, Texture, Transparency, Mass, volume, explore play of light & shade; Variations in forms with planar juxtapositions, Form generation techniques – from 2D to 3D, Additive and Subtractive form Evaluation and Analysis of 3D form with visual grammar Designs of Entrances, gateways, portal, compound walls, etc.						
Module 4						
FORMS IN NATURE						
Study of forms in nature and analysis with respect to their colour, form, texture and structure. Exercises involving these natural forms and various approaches to art such as – Representation, Abstraction and Non-Representational/ Non-Objective compositions. Free-hand drawing of human figures, vehicles, trees, buildings etc, to have a better understanding of proportion.						
Module 5						
MEASURED DRAWING						
Understanding of different scales, measurement device and their uses in practice Drawings to scale, geometrical representation techniques and drafting skill; Examples of Measured drawings involving small spaces and building elements: Furniture, Class rooms, one room unit, doors, windows, entrance gate, columns.						

References

1. Charles Wallschlaeger & Synthia Busic Snyder, *Basic Visual Concepts & Principles for artists, architects & designers*, McGraw Hill, USA, 1992.
2. Paul Zelanski & Mary Pat Fisher, *Design principles & Problems*, 2nd Ed, Thomson & Wadsworth, USA, 1996
3. Owen Cappleman & Michael Jack Kordan, *Foundations in Architecture: An Annotated Anthology of beginning design projects*, Van Nostrand Reinhold, New York.
4. Trewin Copplestone, *Arts in Society*, Prentice Hall Inc, Englewood Cliffs, N. J. 1983.
4. H. Gardner, *Art through ages*.
5. Paul Laseau. (2001). *Graphic Thinking For Architects and Designers*, John Wiley & Sons, New York
6. Ching, F. D. K. (1997). *Design Drawing*. Hoboken : John Wiley & Sons.
7. Ching, F. D. K. (2012). *Architecture: Form, Space and Order*. 3rd Ed. Hoboken: John Wiley & Sons.
8. Broadbent, G. (1973). *Design in Architecture - Architecture and Human Science*. John Wiley and Sons, New York
9. Chauhan, P. (2005). *Learning Basic Design*. Mumbai : Rizvi College of Architecture.

Studio Project

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

Course Outcomes:

CO1	Implement the knowledge of Principles and Elements of Design
CO2	Demonstrate 2 dimensional compositional skills
CO3	Analyze the knowledge of Elementary structural forms and Concept of space
CO4	Evaluate the knowledge about forms in nature
CO5	Demonstrate knowledge of Measure Drawing through case studies

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	1	2	2	-	2	-	1	2
CO2	3	3	-	2	1	2	2	-	2	-	1	2
CO3	3	3	-	2	1	2	2	-	2	-	1	2
CO4	3	3	-	2	1	2	2	-	2	-	1	2
CO5	3	3	-	2	1	2	2	-	2	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	2	1	2	2	-	2	-	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01006	Architectural Graphics- I	02	0	0	4
Objective						
Introduce students to the fundamentals of architectural drawing techniques and skills. Equip the students with understanding of graphical presentation of objects through geometrical projection and visualization is taught in this course.						
Module I						
Introduction to fundamentals of drawing and its practice: Practices in lettering, drafting, and dimensioning, Scale conversion; Introduction to Plane geometry: Exercise in construction of Straight lines, Circles, Tangents and Regular polygons; Description of Plane Curves: Ellipse, Parabola, Hyperbola, Helix and other special curves.						
Module II						
Concept of Orthographic Projection: First-Angle Projection, Projections of Points, Projections of Straight Lines, Projections of Planes, Projections of Solids.						
Module III						
Section of Solids, True shapes of section						
Module IV						
Interpenetration of Solids						
Module V						
Surface development of simple solid forms leading to complex forms						
References						
<ol style="list-style-type: none"> 1. Moris I.H. Geometrical Drawing for art Students 2. Thomas E French Graphic science and design, New York, McGraw hill 3. Nichols TB and Keep Norman, Geometry of construction, 3rd ed, Cleaver Hume Press Ltd. London, 1959. 4. Bhatt ND and Panchal VM Engineering Drawing, plane and solid geometry, 42nd ed, Chartor Pub. Anand, 2000 5. Gill, PS, Text Book of Geometrical drawing, 3rd ed, Dewan Suhil Kumar Kataria, Ludhiana, 1986 6. Shah MG, Kale CM and Patki SY, Building drawing with an integrated approach to built environment, 7th ed Tata McGraw Hill pub Delhi 2000. 7. Bies D John, Architectural Drafting: Structure and Environment Bobbs, Merrill Educational Pub. Indianapolis 8. Nelson A John, Hand book of Architecture and Civil Drafting, Von Nostrand Reinhold New York, 1983. 						
Note						
Along with progressive evaluation of class works, tests to be conducted for Descriptive Geometry as part of the internal and final evaluation process.						

Course Outcomes:

CO1	Demonstrate the fundamentals of drawing and its practice
CO2	Implement the Concepts of Orthographic Projection
CO3	Apply the basic knowledge about Section of Solids
CO4	Demonstrate the knowledge about Interpenetration of Solids
CO5	Evaluate the knowledge of Surface development

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	1	-	-	-	-	1
CO2	3	3	-	-	-	-	1	-	-	-	-	1
CO3	3	3	-	-	-	-	1	-	-	-	-	1
CO4	3	3	-	-	-	-	1	-	-	-	-	1
CO5	3	3	-	-	-	-	1	-	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	-	-	-	1	-	-	-	-	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01007	Building Construction-I	04	0	0	4
<p>Objective To understand various construction methods and techniques using different materials, both in the context of modern and traditional construction methods and practices. The students are required to produce report on materials, construction and detail drawings. With time, each topic can also focus on latest trends in practice and usage of new technology/materials.</p>						
<p>Module I BRICK WORK Brick masonry- Masonry tools & equipment. Different types of bricks. Bonding of bricks & its principles, Stop end, T, L & cross Junctions of English bond, Flemish bond & Rat trap bond and Non structural bond. Attached & detached piers. Brick jallis, Corbelling, Cornices, Types of coping, pointing & threshold</p>						
<p>Module 2 STONE WORK Stone Masonry- Random rubble masonry, Ashlars masonry, coursed and un-coursed rubble masonry etc. Walls with stone facing and brick backing (composite wall)</p>						
<p>Module 3 FOUNDATION: INTRODUCTION TO SHALLOW AND SPREAD FOUNDATIONS Simple foundations with trenches for load bearing walls; Sections of compound walls, retaining wall, foundation forsteps.</p>						
<p>Module 4. LINTELS, BEAMS AND ARCHES Lintels: RCC, Reinforced Brick (RB), Wood, Stone Beam: RCC Beam Arches: Different types of Arches, Segmental, Semi-circular, Jack arch, Three centred, Flat arch</p>						
<p>Module 5 SHALLOW FOUNDATION Types of RCC foundation (Strip, raft, isolated footing, pile foundation)</p>						
<p>Note</p> <ul style="list-style-type: none"> • Frequent site visits to be arranged as a part of the curriculum. Site visits should be in line with the present studio work. It is mandatory for students to submit a site observation report, either periodically or at the end of the semester. • Pedagogy should establish the linkage of the relevant material and construction techniques from past to present. • Performing standards and Codes used for various Building Materials and Construction Techniques needs to be focused. • Alternative construction techniques for respective topics needs to be discussed in detail. • The subject is to be integrated with the ongoing subject of Architectural Design- I through one or many assignments. 						

References

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

Course Outcomes:

CO1	Evaluate the concept of Brick masonry.
CO2	Evaluate the concept of stone masonry.
CO3	Analyze the concept of Foundation and different types.
CO4	Apply basic principles of Lintel, Beams and Arches
CO5	Analyze the concept of Shallow Foundation

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	-	2	2	-	-	-	-	3
CO2	3	2	-	1	-	2	2	-	-	-	-	3
CO3	3	2	-	1	-	2	2	-	-	-	-	3
CO4	3	2	-	1	-	2	2	-	-	-	-	3
CO5	3	2	-	1	-	2	2	-	-	-	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	1	-	2	2	-	-	-	-	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
1ST	BAR01008	Architectural Workshop	02	0	0	4
Objective						
To enable students to acquire basic skills necessary to represent their ideas through models using different materials. To make students practice with various tools essential for making architectural models.						
Module I						
Need for architectural models, Introduction to different materials for model making, like paper, thermocol, clay, wood, foam sheet, sun board, cork sheet, metal sheets, wires, plaster of Paris (PoP), etc.. Introduction to block models of objects (3D Compositions) and buildings using different materials to explore the nature and texture of the material.						
Module 2						
Joinery and Carpentry using wood, plyboard, blockboard and other materials. Simple exercises in cutting, finishing and joinery such as Dovetail joint, Mortise and Tenon joint, Lap joint, Butt joint, etc. to be used for making furniture.						
Module 3						
Introduction to various types of models at appropriate scales- site model, study model, block model, finished presentation models, etc. Preparation of base for models using wood or boards, Various site elements – Contour representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing etc.						
Module 4.						
Making detailed models which includes the representation of various building elements like Walls, Columns, Steps, Windows/glazing, Sunshades, using materials like Mount-board, Snow-white board, acrylic sheets; Representing various surface finishes like brick/stone representation, stucco finish etc;						
Module 5						
Making models of the various structural systems used in buildings like; Space frames – using Match sticks, wires; Different forms of shell roofs using paper, POP, clay, etc; Tensile structures using fabric. Introduction to digital medium to explore models digitally. Photography in built models, using lighting and natural background						
Note:						
The subject will be taught in congruence with subjects like Design and Graphics. Assignments for the subject will be linked to design exercises to achieve higher level of learning and understanding the practical application of the same.						
References						
<ol style="list-style-type: none"> 1. Janssen, <i>Constructional Drawings & Architectural models</i>, Kari Kramer Verlag Stuttgart, 1973. 3. Harry W.Smith, <i>The art of making furniture in miniature</i>, E.P.Duttor Inc., New York, 1982. 4. Thames and Hudson <i>Manual of Rendering with Pen and Ink</i>-Robert W Gill. 5. Ching, F. D. K. (2009). <i>Architectural Graphics. 5th Ed.</i> New Jersey : John Wiley & Sons. 6. Criss. B. M. (2011). <i>Designing with models: A Studio guide to Architectural Process Models.3rd Ed.</i> Hoboken :John Wiley & Sons. 7. Kieran, S. and Timberlake, J. (2008). <i>LobollyHouse : Elements of a New Architecture.</i> New York : Princeton Architectural Press. 8. Morgan, C. L. and Nouvel, J. (2002). <i>The Elements of Architecture.</i> London : Thames & 						

Hudson.

9. Werner, M. (2011). *Model Making*. New York : Princeton Architectural Press.

Course Outcomes:

CO1	Demonstrate the construction of basic architectural models
CO2	Analyze the joinery and carpentry
CO3	Demonstrate preparation of site models
CO4	Evaluate the basic knowledge about advanced materials used for model making
CO5	Analyze the knowledge about non-conventional materials used for model making

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	1	1	2	1	2	1	2	-	1
CO2	3	1	-	1	1	2	1	2	1	2	-	1
CO3	3	1	-	1	1	2	1	2	1	2	-	1
CO4	3	1	-	1	1	2	1	2	1	2	-	1
CO5	3	1	-	1	1	2	1	2	1	2	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	1	1	1	1	2	1	2	1	2	-	1

**SECOND SEMESTER
BARCH PROGRAMME**

SECOND SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR02001	History of Architecture -I	3-0-0	3	WE			
2.	BAR02002	Advanced Building Materials and finishes	2-1-0	3	WE			
3.	BAR02003	Structural Mechanics	3-0-0	3	WE			
4.	BAR02004	Communication Skill	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR02005	Basic Design -II	0-0-6	6		IA	VV	TP
2.	BAR02006	Architectural Graphics - II	0-0-4	2		IA		TP
3.	BAR02007	Building Construction -II	0-0-4	4		IA	VV	TP
4.	BAR02008	Visual Art & Documentation	0-0-4	2		IA	VV	TP
TOTAL			11-1-18 = 30	26				

**DETAIL SYLLABUS
SECOND SEMESTER BARCH PROGRAMME**

SEMSTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2ND	BAR02001	History of Architecture - I	03	03	0	0
<p>Objective</p> <p>The architecture of the world can be categorised as per the timeline of the respective regions of the world with the rock shelters and ancient civilisations of the world.</p> <p>To provide an insight into the architecture of prehistoric period and late ancient civilizations, and the architecture of Classical antiquity of late ancient period. Social, religious and political character, construction methods, building materials and how they influenced their built form and settlement pattern shall be explained with suitable examples. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is embedded in place specific context. The study must enable students to do a comparative evaluation of various civilizations, appreciate chronological developments along the timeline and across geographies.</p> <p>The understanding of space development and structural quality based design approach would enable students to design smaller basic structures/houses with applicable structural principles and construction techniques in mind. Innovation in the use of conventional material in non-conventional way, as portrayed in the landmark historic buildings, would also help students to think out of the box.</p>						
<p>Module 1 PRE-HISTORIC ARCHITECTURE & SETTLEMENT: Introduction to human settlement: People, their shelter, settlement (growth, factors influencing the development of a settlement), burial systems, megaliths, memorials. (<i>Structures: Different types of graves, Stonehenge; & Settlements - World: Catal Hoyuk, Jericho; India: Mehrgarh etc.</i>)</p> <p>INDUS VALLEY CIVILIZATION (IVC) Indus - People, their shelter & civic buildings (typology, planning, construction & aesthetics), settlement pattern & citadel (<i>Structures: Great Bath/Great Granary, simple Harappan house; & Settlements - Mohen-jo-daro/Harappa</i>)</p>						
<p>Module 2 VEDIC: Introduction to vedic era, society and culture, later vedic era (People, their shelter & buildings typology, planning, construction & aesthetics), settlement (typical village, planning, shelter types, materials) (<i>Structures - Vedichouses, Torana, railing around villages; & Settlements - Patliputra</i>) Janapadas, rise of mahajanapadas, Magadha</p>						
Module 3						

NILE VALLEY CIVILIZATION

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

MESOPOTAMIAN (EUPHRATES & TIGRIS) CIVILIZATION:

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

Module 4**CLASSICAL ARCHITECTURE OF ANCIENT GREECE (AEGEAN CULTURE):**

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

Module 5**ROMAN ARCHITECTURE (ETRUSCAN CULTURE)**

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

References

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

Course Outcomes:

CO1 Develop knowledge about prehistoric architecture and its characteristics

CO2 Analyse characteristics and evolution of Vedic Architecture

CO3 Develop knowledge about Nile valley civilization, its architecture and characteristics

CO4	Analyse the development of classical architecture and its influential characteristics
CO5	Recognise the evolution of Roman architecture along with its characteristics

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	1	3	1	1	-	-	1	2	1
CO2	3	3	-	1	3	1	1	-	-	1	2	1
CO3	3	3	-	1	3	1	1	-	-	1	2	1
CO4	3	3	-	1	3	1	1	-	-	1	2	1
CO5	3	3	-	1	3	1	1	-	-	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO
CO	3	3	-	1	3	1	1	-	-	1	2	-

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2ND	BAR02002	Advanced Building Materials and finishes	03	02	01	0
<p>Objective The course intends to introduce different modern building materials, and innovative alternative materials that are being used to make the building more energy efficient and sustainable. To impart knowledge about the properties and application of finishing materials, which is the most dynamic element in the building industry. Property, application and performance of each material is highlighted. To get hands on experience and idea about the material students are required to visit building material outlets and construction sites, and collect product information.</p>						
<p>Module 1 INTRODUCTION AND ADVANCED CONCRETE Introduction to advanced building materials in building industry. Role of advance materials in building performance. Contemporary materials in super structure. Ultra high performance concrete, Ferroock, Liquid granite, Litracon etc. High-Ductility Concrete for Resilient Infrastructures: Engineered Cementitious Composite (ECC), Light weight concrete, Engineered stone, etc.</p>						
<p>Module 2 GLASS Speciality Glass as a contemporary building material. Types and categories of Glass and its application in building facades. Laminated, curved and tempered glass, Kinetic glass, Smart glass and smart windows. Introduction to Digital building facades: Building kinetics and facade engineering, sensor glasses for interiors.</p>						
<p>Module 3 WOOD AND COMPOSITES Wood as an advanced material for buildings: Reconstructed wood, cross laminated timber, Plyboards, composite boards, Acoustics boards, and panelling materials, laminates and veneers, wood foam. Advanced fibre composite materials: Bamboo, glass-reinforced plastic (GRP), Fibre-reinforced polymers (FRP), Shape memory polymer composites.</p>						
<p>Module 4 POLYMERS AND ALLOYS Vacuum insulation panel (VIP), stretched fabric wall systems External Thermal Insulation Cladding System (ETICS), Insulated Vinyl Siding. Different types of stainless steel applications, Polycarbonates. Aluminium composite panels: application method in interior and exterior facades</p>						
<p>Module 5 BUILDING FINISHES</p>						

Paints and Varnishes: Properties and uses of ordinary paints, Varnishes and wood preservatives, method of distempering wall surfaces and painting of timber and metal work. Plastic paints, emulsion paints, cement paint and textured plaster. Enamel and epoxy paints. Reflective indoor coatings and High reflectance and durable outdoor coatings. Nano-materials for building construction and finishes. Different types of flooring and wall cladding tiles, Antistatic Vinyl surfaces.

NOTE

Site visits for practical exposure to different advanced materials and their application in the building industry.
Case studies to be conducted for further documentation of the knowledge explored, and report to be submitted.

References

1. Al-homound, M.S., Performance Characteristics and Practical Applications of Common Building Thermal Insulation Materias, Building and Environment, Vol-40(3), 2005.
2. Duggal, S.K., Building Materials, New Age International Publishing Co., (3rd Ed.), 2008.
3. Varghese, P.C., Building Materials, PHI Learning Pvt. Ltd., 2005.
4. www.in.saint-gobain-glass.com
5. Punmia, B. C. (1993). Building materials and Construction. New Delhi : Lakshmi Publications.
6. Rai, M. (1986). Advances in Building Materials and Construction. CSIR.

Course Outcomes

CO1	Develop knowledge about advanced building materials and their uses.
CO2	Analyse glass as a building material, its uses and characteristics.
CO3	Develop knowledge about wood as a building material, its uses and characteristics.
CO4	Develop knowledge about polymers and alloys.
CO5	Analyse the verity and uses of different kind of finishes

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	1	2	-	1	-	2	2
CO2	3	2	-	-	2	1	2	-	1	-	2	2
CO3	3	2	-	-	2	1	2	-	1	-	2	2
CO4	3	2	-	-	2	1	2	-	1	-	2	2
CO5	3	2	-	-	2	1	2	-	1	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	-	2	1	2	-	1	-	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2ND	BAR02003	Structural Mechanics	03	03	0	0

Objective

To introduce the concepts of behavior of structural components and simple analytical techniques. The course aims at covering basic theorems and mechanical properties of engineering materials, elastic constants, different types of stresses and strains, the deformation of elastic bodies under simple stresses, the use and principles of composite sections, geometrical properties such as centroid, moment of inertia etc of sections for different shapes, analysis of perfect frames for vertical loads by analytical as well as graphical methods.

Module 1

HISTORY TO STRUCTURAL SYSTEMS

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

Module 2

INTRODUCTION TO FORCES AND MOMENTS

Introduction, Forces, system of forces, resultant, equilibrant, Parallelogram law, Triangle law, Lamis Theorem, polygon law, resultant of coplanar, concurrent forces system, couple, characteristics of couple, moment, Equilibrium, Varignon's Theorem

Module 3

SIMPLE STRESSES AND STRAINS, ELASTIC CONSTANTS

Stress, strain, type of stresses, stress-strain curve for ductile material. Hooke's law, Modulus of elasticity, Bars of varying section, Bars of composite section, Shear stress, types of strain, Poisson's ratio, Shear modulus, bulk modulus, relationship between three elastic constants, members subjected to 3 mutually perpendicular forces.

Module 4

CENTRE OF GRAVITY AND MOMENT OF INERTIA

Center of gravity, Center of parallel forces in a plane, Center of gravity, Centroids of curves, Distribution of forces in a plane.

Moment of inertia of plane figure with respect to an axis in its plane, with respect to perpendicular to the plane, parallel axis theorem, Determination of area moment of inertia
Mass moment of inertia, product of Inertia.

Module 5

TRUSSES AND FRAMES

Study of stresses and strains and their effect in various elements of Plane trusses.

Forces in members, analytical method

- Method of joints, Method of sections

Study of bending moment and their effect in various elements of trusses. Bending equation,

- Bending stresses in symmetrical and unsymmetrical sections

References

1. Timoshenko, S., Young, D. H. and Rao, J. V., Engineering Mechanics. 4th Ed. New Delhi: Tata McGraw-Hill Education, 2007.
2. Khurmi R.S., A text book of Engineering Mechanics, S. Chand and Co, New Delhi, 1999.
3. Laudner T.J. and Archer R.R., Mechanics of Solids in Introduction, McGraw - Hill International Editions, 1994.
4. Junarkar S. B., Mechanics of Structures Vol 1, Charotar Publishing House, India, 1995.
5. Rajashekharan, S. and Sankara Subhramanian, G., Fundamentals of Engineering Mechanics, 2nd Edition, Vikas Publishing House Pvt. Ltd.
6. Timoshenko, C.P., and Gere., Mechanics of materials, McGraw - Hill Book Company, New York, 1984.
7. Ferdinand, L. S., Engineering Mechanics: Statics and Dynamics. 3rd Ed. New York: Harper Collins Publishers, 1975.
8. Kumar, K. L., Engineering Mechanics. Delhi : Tata McGraw-Hill Education, 2003.
9. Ramamrutham, S., Engineering Mechanics: A Textbook of Applied Mechanics. New Delhi Dhanpat Rai Publishing Company, 2008.

Course Outcomes

C01	Develop knowledge about structural system and its history.
C02	Evaluate forces and moments along with various laws.
C03	Define the basic concept of stress and strain and their typologies.
C04	Evaluate centre of gravity and moment of inertia.
C05	Analyse the use of Trusses and its various methods of joints and sections.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	-	2	3	-	2	3	-	2	-	1	2
C02	3	-	2	3	-	2	3	-	2	-	1	2
C03	3	-	2	3	-	2	3	-	2	-	1	2
C04	3	-	2	3	-	2	3	-	2	-	1	2
C05	3	-	2	3	-	2	3	-	2	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	2	3	-	2	3	-	2	-	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2ND	BAR02004	Communication Skill	03	03	0	0
<p>Objective To introduce the concepts of behavior of structural components and simple analytical techniques. The course aims at covering basic theorems and mechanical properties of engineering materials, elastic constants, different types of stresses and strains, the deformation of elastic bodies under simple stresses, the use and principles of composite sections, geometrical properties such as centroid, moment of inertia etc of sections for different shapes, analysis of perfect frames for vertical loads by analytical as well as graphical methods.</p>						
<p>Module 1 INTRODUCTION TO COMMUNICATION SKILLS Introduction to types of communication, methods, use & application. Verbal Communication. Developing group discussions and elocution skills. Academic writing & referencing, avoiding Plagiarism.</p>						
<p>Module 2 COMMUNICATION TECHNIQUES-I Business presentation, Illustration techniques - preparing flow charts, tables & diagrams, Books and magazines, film and television posters, coverage etc., reprographic techniques.</p>						
<p>Module 3 COMMUNICATION TECHNIQUES-II Advertising - Typography, artwork, Multimedia - 2D digital graphic design techniques, 3D digital modeling techniques, Packaging – surface decoration such as print, Printmaking – photo screen-printing and etching, scanning and laser printing.</p>						
<p>Module 4 JOURNALISM Introduction to journalism, key concepts & objectives of journalism – specialized journalism, Theories of journalism, techniques and processes. Understanding journalism through media - newspapers, radio, film and television, guidelines for documentation, press laws.</p>						
<p>Module 5 ARCHITECTURAL JOURNALISM Architectural journalism, Skill improvement in reporting, writing, editing, research, write ups, criticism of architecture, structure of architectural journals, writing descriptive and analytical supports, book reviews, page compositions, Analysis of historical and contemporary examples, review and analysis of present architectural styles.</p>						

References

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

Course Outcomes

CO1	Develop knowledge about academic writing and its various aspects.
CO2	Develop the presentation needs and techniques.
CO3	Develop idea about various communication techniques on print media.
CO4	Analyse the terminology and basic structure of journalism as a whole.
CO5	Evaluate the importance of journalism and share their ideas with the common person in an effective way.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	-	-	2	-	-	3	2	1	2	-
CO2	-	1	-	-	2	-	-	3	2	1	2	-
CO3	-	1	-	-	2	-	-	3	2	1	2	-
CO4	-	1	-	-	2	-	-	3	2	1	2	-
CO5	-	1	-	-	2	-	-	3	2	1	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	-	1	-	-	2	-	-	3	2	1	2	

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2ND	BAR02005	Basic Design -II	06	0	0	6
Objective						
<p>Module I ANTHROPOMETRICS Application of form, space, proportion, scale, order, including golden sections and modular concepts through examples from architectural theory and history taught in the previous semester. Anthropometric study and ergonomics of human figure (including physically handicapped persons), dimensions of furniture - relationship with human anthropometrics (like in kitchens, toilets, bedrooms, staircases etc.) Critical analysis of simple man-made objects to understand the underlying concepts in their design. Studies to understand function - Aesthetic Relationship and Anthropometrics.</p>						
<p>Module II BUILDING ELEMENTS AS GENERATORS OF DESIGN (Reference to residences or small structures) Walls, partitions, doors, windows, floors, roof, ceiling, stairs, wardrobes, storage cabinets and furniture could combine in multi-various ways to generate distinctive design solutions that are representative of a concept or theme. Study of functional spaces and the issues like clearances, lighting and ventilation, furniture arrangements, Minimum and optimum areas for various functions.</p>						
<p>Module III ARCHITECTURE AS A DESIGN RESPONSE TO THE PHYSICAL ATTRIBUTES Indoor space, outdoor space, the concept of space in buildings; The relationship between man and space. Defining spaces and the degree of enclosure; Organization of spaces, fenestration and character of facade, enclosure and internal spaces, Perception of space in terms of mundane, vibrant, soothing, irritating, free flowing etc. <ul style="list-style-type: none"> - Quantitative & qualitative analysis of 3-dimensional spaces taking into consideration above concepts. - 3-Dimensional composition resulting into spaces to demonstrate the above concepts. </p>						
<p>Module IV UNDERSTANDING OUTDOOR SPACES AND ELEMENTS Basics of site planning and landscaping; Interpretation of site information as a decision making aid (Location, access, topography, surroundings and site elements such as trees, rock, views etc). Case studies of characteristics of built form – Urban and Rural context.</p>						
<p>Module V DESIGN OF A SMALL STRUCTURE Milk parlour / Snack kiosk / Garden pavilion / Entrance gate with a security booth / Bus stop with toilet, small shop, memorial and traffic island etc.</p>						
<p>References</p> <ol style="list-style-type: none"> 1. Mike W.Lin, Drawing & Designing with confidence – A step by step guide, John Wiley & sons, USA, 1998. 2. Criss B.Mills, Designing with model: A Studio guide to making & using architectural models, Thomson & Wadsworth, USA, 2000. 3. DeChiara and Callender, Time saver standards for building types, Mc Graw Hill Company 4. Bousmaha Baiche & Nicholas Walliman, Neufert Architect's data, Blackwell science ltd. 						

5. Ramsey / Sleeper, National Architectural graphic standards, The American Institute of Architects Building Code – ISI
6. Sam F Miller, Design process– Van Nostrand Reinhold
7. Ching, F. D. K. (2012). Architecture: Form, Space and Order, 3rd Ed. Hoboken : John Wiley & Sons.
8. Pandya, Y. (2007). Elements of Space making, Ahmedabad : Mapin.
9. Peter, V. M. (1998). Elements of architecture – from form to place, 1st Ed. New York : Routledge.

Note

- Study tour of one-week duration is mandatory for conducting case study and field study related to the Architectural Design project.
- All the above modules will be evaluated in the form of Audio/visual and verbal presentation of design work, write up material, drawing work, model making, photography etc.

Course Outcomes

CO1	Develop the idea about relationship of various spaces and elements with human anthropometrics
CO2	Develop knowledge about various kind of building elements
CO3	Defining spaces and the degree of enclosure and evaluating the organization of spaces
CO4	Developing knowledge about outdoor spaces and its elements
CO5	Applying knowledge for planning smaller built forms

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	2	1	2	-	-	-	-	2
CO2	3	3	-	2	2	1	2	-	-	-	-	2
CO3	3	3	-	2	2	1	2	-	-	-	-	2
CO4	3	3	-	2	2	1	2	-	-	-	-	2
CO5	3	3	-	2	2	1	2	-	-	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	2	2	1	2	-	-	-	-	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2ND	BAR02006	Architectural Graphics- II	02	0	0	4
<p>Objective Equip the students with understanding of graphical presentation of objects through geometrical projection and visualization. To introduce students to techniques of architectural representation in 3-dimension and to equip them with the basic methods of presentation techniques. Perspective Drawing and Sciography representation techniques are covered in the course.</p>						
<p>Module I ISOMETRIC VIEWS Introduction to views, types and advantages. Isometric, of objects, building components</p>						
<p>Module II AXONOMETRIC VIEWS Axonometric views of objects, buildings and interior spaces</p>						
<p>Module III PERSPECTIVE VIEWS Introduction to perspectives, difference between views & perspectives, Types of perspectives: one point, two point & three point,- Perspective Drawing of Three Dimensional Objects, Interiors and Exteriors of Building, Sectional perspectives.</p>						
<p>Module IV SCIOGRAPHY Principles of Shade and Shadows, Sciography of Simple and composite forms, Shades and shadows on horizontal, vertical planes, Study of shade and shadows of simple geometrical solids of various forms and groups of forms, shades and shadows on buildings in 2-D and perspective view.</p>						
<p>Module V MEASURED DRAWING Drawings to scale, geometrical representation techniques and drafting skill; Small scale buildings. Drawings include plan, elevations and sections with all measurements and geometrical views (whole or sectional) of the structure.</p>						
<p>References 1. Thoms E. French Graphic Science and Design New York McGrawhill 2. Nichols T. B and Keep Norman Geometry of Construction 3rd ed Cleaver- Hume Press Ltd London 1959 3. Bhatt N. D and Panchal VM Engineering Drawing Plane and Solid Geometry 42nd ed Charotar Pub. Anand, 2000 4. Gill P. S Text Book of Geometrical Drawing 3rd ed Dewan Suhil Kumar Kataria Ludhiana 1986 5. Shah M. G, Kale CM and Patki SY Buidling drawing with an integrated approach to built environment 7th ed Tata McGraw hill Pub. Delhi 2000 6. Claude Bailey Design Development of India</p>						
<p>Note</p>						

This course employs a lab strategy where instructor introduces, demonstrates use of a tool/techniques. Students are supervised on-to-one basis. Primarily stress is given to skill development by hands-on experience with support of reference material.

Course Outcomes

CO1	Develop the idea about isometric views
CO2	Develop the idea about axonometric views
CO3	Develop the idea about perspective views and applying it on architectural designs
CO4	Developing knowledge about sciography
CO5	Demonstrating the process and techniques of preparation of measure drawings

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	3	-	-	1	-	-	-	-	1
CO2	3	3	-	3	-	-	1	-	-	-	-	1
CO3	3	3	-	3	-	-	1	-	-	-	-	1
CO4	3	3	-	3	-	-	1	-	-	-	-	1
CO5	3	3	-	3	-	-	1	-	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	3	-	-	1	-	-	-	-	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2ND	BAR02007	Building Construction -II	04	0	0	4
<p>Objective To introduce students to details of shallow and deep foundations. timber Learning of carpentry joints and construction details of timber doors and windows are one of the important course objective. Roofing techniques using different materials are taught.</p>						
<p>Module I FOUNDATION Deep Foundation: Definition, problems in deep excavation, terms of timbering, methods of timbering, precautions to be taken in deep excavation, dewatering. Grillage foundations, Pile foundations, Caisson foundations, Basement wall and foundation, etc.</p>						
<p>Module 2 STAIRCASE Types of R.C.C. & M.S. staircase & ramps.</p>						
<p>Module 3 CARPENTRY JOINERY DETAILS Lengthening and widening joints, Lap joints, tongue and groved joints, mortise and tenoned joints, Haunched tenon and mortise joints, dove tail joints, oblique tenon joints, etc.</p>						
<p>Module 4 TIMBER DOORS AND WINDOWS Doors: classification of doors; (a) panelled doors. (b) ledged and battened doors, (c) ledged, braced and battened doors, (d) framed, ledged, braced, and battened doors (e) flush doors Windows: Timber windows; Casement window and its details</p>						
<p>Module 5 DIFFERENT TYPES OF ROOFS - Flat- Madras terrace roof, RCC slab, Pitched- lean to, coupled, couple close, collar, scissor, king post and queen post Roof covering materials - asbestos, GI sheets, Fibre, Glass, Aluminium, asphaltic, polycarbonate, clay tiles. Roof fixing details along with gutter.</p>						
<p>Note</p> <ul style="list-style-type: none"> • Frequent site visits to be arranged as a part of the curriculum. Site visits should be in line with the present studio work. It is mandatory for students to submit a site observation report, either periodically or at the end of the semester. • Pedagogy should establish the linkage of the relevant material and construction techniques from past to present. • Performing standards and Codes used for various Building Materials and Construction Techniques needs to be focused. • Alternative construction techniques for respective topics needs to be discussed in detail. • The subject is to be integrated with the ongoing subject of Basic Design- II through one or many assignments. 						

References

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

Course Outcomes

CO1	Develop the knowledge about foundations and its types
CO2	Develop the knowledge about staircase
CO3	Develop the knowledge about carpentry work
CO4	Demonstrating various kind of timber doors and windows
CO5	Develop the knowledge about roofs

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	-	2	3	-	-	-	-	3
CO2	3	2	-	1	-	2	3	-	-	-	-	3
CO3	3	2	-	1	-	2	3	-	-	-	-	3
CO4	3	2	-	1	-	2	3	-	-	-	-	3
CO5	3	2	-	1	-	2	3	-	-	-	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	1	-	2	3	-	-	-	-	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
2nd	BAR02008	Visual Art & Documentation	02	0	0	4
<p>Objective To introduce the students to fundamentals of visual arts and the use of graphics, colour and rendering for presentation of architectural drawings and visual communication. Visual documentation enables to enhance effective use of graphics and artistic skill for visual communication. To expose the students to real world situation and to represent the observation and understanding through graphics, sketches and architectural technical drawings.</p>						
<p>Module I BASIC SKILLS OF VISUAL ART Basic representation techniques in different media through drawing pencil, pen, brush, charcoal, crayons etc Free Hand sketching: line strokes, value, tones of simple natural and 3D geometric forms. Study of forms in nature and analysis with respect to their colour, form, texture and structure. Exercises involving these natural forms and various approaches to art such as – Representation, Abstraction and Non-Representational/ Non-Objective compositions.</p>						
<p>Module 2 RENDERING TECHNIQUES Monochromatic & different themes of rendering, architectural rendering techniques using pen & ink, color, values, tones, and general approach to rendering. rendering of sky, landscape elements, and human figures; Rendering of buildings with foreground and surroundings showing shades and shadows.</p>						
<p>Module 3 ORNAMENTATION IN BUILDINGS Study of ornamentation in architecture design: use of circle in mouldings, Ovolo Covetta, Ogee, Lancet, Horse shoe, Moorish, Stilted and rampant- Tudor, three centered and drop, Exercises on columns, entablature, pediments, cornices, balustrades.</p>						
<p>Module 4 DOCUMENTATION Outdoor sketching: Built environment, Natural Landscape, Rural, Heritage and Urban built environment, e.g. streetscape, chowks, squares, skyline, facade, views and vistas. etc. Understanding variety in Forms.</p>						
<p>Module 5 SOFTWARE GRAPHICS Introduction of various software available for Architectural presentation such as Photoshop & Coral. Basic Tools for Editing and Creating Graphics. Movie making Flash movies, animation graphics, 3D Printing.</p>						
<p>References 1. Albert O’Halse, Architectural Rendering: The Techniques of Contemporary Presentation,</p>						

McGraw Hill Book Company. New York, 1972.

2. Ching, F. D. K. *Architectural Graphics*. 5th Ed. Hoboken : John Wiley & Sons, 2009.
3. Shankar Mulik, *Perspective & Sciography*, Allied Publishers
4. Shah, M.G.. & Kale, K.M., *Perspective Principles*, Asia publication, Mumbai.
5. Atkins, B., *Architectural Rendering*. California : Walter Foster Art Books, 1986.
6. Francis D. K. Ching & Steven P. Juroszek, *Design drawing*, John Wiley & Sons, USA, 1998.
7. H. Morris, *Geometrical Drawing for Art Students*, Orient Longman, Chennai.
8. Holmes, J. M., *Applied Perspective*. London : Sir Isaac, Piotman and Sons Ltd., 1954.
9. Thoms E. *French Graphic Science and Design* New York McGrawhill
10. Atkin William W Corbelletti Raniero and Fiore R Vincent (1962). *Pencil Techniques in Modern Design* 4th ed Reinhold Pub. Corporation New York

Course Outcomes

CO1	Defining visual art and developing its process
CO2	Demonstrating rendering techniques
CO3	Analysing ornamentation in building
CO4	Developing knowledge about documentation
CO5	Applying the knowledge of software graphics

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	3	-	-	-	-	1	-	1	2
CO2	2	3	2	3	-	-	-	-	1	-	1	2
CO3	2	3	-	3	-	-	-	-	1	-	1	2
CO4	2	3	2	3	-	-	-	-	2	-	1	2
CO5	2	3	3	3	-	-	-	-	2	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	3	2	3	-	-	-	-	1	-	1	2

**THIRD SEMESTER
BARCH PROGRAMME**

THIRD SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR03001	History of Architecture -II	3-0-0	3	WE			
2.	BAR03002	Climatology	2-1-0	3	WE			
3.	BAR03003	Structural Analysis	3-0-0	3	WE			
4.	BAR03004	Water Supply and Sanitation	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR03005	Architectural Design - I	0-0-9	9		IA	VV	TP
2.	BAR03006	Surveying and Leveling	1-0-2	2		IA		TP
3.	BAR03007	Building Construction -III	0-0-4	4		IA	VV	TP
4.	BAR03008	Computer Applications - I	1-0-2	2		IA	VV	TP
TOTAL			13-1-17 = 31	29				

**DETAIL SYLLABUS
THIRD SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03001	History of Architecture - II	03	03	0	0
Late Ancient and Early Medieval (1st Century AD – 1000AD)						
Objective						
To provide an overview of the architecture of early Medieval period across different geographies. Social, religious, political and architectural character, construction methods and building materials shall be explained with suitable examples. To provide an understanding of the evolution of Classical period and Church architecture of the west, and Indian Architecture in its various stylistic modes characterized by technology, ornamentation and planning practices. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is embedded in place specific context. The study must enable students to do a comparative evaluation of developments in a chronological manner along the timeline and across different geographies.						
Module 1						
EARLY CHRISTIAN ARCHITECTURE						
Evolution of church form from the Roman Basilica, architectural character & space planning, Schism of Roman Empire to Western & Eastern Provinces, Polymath architecture & Baptisteries, (<i>Structures – St. Peters Basilica, St. Clemente</i>).						
Module 2						
CHURCH ARCHITECTURE OF BYZANTINE						
Factors influencing Byzantine Architecture, development of Domes & Pendentives, (<i>Structures – Hagia Sophia at Constantinople</i>); Romanesque – evolution of religious orders in Christianity – Italy (<i>Pisa Cathedral complex</i>) & England (<i>Tower of London</i>).						
Module 3						
BUDDHIST AND JAIN ARCHITECTURE						
Symbolism of Buddhist Architecture, rock-cut architecture, Ashokan School (Hinayana & Mahayana Period), development of stupa, Buddhist schools – Mathura School & Takshashila School (Greek influence) (<i>Structures – Chaitya & Vihara, Monolithic Ashokan Pillars, Rock-edicts, Stupa of Sanchi / Amravati</i>)						
Symbolism of Jain Architecture, rock-cut architecture, general planning, sitting and decorative treatments of Jain temples. (<i>Structures – Dilwara temple of Mt. Abu, Jain temple- Adinatha temple, Ranakpur</i>)						
<i>Prominent Sites:</i>						
<ul style="list-style-type: none"> • Sanchi stupa • Rock edicts: Maski, Kaushambi, Jaugada, Dhauri etc • Pillar edicts: Lauriya, Rummindei, Rampurva etc • Ancient towns: Girnar, Sarnath etc • Ajanta caves • Iron pillar in Mehrauli • Bhitragon temple and Deogarh temple 						

- Hindu and Buddhist temples at Sarnath
- Nalanda and Taxila

Module 4

EARLY TEMPLE ARCHITECTURE

Study of worshipping places in Indo aryan / Nagara style, role of Shilpasasthras, design of buttressed shikharas, rock cut and structural examples of temples. Evolution of Hindu temples, early shrines of Gupta (*Tigwa, Sirpur, Deogarh*) & Chalukya (*Ladh Khan, Durga Temple*), Development of Indo-Aryan style (*Papanatha, Virupaksha at Pattadakal*),
Temples and Pagodas of South East Asia: Cambodia- Angkor Wat, Borobudur; Nepal

Module 5

DRAVIDIAN TEMPLE ARCHITECTURE

Study of worshipping places in Dravidian style, role of Shilpa sasthras, design of Gopuram & Shikhara, rock cut and structural examples of temples. Dravidan Style: Rock-cut of Pallavas (*Rathas & Mandapa*) & Structural (*Shore temple of Mahabalipuram*).
 Dravidian style in Pallava, Chola, Pandya periods Kailashnath temple Kanchipuram

References

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

Course Outcomes

CO1	Analyze the concept of Early Christian Architecture
CO2	Evaluate the characteristics of Early Byzantine Architecture
CO3	Express the understanding about the Early Buddhist and Jain Architecture
CO4	Analyze the concept of Early Temple Architecture in North India
CO5	Evaluate the characteristics of Early Temple Architecture in South India

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	1	3	1	1	-	-	1	2	1
CO2	3	3	-	1	3	1	1	-	-	1	2	1
CO3	3	3	-	1	3	1	1	-	-	1	2	1
CO4	3	3	-	1	3	1	1	-	-	1	2	1
CO5	3	3	-	1	3	1	1	-	-	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	1	3	1	1	-	-	1	2	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03002	Climatology	03	02	01	0
<p>Objective To impart scientific understanding of processes by which building and entire habitats can be designed to respond to nature, with climate as the basic parameter of design. To study fundamental parameters for thermal comfort. Equip the students with fundamental scientific concepts required to design climate responsive buildings, by offering a clear understanding of the various climatic zones and its climate responsive considerations in architectural design of building and built up areas.</p>						
<p>Module 1 CLIMATE & THERMAL COMFORT Effect of climate on habitat, shelter and environment. Global Climatic factors, elements of climate, graphic representation of climatic data, psychrometric chart, Mahoneys Tables, Study of world climatic zones, characteristics of tropical climate. Human comfort conditions – Thermal balance of the human body, comfort chart, comfort zone, Thermal comfort indices- Effective temperature, CET, humidity, radiation, wind, precipitation and its considerations at Macroclimate and Microclimate (Site- climate), challenge of rapid, extreme environmental change.</p>						
<p>Module 2 PRINCIPLES OF THERMAL DESIGN Thermal quantities – heat flow rate, surface conductance, transmittance – calculation of U- value, convection, radiation, concept of sol-air temperature & solar gain factor, conductivity (k-value), resistivity, thermal capacity and emissivity, conductance through a multi-layered body. Basic principles of heat transfer through buildings, Exercises in heat loss & heat gain under steady state conditions & its application in selection of appropriate materials for walls & roof. Exercises using different measuring instruments in indoor and outdoor conditions.</p>						
<p>Module 3 SOLAR GEOMETRY & DESIGN OF SUNSHADING DEVICES Apparent movement of the sun, sun path diagrams (solar chart) - Solar angles, Shadow angles, solar shading elements, etc. Exercises on plotting isopleths, transfer of isopleths to solar chart, fitting a shading mask over the overheated period & design of sun shading devices for different orientations.</p>						
<p>Module 4 VENTILATION IN BUILDINGS Ventilation- The wind, The effects of topography on wind patterns, principles of natural ventilation, wind flow around buildings and air flow patterns inside buildings, air change, quality of air, use of fans, thermally induced air currents, Pressure losses: Stack effect, Venturi effect, Use of courtyard. Wind velocity – wind rose diagram. Exercises on anemometer and its use. Wind tunnel experiment for wind movement around the buildings.</p>						

Module 5**DESIGN FOR CLIMATIC TYPES**

Building design & lay out planning consideration for warm humid, hot dry & composite climates, Tropical climate. Evaluating various built form and orientation of single building, Building material and construction for comfort conditions in the tropics. Effect of landscape elements on Climate and Architecture.

Passive Cooling:: Passive methods of Cooling, roof pond, desiccant cooling, Evaporative Cooling and earth sheltered buildings etc.

Exercises on climatic data sets, analysis, climate graph, the Mahoney tables & its recommended specification

References

1. *O.H. Koenigsberger, Manual of Tropical housing and building – Climatic Design, Orient Longman, Chennai, 1975.*
2. *M .Evans – Housing, Climate & Comfort , Architectural Press, London ,1980.*
3. *E.Schild & M.Finbow – Environmental Physics in construction & its application in Architectural Design, granadar , London, 1981.*
4. *Olgyay, A. and Olgyay, V., Solar Control and Shading Devices. New Jersey : Princeton University Press, 1976.*
5. *Krishan, A. and Nick Baker, Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, McGraw Hill Education Private Limited, India, 1999.*
6. *B.Givoni, Man, Climate & Architecture, Applied Science, Essex 1982.*
7. *Donald Watson & Kenneth labs – Climatic Design – Mcgraw hill NewYork 1983.*
8. *A.Konya- Design Primer for Hot Climates, Architectural Press, London, 1980.*
9. *Chand, I. and Bhargava, P. K., The Climatic Hand Book. New Delhi : Tata McGraw-Hill, 1999.*

Course Outcomes

CO1	Implement the basic knowledge about Climate and its elements
CO2	Demonstrate the knowledge about thermal design
CO3	Implement principles of solar geometry and sun-shading devices
CO4	Analyze the knowledge about ventilation in building
CO5	Evaluate the building design according to different climatic condition

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	1	2	3	3	-	-	1	2	3
CO2	3	-	-	1	2	3	3	-	-	1	2	3
CO3	3	-	-	1	2	3	3	-	-	1	2	3
CO4	3	-	-	1	2	3	3	-	-	1	2	3
CO5	3	-	-	1	2	3	3	-	-	1	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	1	2	3	3	-	-	1	2	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03003	Structural Analysis	03	03	0	0
<p>Objective</p> <p>With the acquired knowledge of statically equilibrium of forces the course aims at teaching methods to determine effect of loads on members of different determinate structures and give additional knowledge of deformation of structures to solve indeterminate structures. To familiarize the student with the effects of transverse forces such as shear force & bending moment in beams; determination of SF & BM in simple beams under different loading systems; and understanding of strength and forces in columns and arches.</p>						
<p>Module 1</p> <p>Introduction to determinate and indeterminate structures, Different types of loads acting on a structure</p> <p>BEAMS: TYPES & PROPERTIES</p> <p>Types of beams, its behaviour, types of supports (fixed, simple supported), and reactions, bending moment and shear forces; simply supported, cantilever and overhanging beams, relation between bending moment and shear force.</p> <p>Explaining with Shear force diagram (SFD) and Bending moment (BMD).</p>						
<p>Module 2</p> <p>BENDING AND SHEAR FORCES</p> <p>Shear force and bending moment for fixed and continuous beams, application of Clapperayon's theorem of three moments. Moment distribution method.</p> <p>Determination of member of forces in determinate trusses and simple frames</p>						
<p>Module 3</p> <p>DEFLECTION</p> <p>Relation between slope, deflection and curvature, cantilever beams with point load & udl using double integration method & moment area methods, three moment theorem, deflection by conjugate beam method.</p> <p>Deflection-II, Introduction of Maculay's method, slopes and deflections, simply supported beams with point load & udl using double integration & Macaulay's method, Fixed beams: Introduction, Application to simple cases including overhanging beams.</p>						
<p>Module 4</p> <p>COLUMNS</p> <p>Types of columns, columns and struts, buckling and crushing failure, Euler's theory, equivalent length and slenderness ratio, Rankine's formula.</p>						
<p>Module 5</p> <p>ARCHES</p> <p>Determination of horizontal thrust, radial shear and normal force, axial thrust, Bending moment and Shear force for three-hinged arch; segmental arches with supports at same level and different levels. Structural concepts in post & lintel, arch, dome, and vault construction.</p>						

References

1. Junnarkar, S. B. (1991). Mechanics of Structures. Vol. 1. 20th Ed. Delhi : Charotar.
2. Kurmi, R. S. Strength of Materials. New Delhi : S. Chand & Company.
3. Mukherjee, S. Elements of Engineering Mechanics. New Delhi : PHI Learning.
4. Ramamrutham, S. (2008). Engineering Mechanics: A Textbook of Applied Mechanics. Dhanpat Rai Publishing.
5. Vazirani and Ratwani. (2008). Analysis of Structures. Vol. I. New Delhi : Khanna Publishers.
6. Gere, J. M & Timoshenko, S. P. , Mechanics of Materials , CBS Publishers & Distributors.

Course Outcomes

CO1	Analyze the concept of Beams and affecting forces
CO2	Implement principles of bending and shear force
CO3	Analyze the concept of deflection
CO4	Apply basic principles of columns and its structural roles
CO5	Demonstrate basic principles of arches and its structural roles

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	1	-	-	1	-	-	-	1	2
CO2	3	-	-	1	-	-	1	-	-	-	1	2
CO3	3	-	-	1	-	-	1	-	-	-	1	2
CO4	3	-	-	1	-	-	1	-	-	-	1	2
CO5	3	-	-	1	-	-	1	-	-	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	1	-	-	1	-	-	-	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03004	Water Supply and Sanitation	03	03	0	0
<p>Objective To provide knowledge and understanding of the fundamentals of water supply and sanitation infrastructure required for buildings and urban areas, so as to enable them to comprehend the subject thoroughly and integrate the learning into architectural design. Students to be encouraged to explore technologies for recycling and reuse of water and solid waste.</p>						
<p>Module 1 WATER SUPPLY Introduction, types of sources, yield & spacing of wells, intakes, pumping and transportation of water. Treatment of water, qualities of potable water. Domestic water distribution system, reservoirs, supply system layouts, Pipe appurtenances, pumps, pumping plants, overhead tanks, water demand calculations. Building service connection, Ferrules, Water meters. Layout of domestic water piping systems, joints, fittings and valves. Cold & hot water lines in buildings, Water supply to high rise buildings: problems encountered & systems adopted.</p>						
<p>Module 2 BUILDING SANITATION Principles of sanitation, collection and disposal of various kinds of refuse from buildings. Methods of carrying refuse, systems of refuse disposal, their principles. Plumbing definitions and related terms, plumbing systems (one pipe, two pipe etc), Design of drainage and vent pipes, system for low-rise and high-rise buildings, building drains, sewers, gullies, inspection chambers, manholes, connection to public sewer, cross connections, House drainage system, Drainage of sub-soil water, Sub-drains, culverts, ditches and gutters, drop inlets and catch basins, roads and pavements, storm overflow/regulators.</p>						
<p>Module 3 PLUMBING AND SANITARY APPLIANCES Basic principles of Plumbing, need, scope, terminology. Specifications and installation of sanitary fittings like shower temple, bath tub, Jacuzzi, water closets, flushing cisterns, urinals, sinks, wash basins, bidet, low flow fixtures, etc. Uses of gate valve, float valve, flap valve, ball valve, flush valve, etc, different types of taps, faucets, stop cocks, bib cocks, 'P', 'Q', 'S', floor/bottle traps used in buildings.</p>						
<p>Module 4 SEWERAGE AND SOLID WASTE DISPOSAL Indian standards and byelaws for sanitary conveyance. Disposal of sewage from isolated building, Gradients used in laying of drains and sewers for various sizes. Septic tank details & capacity calculation. Sewage treatment. biogas, soil disposal without water carriage, rural sanitation. Oxidation pond, Dispersion trench and soak pits Sewerage Treatment system- Root zone treatment system, Decentralized Wastewater Treatment Systems (DEWATS), Soil Bio technology, packaged Bio-Reactor System Approaches for solid waste management, Solid wastes collection and removal from buildings. On-site processing and disposal methods, guidelines for municipal solid waste management, e-waste management</p> <p>DISPOSAL OF WASTES: Sanitary land filling, Composting, Vermi-compost, Incineration, Pyrolysis</p>						

Module 5**DESIGN OF PLUMBING SYSTEMS**

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

References

1. Birdie, B. S. (1996). Water supply and Sanitary Engineering. Dhanpat Rai and Sons.
2. National Building Code of India. (2005).
3. Punmia, B. C., Jain, A. K. and Jain, A. K. (1995). Water Supply Engineering. New Delhi: Laxmi Publications.
4. Punmia, B. C., Jain, A. K. and Jain, A. K. (1998). Waste Water Engineering. New Delhi: Laxmi Publications.
5. Rangwala, S. C. (2005). Water Supply and Sanitary Engineering. Charoter Publishing.
6. Handbook Water Supply and drainage with Special Emphasis on Plumbing. Bureau of Indian Standards, New Delhi.

Course Outcomes

CO1	Analyze the concept of Water sources and water supply system
CO2	Apply basic principles of sanitation process in buildings and other built-forms
CO3	Demonstrate the knowledge about sanitary fittings, valves and faucets
CO4	Demonstrate the knowledge about sewerage and solid waste disposal
CO5	Implement principles of plumbing system and its principles

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	1	2	1	-	-	-	1	2
CO2	3	1	-	3	1	2	1	-	-	-	1	2
CO3	3	1	-	3	1	2	1	-	-	-	1	2
CO4	3	1	-	3	1	2	1	-	-	-	1	2
CO5	3	1	-	3	1	2	1	-	-	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	1	-	3	1	2	1	-	-	-	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03005	Architectural Design - I	09	0	0	9
<p>Objective To explore the interrelationship between human behaviour and space in a small residential environment, including, volume of space, shape, form, function, climate and materials.</p>						
<p>1. MAJOR DESIGN PROBLEM</p> <p>Residential Built spaces</p> <p>Intent To make the students know about and resolve the complexities involved in integrating living and working spaces in urban areas and understanding the relationship of internal spaces in such structures.</p> <p>Focus Areas</p> <ul style="list-style-type: none"> • Formulations of the concept • Appropriate Space-planning methods (facilitation and circulation) • Various functions and their spatial implications • Integration of form and function • Anthropometry and furniture layout • Horizontal circulation • Interior volumes and space articulation through different materials • Relationship of varied spaces having a composite relationship of occupancy and their nature [vertical(2 to 3 /evels)/horizontal] • Impact of Living and Working environments on the psychology of users <p>Allied Knowledge Required</p> <ul style="list-style-type: none"> • Types of relevant furniture and techniques of area analysis • Basic contemporary building materials and their applications • Principles of framed structures <p>Examples of Studio Projects Residence cum workplace - Artist's residence, Architect's residence, Doctor's residence, Sculptor's residence, Farm house etc.</p>						
<p>2. SMALL SCALE PACE SETTER DESIGN PROBLEM</p> <ul style="list-style-type: none"> • Small design problems using metaphors, signs & symbols as a design tool • Small form oriented design problems <p>Examples: Doctor's Clinic, small Cafeteria, Highway Restaurant, Village post office, Bank extension counter</p>						
<p>Note</p> <ul style="list-style-type: none"> • Study tour of one-week duration is mandatory for conducting case study and field study related to the Architectural Design project. • End Semester evaluation will be done by external jury member (from Academics or Professional Architect) other than the University faculty. 						
<p>References</p>						

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

Course Outcomes

CO1	Implement the concept of Anthropometry
CO2	Analyze Zoning and Circulation
CO3	Demonstrate Relationship of varied spaces
CO4	Evaluate the Impact of Living and Working environments on the psychology of users.
CO5	Analyze the concepts of Small form-oriented design problems

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03006	Surveying and Levelling	02	1	0	2

Objective

To equip students with the basic principles and theories which underlie the systematic study of topographic features, through different methods of land surveying. Basic skills of landform analysis, execution of field survey for foundation lay outing, contour survey, gradient plotting, surveying physical features, etc. are covered in the course. To train the students for preparation and interpretation of survey drawings, methods, tools and equipment necessary to carryout different survey procedures and recent advancements in the field of landforms survey and measurements.

NOTE: Theoretical understanding about different surveying techniques taught in each module to be imparted in the beginning of the respective modules before doing the practical site surveys.

Module 1

INTRODUCTION AND LINEAR MEASUREMENTS

LECTURE

Reading of survey Maps, understanding of features and undulations of ground; Scales used in Plotting.

Linear measurement and chain survey: use of various types of chains and tapes, setting-out & survey stations, measurement of correct length of line, direct and indirect ranging, open & closed traverse changing along sloping ground, Obstacles in chaining, errors, and their elimination
Compass survey, bearings & angles, local attractions, errors in compass survey.

Log-books, field boundaries, field area estimation.

PRACTICALS

Chaining station points, offsets, field-book entry, single- & double-line entry, Triangulation, Traversing, Plotting, Calculation of Areas. Compass Surveying Traversing, balancing, closing errors, plotting, calculating areas.

Module 2

LEVELLING

LECTURE

Profile levelling, Use of auto level and levelling staff; Temporary and Permanent adjustments of auto level; Reduction of levels by H.I and rise and fall method. Curvature and refraction error, sensitiveness of level tube, reciprocal levelling, levelling difficulties and common errors

PRACTICAL

Profile levelling using auto level and staff.

Module 3

CONTOURS IN LANDFORMS

LECTURE

Characteristics of contours, Contour interval and horizontal equivalent, methods of contouring- direct and indirect method, contour gradient, block contour surveys, longitudinal & traverse cross sections, gradients, Contouring methods & equipment, plane-table, plotting contours & profiles, estimating areas & volumes.

PRACTICAL

Method of Plane Table Surveying, Two- & Three-Point Problems.

<p>Module 4 THEODOLITE SURVEY & MEASUREMENT LECTURE Theodolite Surveying, temporary adjustment, measuring horizontal and vertical angles, closing errors, theodolite traversing PRACTICAL Theodolite, measuring vertical and horizontal angles, Theodolite Plotting, balancing closing errors.</p>
<p>Module 5 PRECISION METHODS LECTURE Automated & digital surveying, Total station, G.P.S PRACTICAL Demonstration of Surveying with Total Station equipment.</p>
<p>References 1. Shahani, P. B. (1980). Text of Surveying Vol. I. Oxford and IBH Publishing. 2. Punmia, B. C., Jain, A. K. and Jain, A. K. (2005). Surveying Vol. I-III. New Delhi : Laxmi Publications. 3. Duggal, S. K. (2004). Surveying Vol. 1-2. New Delhi : Tata McGraw Hill. 4. Miller, V. C. and Westerback, M. E. (1989). Interpretation of Topographic Maps. Columbus: Merrill. 5. Easterbrook, D.J. (1999). Surface Processes and Landforms. 2nd Ed. New York : McMillan. 6. Carson, M. A. and Kirkby, M. J. (1972). Hill slope Form and Process. London and New York : Cambridge University Press. 7. Kanetkar, T. P. & Kulkarni, S. V., Surveying & levelling, Vol - 1.</p>

Course Outcomes

CO1	Analyze the concept of survey Maps and undulations of ground
CO2	Analyze the concept of Levelling
CO3	Apply basic principles of contours
CO4	Demonstrate basic principles of Theodolite Surveying
CO5	Express the concept of Automated & digital surveying

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	1	-	-	-	-	-	-	-
CO2	3	-	-	3	1	-	-	-	-	-	-	-
CO3	3	-	-	3	1	-	-	-	-	-	-	-
CO4	3	-	-	3	1	-	-	-	-	-	-	-
CO5	3	-	-	3	1	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	3	1	-	-	-	-	-	-	-

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03007	Building Construction -III	04	0	0	4
<p>Objective To understand fundamental building material in the context of various construction methods. Focus on various building materials would be emphasised based on the performing standards and codes, wherein application of each material would be discussed in detail, both in the context of traditional and modern construction methods and practices. Based on the lecture delivered, the students are required to produce construction and detail drawings. With time, each topic can also focus on latest trends in practice and usage of new technology/materials.</p>						
<p>Module1 DOORS Introduction of Glass, Fibre Glass, Aluminium and Steel as building materials Types of doors based on the make Sliding door, Sliding door, pivoted, revolving, swing, rolling shutter, safety doors, collapsible and etc., hardware fixtures, joinery, door-fixing details, and types of materials used in doors (metal, glass, aluminium, & PVC).</p>						
<p>Module 2 WINDOWS AND VENTILATORS Types of windows based on the make sliding, pivot, casement, louvered, fixed, bay window, etc.) and material (steel, glass and aluminum) hardware fixtures, joinery, window fixing Anodised aluminium, steel and UPVC window sections.</p>						
<p>Module 3 DEEP EXCAVATION, SCAFFOLDING & FORMWORK, SHORING, AND UNDERPINNING Definition, problems in deep excavation, terms of timbering, methods of timbering, precautions to be taken in deep excavation, dewatering. Types of scaffolding, formwork (slab, arches, vaults and domes) shoring and underpinning, precautions to be taken, and methods adopted while doing.</p>						
<p>Module 4 TIMBER FLOORS Timber floors: construction techniques, types of timber floors: single, double and triple joist timber floors Types of timber partitions: Single, double and flushed timber partitions</p>						
<p>Module 5 TIMBER PARTITIONS Types of timber partitions: Single, double and flushed timber partitions finished with laminates, veneer and other materials.</p>						

NOTE:

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

- Pedagogy should establish the linkage of the relevant material and construction techniques from past to present.
- Performing standards and Codes used for various Building Materials and Construction Techniques needs to be focused.
- Alternative construction techniques for respective topics needs to be discussed in detail.

References

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

Course Outcomes

CO1	Analyze the concept of Doors.
CO2	Apply basic principles of Windows and Ventilators.
CO3	Express the concept of deep excavation and scaffolding.
CO4	Demonstrate basic principles of Timber Floors.
CO5	Apply basic principles of Timber Partition

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	-	2	3	-	-	-	-	3
CO2	3	2	-	1	-	2	3	-	-	-	-	3
CO3	3	2	-	1	-	2	3	-	-	-	-	3
CO4	3	2	-	1	-	2	3	-	-	-	-	3
CO5	3	2	-	1	-	2	3	-	-	-	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	1	-	2	3	-	-	-	-	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
3RD	BAR03008	Computer Applications - I	02	1	0	2
Objective						
To familiarize students with basic understanding of documentation and presentation software. To develop skill in using Computer aided Architectural Design software for preparing architectural drawings.						
Module 1						
Introduction to Applications of MS Office in presentation: Microsoft Word, Microsoft Power Point, Microsoft Excel, Adobe Page Maker.						
Module 2						
Introduction to computer aided design in architecture. Introduction to two-dimensional drafting in CAD. Understanding commands like Draw, Modify, use of tools, layers, plotting system and its applications etc.						
Module 3						
Customization of Auto-CAD, Auto-CAD express tools, creation of architectural library elements and blocks, applying materials and rendering. Google Sketch-up application in 3D architectural drawings, modelling, creation of entities, dimensioning, application of solids and surfaces.						
Module 4						
Application of CAD in small Architectural projects done in the previous semester design class through site plan, floor plan, presentation plan, elevation and section using appropriate software.						
Module-5						
Seminar on another related software like ARCHICAD/REVIT to understand basic differences between the two.						
Reference						
<ol style="list-style-type: none"> Gindis, E. (2014). Up and Running with AutoCAD 2015: 2D & 3D Drawing and Modelling. Oxford : Elsevier. Seidler, D. R. (2007). Digital Drawing for Designers: A Visual Guide to AutoCAD 2012. London: Fairchild Publications. Tutorials: http://www.lynda.com/ 						

Course Outcomes

C01	Demonstrate basic working of MS Office
C02	Implement principles of CAD Drawings.
C03	Demonstrate working of CAD Drawings in projects.
C04	Apply basic principles of 3D Modelling.
C05	Analyze the concept of working on CAD and 3D Modelling together

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	-	-	-	1	-	1	-	1	1
CO2	2	2	3	-	-	-	1	-	1	-	1	1
CO3	2	2	3	-	-	-	1	-	1	-	1	1
CO4	2	2	3	-	-	-	1	-	1	-	1	1
CO5	2	2	3	-	-	-	1	-	1	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	2	3	1	1	-	1	2	1	-	1	1

**FOURTH SEMESTER
BARCH PROGRAMME**

FOURTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR04001	History of Architecture -III	3-0-0	3	WE			
2.	BAR04002	Design of RCC Structures	3-0-0	3	WE			
3.	BAR04003	Lighting and Electrical Services	2-1-0	3	WE			
4.		Professional Elective (PE) -I	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR04004	Architectural Design - II	0-0-9	9		IA	VV	TP
2.	BAR04005	Building Construction -IV	0-0-4	4		IA	VV	TP
3.	BAR04006	Computer Applications - II	1-0-2	2		IA	VV	TP
TOTAL			12-1-15 = 28	27				

**DETAIL SYLLABUS
FOURTH SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BAR04001	History of Architecture - III	03	03	0	0
Medieval - Early Modern (10th Century - 19th Century AD)						
Objective To impart understanding of the evolution in architecture and urbanism from the medieval to Early Modern times; Social, religious and political character, building materials, construction methods, landscape and how they influenced their built form and settlement patterns shall be explained with examples. Knowledge of European Renaissance and Mughal architecture in India is provided; Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is embedded in place specific context.						
Module 1 GOTHIC & RENAISSANCE ARCHITECTURE Evolution of vaulting & development of structural system (flying buttress, pinnacles, spires, pointed arches); Italian Gothic (<i>Vatican City and St Peters Cathedral</i>), French Gothic (<i>Notre Dame at Paris</i>), English Gothic (<i>Westminster Abbey</i>). Renaissance architecture at Italy and France, Baroque Period.						
Module 2 TEMPLE ARCHITECTURE <ul style="list-style-type: none"> • Indo-Aryan – salient features & development of Shikharas. Odishan – Early (<i>Vaithal Deula / Parshurameswar</i>), Middle (<i>Lingaraj / Konark Sun Temple</i>), Late (<i>Mukteswar / Raja Rani</i>); • Gujarat (<i>Surya Temple, Modhera</i>); Central India (<i>Khadariya Mahadev, Khajuraho</i>); • Dravidian – Rock-cut of Pallavas (Rathas& Mandapa) & Structural (Shore temple of Mahabalipuram); Salient features & development of Vimanas & Gopuram. Chola style (<i>Brihadeswara, Tanjore</i>); Pandya Style (<i>Gopuram & temple complex, Meenakshi Temple</i>).						
Module 3 ISLAMIC ARCHITECTURE <ul style="list-style-type: none"> • Evolution of Islamic architecture – features of a typical mosque, principles & influences; • Construction techniques – domes, arches, minarets, calligraphy, etc. • Imperial Style (Delhi Sultanate) and Provincial Islamic Styles –Development of mosques & tomb prototypes in India (<i>Structures - Qutab Complex at Delhi</i>), Bengal (<i>Adina Mosque</i>), Gujarat (<i>Jami Masjid</i>), Deccan (<i>Golgumbaz and Bijapur</i>), Hyderabad (<i>Charminar</i>), Lucknow (<i>Bara Imambada and Chota Imambada</i>) 						
Module 4 MUGHAL ARCHITECTURE Development of Mughal architecture under different rulers (<i>Fatehpur Sikri, Taj Mahal, Red fort</i>)						

INDO SARACENIC ARCHITECTURE

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

Module 5**HERITAGE OF INDIA: ALONG WATER, FORTS AND PALACES**

- Study of heritage along water front in India. (Along the Ganges)
- Study on development of fortification, walled towns, settlement pattern, and the causative factors in India;
Study of Forts (Hill forts of Rajasthan: (Amer, kumbhalgarh, mehrangarh)
- Study of Palaces and Havelis

References

1. Brown, P. (2003). Indian Architecture (Buddhist and Hindu periods). Bombay : Taraporevala and Sons.
2. Grover S. The Architecture of India, Vikas Pub. House Pvt. Ltd. Ghaziabad, 1980
3. Benjamin, R. Art and Architecture of India
4. Christopher, T. The History of Architecture in India, from the Dawn of Civilization to the
5. End of the Raj. Om Book Service, New Delhi 1990
6. Brown, P. (1983). Indian Architecture (Islamic Period). Bombay: Taraporevala and Sons.
7. Fletcher, B. (1996). A History of Architecture on the Comparative Method. 20th Ed. London: B.T. Batsford Ltd.
8. Catherine, A. (2001). Architecture of Mughal India. Cambridge University Press.
9. Faulkner, H. T. (1953). Architecture through the Ages. New York: Putnam Adult.
10. Grover, S. (2002). Islamic Architecture in India. New Delhi: CBS Publications.
11. Harris, M. C. (1977). Illustrated Dictionary of Historic Architecture. New York: M. Courier Dover Publications.
12. Hillenbrand, R. (1994). Islamic architecture - form, function and meaning. Edinburgh: Edinburgh University Press.
13. Ingersoll, R. And Kostof, S. (2013). World architecture: a cross-cultural history. Oxford: Oxford University Press.
14. Mitchell, G. (1978). Architecture of the Islamic world - its history and social meaning. London: Thames and Hudson.
15. Nath, R. (1985). History of Mughal Architecture Vols I-III. New Delhi: Abhinav Publications.
16. Tadgell, C. (1990). The History of Architecture in India. New Delhi: Penguin Books.

Course Outcomes

CO1	Develop knowledge about Gothic and Renaissance architecture.
CO2	Analyse characteristics and evolution of Temple Architecture.
CO3	Develop knowledge about Islamic Architecture and characteristics
CO4	Analyse the development of Mughal Architecture.
CO5	Recognise the various Heritage of India.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	1	3	1	1	-	-	1	2	1
CO2	3	3	-	1	3	1	1	-	-	1	2	1
CO3	3	3	-	1	3	1	1	-	-	1	2	1
CO4	3	3	-	1	3	1	1	-	-	1	2	1
CO5	3	3	-	1	3	1	1	-	-	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	1	3	1	1	-	-	1	2	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BAR04002	Design of RCC Structures	03	03	0	0
<p>Objective The course aims to impart knowledge about reinforced cement concrete and its applications in buildings. To equip students about the methods of designing various structural members using reinforced cement concrete and fundamentals of soil mechanics and foundations.</p> <p>ISI CODE COMPLIANCE</p>						
<p>Module 1 INTRODUCTION TO RCC DESIGN Introduction to RCC design, characteristics of RCC, assumptions, nominal mix, Design mix. Neutral axis; balanced, under & over reinforced sections. Working Stress Method, Limit State Method, Various Limit States. Role of admixtures in concrete, honey combing, cold joint, high performance concrete. Creating building frames and selecting sizes of structural elements based on thumb rules with guidelines of relevant codes.</p>						
<p>Module 2 DESIGN OF REINFORCEMENT IN BEAMS Design of singly reinforced beams for flexure, shear & bond. Concept and design of doubly reinforced beams and T-beams by Limit State Methods. Shear failure of beams, Shear reinforcement, Curtailment of reinforcement, Bond, Anchorage and Development length, IS-Coded provisions, Numerical Problems.</p>						
<p>Module 3 BASIC CONCEPTS AND DESIGN OF DIFFERENT TYPES OF SLAB Concepts and design of different types of slabs spanning in one direction, two directions, continuous slab, cantilevered slab, circular slab and flat slab by limit state method</p>						
<p>Module 4 BEARING CAPACITY OF SOILS, AND SETTLEMENTS OF FOUNDATIONS</p> <p>Soil Mechanics: Soil formation and resulting soil deposits, different types of soils and their physical properties, classification as per Indian standard system.</p> <p>Foundations: Types of foundations for RCC structures, Design of isolated column footing, retaining wall. Introduction, terminology, factors affecting bearing capacity of soils, methods of determining bearing capacity; Types of failures in soil, General, Local and Punching shear failure. Methods of improving bearing capacity of soil, settlement of foundations, Causes and Effect of settlement - Plate load test - Simple problems.</p>						

Module 5**DESIGN OF RCC COLUMNS AND STAIRCASES**

Design of RCC columns, axially and eccentrically loaded Columns.

Design of Short and Long RCC columns under axial compression (IS-Code Provisions)

Concepts and Design of different types of staircases.

Introduction to pre-stressed concrete, Pre-tensioning and Post-tensioning methods, Problems of beams

PRACTICAL

Laboratory: Soil testing, casting of cement concrete cubes, Compressive test of cement concrete cubes, Tensile strength of steel.

Visit to construction site for study of RCC structures.

References

1. Varghese, P. C. (2011). Limit state Design of Reinforced Concrete. PHI Learning.
2. Ramachandra, S. (2004). Limit State Design of Concrete Structures. Scientific publishers.
3. Ramamrutham, S. (2000). Design of RCC Structures. New Delhi : Tata McGraw Hill Education.
4. Ramamrutham .S and Narayanan .R, (1997), Reinforced Concrete Structures, Dhanpat Kai Publication, New Delhi.
5. Punmia, B. C. (2005). Soil Mechanics and Foundation Engineering. Delhi : Laxmi publications.
6. Swamisaran. (2010). Analysis and Design of Substructures. 2nd Ed. (LSD).
7. Punmia, B. C. (2007). Limit State Design of Reinforced Concrete. Delhi : Laxmi Publications
8. I S 456-2000
9. I S 875-1987
10. I S 800 -2007.
11. Explanatory Hand Book SP24 Design Aid SP 16,
12. Detailing of Reinforcement, SP 34

Course Outcomes

CO1	Planning and evaluating knowledge RCC Design
CO2	Analysing reinforcement in beams
CO3	Develop knowledge about different types of slabs
CO4	Analysing bearing capacity of soil
CO5	Designing RCC columns and staircases

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	1	-	-	1	-	-	-	1	2
CO2	3	-	-	1	-	-	1	-	-	-	1	2
CO3	3	-	-	1	-	-	1	-	-	-	1	2
CO4	3	-	-	1	-	-	1	-	-	-	1	2
CO5	3	-	-	1	-	-	1	-	-	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	1	-	-	1	-	-	-	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BAR04003	Lighting and Electrical Services	03	02	01	0
<p>Objective</p> <p>This course gives basic understanding about the science behind Lighting, and fundamental principles of lighting design and electrical services in buildings. By learning this course students can design for optimum lighting requirement for indoor and outdoor spaces. Power distribution network and fundamentals of electrification in buildings is covered to impart technical and practical knowledge.</p>						
<p>Module 1 INTRODUCTION TO DAYLIGHTING</p> <p>Physics of light, Transmission of light, coloured light, the munsell system, Photometry (Law of illumination, illumination from point, line and surface sources), recommended illuminances, Glare, Luminance distribution.</p>						
<p>Module 2 DESIGN FOR DAYLIGHTING</p> <p>Daylighting Design Principles, Design methods, Total flux method, Daylight factor method, Planning for daylight, day light utilization factor, Simple experiments to measure Lux levels under different sky conditions, Class room lux measurements, etc.</p>						
<p>Module 3 ARTIFICIAL LIGHTING</p> <p>Classification of lighting, Artificial light sources, Spectral energy distribution, Luminous efficiency, Colour temperature, Colour rendering.</p> <p>Types of luminaires, Power factor, reflector, type of lens, cove lighting, cornice lighting, track lighting, wall washer, down light, spot light and stage lighting.</p> <p>Exterior lighting –Flood, street, lighting for displays and signalling, Neon signs LED-LCD and lighting for surveillance.</p> <p>General Illumination design & interior lighting: industrial, residential, office departmental store, indoor stadium, theatre, museum, hospital.</p>						
<p>Module 4 ELECTRICAL SERVICES</p> <ul style="list-style-type: none"> • General distribution of electric power in towns and cities. Substation for small schemes and industrial units, supply undertaking, meter room, electrical installation in buildings, connection with the supply company, mains and meter board installation from the meter board to individual units. • Basics of electricity, Single and Three Phase Supply, Protective devices in electrical installation, Earthing for safety – Types of earthing, ISI Specifications. • Energy saving and sustainable lighting and electrification systems 						
<p>Module 5 BUILDING ELECTRIFICATION</p>						

Electrical installations in buildings – Types of wires, Wiring systems and their choice – planning electrical wiring for building – Main and distribution boards, Planning transformer & generator rooms, Standby Generators & Inverter Backup Systems; Electrical Load Calculation of Buildings. Electrical layout of a simple residential, school and commercial building

The modules will include experiments and market surveys of the Electrical systems and luminaries manufactured by different industries under various company and brand names.

References

1. Szokolay, S. V. (2008). Introduction to architectural science. Taylor & Francis.
2. Conceptnine, R. (2008). The Architecture of Light: Architectural Lighting Design Concepts and Techniques. Sage Publications.
3. Cox, T. J. and D'Antonio, P. (2009). Acoustic Absorbers and Diffusers. 2nd Ed. Taylor & Francis
4. Cuttle, C. Lighting by Design. 2nd Ed. Architectural Press.
5. Rea, M. (2000). The Lighting Handbook. 9th Ed. Illuminating Engineering Society of North America.
6. Reinhart, C. (2014). Day lighting Handbook.
7. Steffy, G. (2000). Time-Saver Standards for Architectural Lighting. McGraw-Hill.
8. Philips, D., Lighting in Architectural Design, MCGraw Hills, New York.
9. Bovay, H. E. (1981). Handbook of Mechanical & Electrical systems for Buildings. McGraw-Hill Higher Education.
10. Bureau of Indian Standards. (2005). Code of Practice for Electrical Wiring Installations IS-732.
11. Electrical Wiring & Contracting (Vol.1 to Vol.4).

Course Outcomes

CO1	Developing knowledge about day lighting
CO2	Utilisation of concept of day-lighting in design
CO3	Developing knowledge about various aspects of artificial lighting
CO4	Obtain knowledge about various electrical services.
CO5	Obtain knowledge about Building Electrification.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	3	2	3	3	-	-	2	3	3
CO2	3	-	1	3	2	3	3	-	-	2	3	3
CO3	3	-	1	3	2	3	3	-	-	2	3	3
CO4	3	-	1	3	2	3	3	-	-	2	3	3
CO5	3	-	1	3	2	3	3	-	-	2	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	1	3	2	3	3	-	-	2	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BARPE401	Professional Elective (PE) – I Vernacular Architecture	03	03	0	0

Objective

Efforts and activities related to promotion of Sustainable Architecture are underway, and this can be reinforced with the knowledge of Vernacular Architecture. Odisha has a rich treasure of vernacular architecture. The objective is to instil sensitivity towards the less explored field that is concerned with Architectural building traditions/practices that are cost effective, ecologically sensible and culturally relevant. Students acquire a working vocabulary that can help them describe vernacular architecture in meaningful ways. The course introduces grass root principles of indigenous architecture that has evolved over time in response to environment, climate, culture, economy and basic human needs. The course covers variations in built forms and their environmental performance across different climatic and geographical regions of India with more emphasis to Odisha. Cases studies of adaptations of vernacular architecture in contemporary buildings are also covered in the syllabus.

Module 1

INTRODUCTION TO VERNACULAR ARCHITECTURE

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

Module 2

ENVIRONMENT AND MATERIALS

Typical building materials, Built form and elements, Construction technique and Environmental performance

Module 3

REGIONAL VARIATIONS IN BUILT FORM: TRIBAL ARCHITECTURE

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

Andhra Pradesh, Madhya Pradesh, Odisha (Kondha and Santals)

Module 4

REGIONAL VARIATIONS IN BUILT FORM: RURAL ARCHITECTURE

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

Eastern Region

Odisha – Rural houses of the coastal and inland areas; Bengal –Rural house form- Aat Chala houses, Thakur Bari (Mansions in North Kolkata).

Western Region

Rajasthan- Rural Jat houses for farming caste and Bhungas (Circular Huts) and Havelis; Gujarat- Deserts of Kutch, Pol houses of Ahmedabad, Wooden Havelis;

Southern Region

Kerala – Nalukettu, Houses of Nair & Namboothri community, Koothambalam;

TamilNadu – Toda Huts, Chettinad Houses (Chettiars);

Andhra Pradesh –Rural Kaccha house

Northern Region

Kashmir – Typical Kutcha houses, Dhoongas (Boathouses), Ladakhi houses, bridges ;

Himachal Pradesh – Kinnaur houses

Module 5 EXMPLES OF ADAPTATIONS IN CONTEMPORARY ARCHITECTURE (To be decided by subject teacher) Examples - Works of Laurie Baker, Hasan Fathy, Anil Laul, Gerard Da Cunha, Building Centres- Auroville, Anangpur, Nizamuddin Building Centre Basics of Architectural Heritage Conservation
References 1. Paul Oliver. Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997. 2. Amos Rapoport. House, Form & Culture, Prentice Hall Inc. 1969. 3. R W Brunskill: Illustrated Handbook on Vernacular Architecture. 1987. 4. Ilay Cooper and Barry Dawson. Traditional buildings of India, Thames and Hudson Ltd., London. 1998. 5. Frampton, Kenneth. Towards a Critical Regionalism: Six points for an architecture of resistance, In The Anti-Aesthetic: Essays on Postmodern Culture. Edited by Hal Foster. Seattle, WA: Bay Press. 1983. 6. V.S. Pramari. Haveli- Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad. 1989. 7. Kulbushanshan Jain and Minakshi Jain. Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad. 1992. 8. G.H.R. Tillotson - The tradition of Indian Architecture Continuity, Controversy - Change since 1850, Oxford University Press, Delhi. 1989. 9. Carmen Kagal, VISTARA - The Architecture of India, Pub: The Festival of India, 1986. 10. S. Muthiah and others: The Chettiar Heritage. 2000 11. House, Form & Culture, Amos Rappoport, Prentice Hall Inc, 1969.

Course Outcomes

CO1	Developing knowledge about vernacular architecture and its various characteristics.
CO2	Planning the use of materials as per the environment
CO3	Developing knowledge about tribal architecture and its regional variations.
CO4	Developing knowledge about Rural architecture and its regional variations.
CO5	Adaptation of Contemporary architecture.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	3	3	3	-	-	-	2	2
CO2	3	2	-	2	3	3	3	-	-	-	2	2
CO3	3	2	-	2	3	3	3	-	-	-	2	2
CO4	3	2	-	2	3	3	3	-	-	-	2	2
CO5	3	2	-	2	3	3	3	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	2	3	3	3	-	-	-	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BARPE402	Professional Elective (PE) – I Barrier Free Design	03	03	0	0
<p>Objective Barrier free design is an introduction to the concepts of accessibility and universal design with a particular focus on the implications of ability and dis-ability on usability of the built environment; spaces, buildings, infrastructure and interfaces. The student will learn how to apply this knowledge in architecture, landscape architecture, interior design and planning. The interdisciplinary collaboration with disability studies, rehabilitation studies and social science research will provide students with an opportunity to learn and develop wider understanding about the subject.</p>						
<p>Module 1 BASIC CONCEPTS OF ACCESSIBILITY AND UNIVERSAL DESIGN</p> <p>Knowledge of human ability relevant to design problems in home, workplace, infrastructure and public spaces. Types of disabilities, An understanding of the evolution and limitations of Accessible Design, and differences between Accessible and Universal Design.</p>						
<p>Module 2 THEORIES OF UNIVERSAL DESIGN</p> <p>Understanding Principles of Universal Design that enable usability and inclusion across the spectrum of age, size, gender, ability and conditions, and contextual derivation of Universal Design Principles in India.</p>						
<p>Module 3 UNIVERSAL DESIGN FEATURES IN EXTERNAL AND INTERNAL ENVIRONMENTS</p> <p>Devices and Controls for different types of disabilities Defining Architectural design requirements, Classification of Buildings and Access provisions. Design Elements within the buildings; Site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, ramps, stairways, lifts, toilets, signage, guiding and warning systems, floor finishes and materials, guide rails, lifts, dimensions of wheel chairs. Design Elements Outside the building; kerb at footpath, road crossing, public toilet, bus stop, telephone booth, signage.</p>						
<p>Module 4 BARRIER FREE CONSIDERATIONS IN TYPOLOGY OF SPACES</p> <p>Provisions in residential buildings, auditorium, parks, restaurants, railway stations etc. Best examples and case studies in Universal Design practice. Educational institutions, hospitals, transportation terminals such as bus, railway stations and airports for barrier free spaces</p>						
<p>Module 5 ACCESSIBILITY LEGISLATION</p> <p>Information on various types of national institutes, agencies and professional bodies involved in disabled welfare, associated norms and standards, standards as given in NBC, CPWD and Byelaws</p>						

Understanding legislative framework for practice in India; Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995, Amendments and United Nations Convention for Rights of Persons with Disabilities (UNCRPD).
Other initiatives at global and international level for protection of rights of disabled and also elderly person

References

- Mullick, A., Ostroff, E., Sanford, J., Steinfeld, E., Story, M. And Vanderheiden, G., Center for Universal Design. North Carolina State University, Raleigh, NC. Available at https://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciples.htm
- Universal Design by Goldsmith, S. -(2000) Architectural Press.
- Guidelines and Space Standards for Barrier Free Built Environment for Disabled and Elderly (1998), CPWD, Ministry of Urban Affairs and Employment, India.
- Persons with Disabilities Act. (1995). Government of India. Available at disabilityaffairs.gov.in/upload/uploadfiles/files/PWD_Act.pdf.
- Universal Design Handbook by Preiser, Wolfgang, Editor in Chief; Elaine Ostroff, Senior Editor – McGraw Hill, 2000.
- Enabling Environments by Steinfeld, E., Danford, G. Scott. (1999). Plenum Press, New York.
- Creating Universal Environment by Steinfeld, E., Maisel, J. (2012).. John Wiley and Sons INC, Hoboken, New Jersey.
- The universal design file: Designing for people of all ages and abilities by Story, M. F. (1998).. Available at <http://design-dev.ncsu.edu/openjournal/index.php/redlab/article/viewFile/102/56>.
- UDIP. (2011). The Universal Design Principles, Abir Mullick, Anjee Agarwal, Balam S., Debkumar Chakrabarti, Gaurav Raheja, Haimanti Banerjee, Rachna Khare, Ravi Shankar and Shivani Gupta, National Institute of Design, Ahmedabad, India. Available at <http://www.humancenterreddesign.org/resources/universal-design-india-principles>
- UNCRPD. (2006). Convention on the Rights of Persons with Disabilities at the United Nations and the Optional Protocol. Available at <http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>.
- UN-ENABLE. (1982). UN’s World Program of Action concerning Disabled persons in 1982, Available at <http://www.un.org/disabilities/default.asp?id=23>.

Course Outcomes

CO1	Introduction and basic concepts of universal design.
CO2	Developing knowledge about the theory of universal design and its need.
CO3	Developing knowledge about Universal Design and its various characteristics.
CO4	Understand the Barrier Free Considerations
CO5	Planning accessibility and understand the legislative framework

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	3	-	-	-	2	2
CO2	3	-	-	-	-	-	3	-	-	-	2	2
CO3	3	-	-	-	-	-	3	-	-	-	2	2
CO4	3	-	-	-	-	-	3	-	-	-	2	2
CO5	3	-	-	-	-	-	3	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	-	-	-	3	-	-	-	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BARPE403	Professional Elective (PE) – I Graphic and Product Design	03	03	0	0
<p>Objective The subject Product Design is a specialized course offered in architecture which deals with functionality, safety and provides an aesthetically pleasing product for users. The subject is integrated to subjects like Design, Graphics, Art Appreciation</p>						
<p>Module 1 BASIC CONCEPTS OF GRAPHIC AND PRODUCT DESIGN</p> <ul style="list-style-type: none"> • Elements of design – visual grammar and principles of design • Different techniques for form studies. • Creating a visual vocabulary through drawing, the development of aesthetic judgment, values of form, proportion, colour, symbol, image and word • Development of product design concepts - a historic review. • Definitions related to Ergonomics and Product design. • Role of Product designer. 						
<p>Module 2 APPLICATIONS OF GRAPHIC DESIGN</p> <ul style="list-style-type: none"> • Typography & type design, publication design, image making, illustration, photography, packaging, print design, corporate identity, branding, information & communication systems in digital domain, portfolio design • Theories and principles of layout for creating effective visual signage, and explore the unique problems and technique. • Introduction to the design applications for building signage. 						
<p>Module 3 ERGONOMICS AND DESIGN</p> <ul style="list-style-type: none"> • Application of ergonomics in human-product interaction • Application of human factors data. Human activities, their nature and effects • Visual, Auditory, Tactual, Olfactory human mechanisms 						
<p>Module 4 ASPECTS OF PRODUCT DESIGN</p> <ul style="list-style-type: none"> • Physical space and arrangement • Product display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays, Visual codes and symbols. • Processes of product designing, User specific criteria, Material selections, Technology, manufacturing and testing, packaging and recyclability • Multiple Utility oriented approach to Product Design 						
<p>Module 5 DESIGN OF PRODUCT TYPOLOGY</p> <ul style="list-style-type: none"> • Design of Household elements, tools and devices. • Design of furniture. • Design of Industrial Product - Automobiles and Electrical 						

<ul style="list-style-type: none"> Element design for differently able, old and children.
<ul style="list-style-type: none"> The subject will also be integrated with a small component of design exercise with the current or any of the previous semester design works. The course will include one or several exercises in relation to context of use study, market surveys, presentations, reports, etc.
<p>References</p> <ol style="list-style-type: none"> Elements of Design by Anderson, Donald M., Holt- Rinehart and Winston, New York (1961) Graphics in Urban design by Ballly Meeda, Neil Parkyn and David StuartWalton. Time Saver Standards for Interior Design Andrew Alpern, Handbook of Speciality Elements in Architecture, McGrawhill Co., USA, 1982. Francis D. K. Ching, Interior Design Illustrated, VNR Publications, New York, 1987. Helen Marie Evans, An invitation to Design. Crosbie, M. J. and Watson, D. (2005). Time Savers Standards for Architectural Design: Technical data for Professional Practice. 8th Ed. The McGraw-Hill Company.

Course Outcomes

CO1	Introduction to graphic and product design
CO2	Developing knowledge about graphic design
CO3	Developing knowledge about ergonomics and design principles
CO4	Developing knowledge about product design and its aspects
CO5	Apply various aspects of designing and typologies of products.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	3	-	2	-	2	3
CO2	3	3	-	-	-	-	3	-	2	-	2	3
CO3	3	3	-	-	-	-	3	-	2	-	2	3
CO4	3	3	-	-	-	-	3	-	2	-	2	3
CO5	3	3	-	-	-	-	3	-	2	-	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	-	-	-	3	-	2	-	2	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BAR04004	Architectural Design - II	09	0	0	09

Objective

The scope of designing to progress with complexity in usage and aesthetic qualities with more emphasis on architectural and functional aspects.

To enable the students to understand the habitat and socio-cultural character of rural environment and develop sensitivity in designing in rural context, as Odisha has a significant rural character.

There will be at least two design problems, one major and one minor.

INTENT

- To enable the understanding to adopt integrated design approach considering Site Planning, Structural aspect, Landscape Architecture and Art Appreciation.
- To acquaint the students with the contextual background and locale of traditional and vernacular architecture to base their ideas on functional simplicity, physical comfort, climatic conditions, locally available material and cultural background.

FOCUS AREAS

- The aesthetics of building form and materials
- Functional patterns
- Passive techniques to create climate sensitive built environment providing thermal comfort
- Relationship of built spaces with the surrounding landscape

ALLIED KNOWLEDGE REQUIRED

- Anthropometry
- Principles of load bearing and framed structures
- Vernacular architecture
- Symbolism and culture
- Basic theories of design
- Basic concepts of climatology
- The science of Building materials; their structural integrity and their behaviour against climate
- Drafting and presentation techniques (Visual Graphics)

1. Examples of Major Projects

Small Rural Housing Cluster, Village Community centre, Village Haat, Tribal Housing, Nursing home, School, Motel, Bank, etc.

2. Examples of Minor Projects

Village Health Centre, Dispensary, Guest House, Club, Restaurant, etc.

Work Plan

- Introduction to the Design Exercise/ Problem
- Study and data collection through
 - Literature reviews
 - Field study and case studies
 - Site Visit and Site Analysis
- Synthesising and Analysing the above data
- Deriving Area Requirements for the Design Exercise
- Conceptual Design
- Detailed Site Plan with built and un-built spaces and landscaping features
- Final developed to- scale drawings- site plan, plans, elevations, sections, elevations
- Conceptual write-up to the floor plan for justification of provided spatial proposals
- Development of views and construction details
- Model of the proposed design

Note

- Study tour of one-week duration is mandatory for conducting case study and field study related to the Architectural Design project.
- End Semester evaluation will be done by external jury member (from Academics or Professional Architect) other than the University faculty.

References

13. Chaira, J. D. and Crosbie, M. J. (2001). Time Saver Standards for Building Types. 4th Ed. New York : McGraw-Hill.
14. Time Saver Standards for Landscape Type.
15. Bousmaha Baiche & Nicholas Walliman, Neufert Architect's data, Blackwell science ltd.
16. Hareguchi, H. (1988). A Comparative analysis of 20th C. houses. London: Academy Editions.
17. Frampton, Kenneth. Towards a Critical Regionalism: Six points for an architecture of resistance, In The Anti-Aesthetic: Essays on Postmodern Culture. Edited by Hal Foster. Seattle, WA: Bay Press. 1983.
18. Robson, D. (2002). Geoffrey Bawa: The Complete Works. New York : Thames & Hudson.
19. V.S. Pramar. Haveli- Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad. 1989.
20. Kulbushanshan Jain and Minakshi Jain. Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad. 1992.

Course Outcomes

CO1	Developing knowledge of aesthetics of building form and materials
CO2	Applying relationship of built spaces with the surrounding landscape
CO3	Developing knowledge about building materials; their structural integrity and their behaviour against climate
CO4	Synthesizing and analyzing of collected data
CO5	Developed to- scale drawings- site plan, plans, elevations, sections, elevations

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BAR04005	Building Construction -IV	04	0	0	04
<p>Objective To acquaint the students with construction practices on framed steel structure and its formwork. To understand building material in the context of various construction methods. Focus on various building materials would be emphasised based on the performing standards and codes, wherein application of each material would be discussed in detail, both in the context of traditional and modern construction methods and practices. Based on the lecture delivered, the students are required to produce construction and detail drawings. With time, each topic can also focus on latest trends in practice and usage of new technology/materials.</p>						
<p>Module 1 Iron and Steel: cast iron, Steel and wrought iron with properties, use of iron work in buildings. Introduction to tensile structures Different types of steel trusses & girders, North light, Tubular, K-Type.</p>						
<p>Module 2 Domes, Shells, Folded plates. Space frame- Single layer, Tensile structures, Pneumatic structures, cable structures, Double layer. Hyperbolic & parabolic structure.</p>						
<p>Module 3 Glass: Types of glass like plate, decorative, tinted, heat absorbing etc. structural glass bricks and glass Crete, fibre glass, wool etc. Curtain walls & structural glazing-</p>						
<p>Module 4 Designing and construction details of types of Lifts and Ramps</p>						
<p>Module 5 Modular coordination and pre-fabrication, Precast & Pre stressed concrete units. Advanced tools and equipment.</p>						
<p>NOTE: Frequent site visits to be arranged as a part of the curriculum and contact hours. Site visits should be in line with the present studio work. It is mandatory for students to submit a site observation report, either periodically or at the end of the semester.</p>						

References

1. Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi : East-West Press.
2. Foster, J. and Mitchell, S. (1963). Building Construction: Elementary and Advanced, 17th Ed. London : B.T. Batsford Ltd.
3. McKay, W. B. (2005). Building Construction Metric Vol. I–V. 4th Ed. Mumbai : Orient Longman.
4. Merritt, F.S. and Ricketts, J.T., Building Design and Construction Handbook, McGraw Hill.
5. Rangwala, S. C. (1963). Building Construction: Materials and types of Construction. 3rd Ed. New York : John Wiley and Sons.
6. Chudley, R. (2008). Building Construction Handbook. 7th Ed. London : Butterworth-Heinemann.
7. Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi : Standard Publishers.
8. Ching, F. D.K – Building Construction illustrated. VNR, 1975
9. Chudley, R. (2008). Building Construction Handbook. Noida : Elsevier.
10. Eldridge, H. J. (1976). Common Defects in Buildings. London : HMSO.
11. Emmit, S. and Gorse, C. A. (2006). Barry's Advanced Construction of Buildings. Blackwell Publications.

Course Outcomes

CO1	Developing knowledge about Iron and Steel
CO2	Developing knowledge of Domes, Shells, Folded plates
CO3	Demonstrating the use of glass
CO4	Designing and construction details of types of Lifts and Ramps
CO5	Developing knowledge on modular, pre-cast and pre-fabricated elements

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	3	2	3	-	2	-	3	3
CO2	3	2	-	-	3	2	3	-	2	-	3	3
CO3	3	2	-	-	3	2	3	-	2	-	3	3
CO4	3	2	-	-	3	2	3	-	2	-	3	3
CO5	3	2	-	-	3	2	3	-	2	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	-	3	2	3	-	2	-	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
4TH	BAR04006	Computer Applications - II	02	01	0	02
<p>Objectives To enable the students to understand the fundamentals of computer aided 3D Modeling (3DS-Max/ Revit etc.) -Rendering Engines (V- Ray, Lumion etc.) and presentation techniques.</p>						
<p>Module 1 INTRODUCTION TO 3D MODELLING Project: Create 3D sculpture using 3D primitives (cubes, spheres etc.). Introduction to 3D-modelling technique and construction planes, drawing objects, 3D surfaces setting up elevation thickness and use of dynamic projections.</p>						
<p>Module 2 3D MODELLING AND RENDERING ENGINES Project: Visualize a building. Explore the potential of lights and camera and use the same in the model created for the final submission. Rendering and scene setting to create a photo realistic picture, understanding material mapping, environment setting and image filling. Exercise to identify and visualize a building using the above said utilities.</p>						
<p>Module 3 ILLUSTRATIONS AND COMPOSITION Project: Post production of various renders using Photoshop and Illustrator to visualize a building from various perspective. Explore the potential of Birds eye view, Worms eye view, Exploded view etc. by using graphics and texture overlay. Use of photo realistic pictures too compose presentation drawings, understanding various styles and needs of presentation. Exercise to compose sheets involving various technical drawings and photo realistic renders for by using the above said utilities.</p>						
<p>Module 4 WALK-THROUGH AND ANIMATION Project: To understanding the process of creating walk through by using rendering engines for 3D Models. Understanding the overall flow of video, Editing clips with sound effects and adding animations.</p>						
<p>References</p> <ol style="list-style-type: none"> 1. Gindis, E. (2014). Up and Running with AutoCAD 2015: 2D & 3D Drawing and Modelling, Oxford : Elsevier. 2. Seidler, D. R. (2007). Digital Drawing for Designers: A Visual Guide to AutoCAD 2012, London: Fairchild Publications. 3. Smith, B. L. (2007). 3ds Max 2008 Architectural Visualization Beginner to Intermediate, Sarasota: 3DATS. 4. 3DS MAX- Advanced 3D modeling and animation – C & M, CADD Centre Tutorials: http://www.lynda.com/ 5. Lumion – Rendering Software- https://lumion.com/ 						

Course Outcomes

CO1	Developing knowledge of 3D modelling
CO2	Visualizing and rendering of models
CO3	Developing sense of illustrations and compositions
CO4	Developing the knowledge of preparation of walk-throughs
CO5	Defining the overall flow of video, editing clips with sound effects and adding animations

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	-	2	-	2	-	-	-	2	2
CO2	2	2	3	-	2	-	2	-	-	-	2	2
CO3	2	2	3	-	2	-	2	-	-	-	2	2
CO4	2	2	3	-	2	-	2	-	-	-	2	2
CO5	2	2	3	-	2	-	2	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	2	3	-	2	-	2	-	-	-	2	2

**FIFTH SEMESTER
BARC PROGRAMME**

FIFTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR05001	History of Architecture -IV	3-0-0	3	WE			
2.	BAR05002	Landscape Architecture	2-1-0	3	WE			
3.	BAR05003	Design of Steel Structures	3-0-0	3	WE			
4.	BAR05004	Acoustics	2-1-0	3	WE			
5.	BAR05005	Environment and Behavior	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR05006	Architectural Design - III	0-0-9	9		IA	VV	TP
2.	BAR05007	Landscape Design Studio	0-0-2	1		IA	VV	
3.	BAR05008	Working Drawing and Detailing- I	0-0-4	4		IA	VV	
TOTAL			13-2-15 = 30	29				

**DETAIL SYLLABUS
FIFTH SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05001	History of Architecture - IV	03	03	0	0
Modern (19th Century AD – Until Present)						
<p>Objective To impart an understanding of the evolution in architecture and urbanism from the advent of modern era to present times. Understanding about the theories, principles and styles of architecture that emerged during Industrial Revolution and its influence on the built form and settlement patterns is covered. Colonial mercantile capitalism and spread of Western influences in India, and synthesis of architectural styles as modes of political accommodation are imparted in the course. The socio-economic and political context, scientific inventions, and technological improvements, and the exchange of styles and philosophies is discussed through notable works of leading architects.</p>						
Module 1						
<ul style="list-style-type: none"> • INDUSTRIAL REVOLUTION Its impact, new materials & techniques, Exhibitions (<i>Great Exhibition 1851</i>), development of railways & change in settlement pattern, rapid urbanization & urban crisis. Art Nouveau, Art & Craft, Art Deco; Neo Classicism; Gothic Revival (<i>John Ruskin, works of Victor Horta, Antonio Gaudi</i>). • SELF CONSCIOUS MODERNITY Chicago school (<i>Louis Sullivan</i>), Bauhaus Movement (<i>Peter Behrens, Walter Gropius</i>), Late-Modern Styles; works of great masters (<i>Mies Van der Rohe, F. L. Wright, Le Corbusier, Louis Kahn, Alvar Aalto, Kenzo Tange, etc.</i>). 						
Module 2						
<p>COLONIAL ARCHITECTURE IN INDIA Spread of European mercantile capitalism and development of early colonial architecture, British, French and Portuguese influences; Inflow of new cultural practices and construction technology, Stylistic transformations; Synthesis with Indian traditional motifs and climatic factor.</p> <ul style="list-style-type: none"> • EARLY: Portuguese (<i>Basilica of Bom Jesus</i>), French (<i>Pondicherry- Old French Colony</i>) & British (<i>St. Andrew's Kirk</i>), Jewish settlement of Kerela • LATE: <i>Edwin Lutyens, Herbert Baker</i> and planning of New Delhi, Indo- Deco architecture (<i>Rashtrapati Bhawan / Victoria Terminus / Umaid Bhawan Palace, Jodhpur</i>). 						
Module 3						
<p>WORLD ARCHITECTURE 1950 ONWARDS Post modernism and classical revivalism (<i>James Sterling, I. M. Pei, Robert Venturi</i>); Counter reaction, De-constructivism and industrial architecture (<i>Zaha Hadid, Renzo Piano, Norman Foster, Santiago Calatrava, Frank O. Gehry</i>) Alternative practices (<i>Hassan Fathy, Geoffrey Bawa, Tadao Ando</i>)</p>						

Module 4**ARCHITECTURE IN INDIA: POST INDEPENDENT ERA**

Planning and Design of Post Independent Cities and Towns: Chandigarh, Bhubaneswar, Amaravati, Auroville Experiments, Nehruvian nation Building Initiatives, Planning commission & industrialization, Architecture by great Indian and International Masters: *A. Kanvinde, B. V. Doshi, Charles Correa, Raj Rewal, Joseph A. Stein*; Alternative practices (*Laurie Baker*), Award winning works of contemporary architects.

Module 5

Presentations and critical analysis of any other significant works of architects, as decided by the subject faculty.

Reference

1. Benevolo, L. (1977). History of Modern Architecture. 2 Vols., reprint, MIT Press.
2. Curtis, W. J. (1982). Modern Architecture since 1900. Phaidon Press.
3. Giedon, S., Space, Time and Architecture: The Growth of New Tradition, Harvard University Press.
4. Frampton, K. (1994). Modern Architecture: A Critical History. London : Thames & Hudson.
5. Jenks, C. (2007). The Story of Post-Modernism. London : Wiley and Sons.
6. Lang, J., Desai, M. and Desai, M. (2000). Architecture and Independence: The search for Identity – India 1880 to 1980. New Delhi : Oxford University Press.
7. Lang, J.T (2002). A Concise History of Modern Architecture in India
8. Mehrotra, R. (2011). Architecture in India Since 1990. Pictor.
9. Tadjell, C. (1990). The History of Architecture in India. New Delhi : Penguin Books (India) Ltd.
10. Johnson, P. and Wigley, M. (1988). Deconstructivist Architecture. New York : Museum of Modern Art.
11. Schulz, C. N. (1993). Meaning in Western Architecture. New York : Rizzoli International Publishers.
12. Singh, M. and Mukherjee, R. New Delhi- Making of a Capital. New Delhi : Roli Books.
13. Tafuri, M. (1980). Modern Architecture. Harry N. Abrams Inc.
14. Verma, P. (2010). Becoming Indian – The Unfinished Revolution of Culture and Identity. New Delhi : Penguin India.

Course Outcomes

CO1	Implement principles of of different social reformations and movements on the field of architecture
CO2	Analyze the concept of evolution of colonial architecture in India
CO3	Express the concept of evolution in the field architecture after 1950 world wide
CO4	Express the concept of evolution in the field architecture after independence in India
CO5	Demonstrate basic principles through seeing works of eminent Architects

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	1	3	1	1	-	-	1	2	1
CO2	3	3	-	1	3	1	1	-	-	1	2	1
CO3	3	3	-	1	3	1	1	-	-	1	2	1
CO4	3	3	-	1	3	1	1	-	-	1	2	1
CO5	3	3	-	1	3	1	1	-	-	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	1	3	1	1	-	-	1	2	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05002	Landscape Design	03	02	1	0
<p>Objective To enable the students to understand the principles of site planning, site analysis techniques and its application in design of different landscape types.</p>						
<p>Module 1 PRINCIPLES Landscape design- definition, Theories and principles, aesthetic value of landscape, site survey, analysis and appraisal, Elements of landscape design</p>						
<p>Module 2 LANDSCAPE ELEMENTS</p> <ul style="list-style-type: none"> • Contours- Representation of Land form and Landform design, interpolation of contours, slope analysis, Grading, • Design of water bodies, swimming pool, storm water drainage design, design to reduce surface runoff, paving and surface treatments. • Vegetation, planting design principles and practice, Indoor landscaping, terrace gardening, industrial landscaping. • An assignment to be given to identify native plant species, their availability 						
<p>Module 3 LANDSCAPE DESIGN STYLES History of landscape design. Landscape design style and principles: Chinese, Japanese, English, French, Moghul.</p>						
<p>Module 4 SITE PLANNING AND LANDSCAPE DESIGN</p> <ul style="list-style-type: none"> • Site Zoning. Organization of vehicular and pedestrian circulation; parking; street widths; turning radii; street intersections; steps and ramps. Site planning considerations in relation to water systems, sewage disposal, outdoor electrical systems. • Landscaping of residential areas, parks, archaeological gardens, urban avenues, Roads and Highways and Parking design • Landscaping details. • An assignment to be prepared on designing and execution of a small landscape. 						
<p>Module 5 Methods for multi-criteria landscape evaluation.</p>						

References

1. Appleton. (1996). *The Experience of Landscape*. Wiley.
2. Laurie. (1986). *An Introduction to Landscape Architecture*. Elsevier.
3. Lynch, K. (1962). *Site Planning*. Cambridge : The MIT Press.
4. Simonds, J. O. (2006). *Landscape Architecture: A Manual of Land Planning and Design*.

Course Outcomes:

- CO 1: Express the concept of theories and principles of landscape design
- CO 2: Analyze the concept of elements of landscape design
- CO 3: Demonstrate the different styles of landscape design world wide
- CO 4: Implement the basic principles of site planning
- CO 5: Demonstrate basic principles of landscape evaluation

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	2	2	1	2	2	1	1	1
CO2	3	2	-	1	2	2	1	2	2	1	1	1
CO3	3	2	-	1	2	2	1	2	2	1	1	1
CO4	3	2	-	1	2	2	1	2	2	1	1	1
CO5	3	2	-	1	2	2	1	2	2	1	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	1	2	2	1	2	2	1	1	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05003	Design of Steel Structures	03	03	0	0
<p>Objective To introduce the concepts of designing with steel structures and its components. To enable students to analysis and design simple steel structural components; To enable the students to select suitable steel roof truss for different spans of industrial buildings and large span structures.</p>						
<p>Module 1 INTRODUCTION Introduction to Steel structures: Steel structural shapes, Introduction to IS 800; Rivets, welded connection, Steel structural members, tension, compression and bending Members. Design of riveted and welded connections like beam end connections (Limit Stress method).</p>						
<p>Module 2 STRUCTURAL ELEMENTS Design of structural elements; Truss members under tension, a laterally restrained beam using rolled steel sections. Design of structural element under compression in a truss, a column using rolled steel sections, effective length bulking load. (Practical case study of a steel section).</p>						
<p>Module 3 FOUNDATION Concept of type of foundation; Design of slab base and gusseted base; Introduction of plastic design.</p>						
<p>Module 4 DESIGN OF A UNIT Visit to a construction site to study steel fabrication work. Design of shed in steel structure</p>						
<p>Module 5 Innovative designs in steel for space frames and box frames.</p>						
<p>Reference 1. Ramachandra .S, Design of steel structures Vol. I, Standard publication, New Delhi, 1992. 2. Vazirani .V.N, and Ratwani .M.M, Steel structures, Khanna Publications, New Delhi, 1995. 3. Arya .A.S, Ajamani .J.L, Design of Steel Structures, Nem Chand and Bros, Roorkee, 1999. 4. Subramanian, N. (2008). Design of Steel Structures. Oxford University Press. 5. Duggal, Design of Steel structures, Tata McGraw Hill Company, New Delhi, 2000 6. Lin .T.R, and Scalzi .J.B, Design of Steel structures – Bressler Weley Eastern Pvt. Ltd., New Delhi, 1960. 7. Dayaratnam .P, Design of Steel Structures, Wheelers Publishing Company Co. Ltd, 1990 8. Handbook of Typified Designs for Structures with steel roof trusses, SP 38 (S&T) – 1987, BIS, New Delhi, 1987.</p>						

9. Code of practice for Earthquake Resistant Design and Construction of Buildings IS4326-1976, BIS, New Delhi.

Course Outcomes:

- CO 1: Implement the basic use of steel structures and its members
- CO 2: Analyze the designing structural elements under different structural conditions
- CO 3: Evaluate the design process of foundation for steel structure
- CO 4: Implement the design shed in steel structure with proper site visit
- CO 5: Demonstrate the knowledge about innovative approach in steel structure design

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	1	-	-	1	-	-	-	1	2
CO2	3	-	-	1	-	-	1	-	-	-	1	2
CO3	3	-	-	1	-	-	1	-	-	-	1	2
CO4	3	-	-	1	-	-	1	-	-	-	1	2
CO5	3	-	-	1	-	-	1	-	-	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	1	-	-	1	-	-	-	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05004	Architectural Acoustics	03	02	1	0
Objective						
The course imparts fundamental understanding about architectural acoustics and environmental noise. Physics of sound and acoustical design for built spaces are covered, which enables the student to provide appropriate acoustic solutions for both indoor and outdoor spaces.						
Module 1						
FUNDAMENTALS OF ARCHITECTURAL ACOUSTICS						
Fundamentals: Definitions, terms related to acoustics, sound waves, frequency, amplitude, intensity, wavelength, sound pressure, measurement of sound, decibels. Characteristics of speech, music and hearing.						
Module 2						
ROOM ACOUSTICS CONCEPTS						
<ul style="list-style-type: none"> Room Acoustics: resonance, reverberation, echo, reverberation time (Sabine's formula) Material property: Absorption, reflection, scattering, diffusion, transmission, absorption coefficient, Noise Reduction Coefficient (NRC), Absorbing materials used and their choices for different acoustic treatment, Sound insulation Simple exercises involving reverberation time and absorption 						
Module 3						
ACOUSTICS IN BUILDING DESIGN AND TREATMENT						
Basic room acoustics concepts and design: shape, volume, defects, treatment for interior surface, basic principles in designing, cinemas, recording studios, class rooms, conference halls, Auditorium.						
Module 4						
ENVIRONMENTAL NOISE						
<ul style="list-style-type: none"> Noise and its control- Air and structure borne, sound transmission, vibration isolation, damping. Noise source within buildings and its control (Fans, chillers, boilers, HVAC noise sources). External noise source and its control: Open air acoustics, Free field propagation of sound, absorption from air and natural elements, Site planning, Design of open air theatres, Types and design of Noise barrier, effects of landscape elements 						
Module 5						
Acoustic design of small spaces using innovative techniques and materials by applying manual or simulation software method, as decided by the subject teacher.						
Reference						
<ol style="list-style-type: none"> Szokolay, S. V. (2008). Introduction to architectural science. Taylor & Francis. Vigran, T. E. (2008). Building Acoustics. 1st Ed. Taylor & Francis. Barron. M. (2009). Auditorium acoustics and architectural design. 2nd Ed. Taylor & Francis. Eagan, D. Concepts in Architectural Acoustics. Kang, J. (2006). Urban Sound Environment. 1st Ed. CRC Press. Meyer, H. B. and Good friend, L. Acoustics for Architects. Reinhold. Smith, B. J., Peters, R. J., and Stephanie, O. (1982). Acoustics and Noise Control. New York: Longman. 						

Course Outcomes:

Upon completion of the subject the students will demonstrate the ability to:

- CO 1: Evaluate the the fundamental knowledge about role of acoustic in Architecture
- CO 2: Express the basic knowledge about different scientific terms involved in acoustic
- CO 3: Demonstrate the basic principles of acoustic for designing spaces
- CO 4: Implement the term noise and its environmental impact
- CO 5: Demonstrate the Design of indoor spaces with keeping consideration of acoustic

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1
CO1	2	3	-	1	1	2	1	2	2	2	2	1
CO2	2	3	-	1	1	2	1	2	2	2	2	1
CO3	2	3	-	1	1	2	1	2	2	2	2	1
CO4	2	3	-	1	1	2	1	2	2	2	2	1
CO5	2	3	-	1	1	2	1	2	2	2	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	3	-	1	1	2	1	2	2	2	2	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05005	Environment and Behavior	03	03	0	0
<p>Objective To impart knowledge about sociological and psychological implications in designing built environment. The focus is on understanding man-environment relationship, behavioral dynamics with respect to spatial pattern, and methods of conducting behavioral studies.</p>						
<p>Module 1 SPATIAL IMPLICATIONS OF SOCIOLOGY Difference in lifestyle due to socio-economic background, and then implication in architectural design. Sociological aspects in the history of evolution of housing or shelter forms. Room use, geometry & meaning, Personal space, adjacencies, Territoriality.</p>						
<p>Module 2 SOCIOLOGY AND PLANNING Essential elements of society: Rural and Urban communities. Growth of socio-cultural factors through ages, dynamics of urban growth and social change, Behavioral assumptions in planning.</p>						
<p>Module 3 SOCIO-PSYCHOLOGICAL DIMENSIONS Social aspects of physical environment, Perceptual dimension of space, Psychological aesthetics, Patterns of activity in time and space across different demographics, social & psychological issues in neighborhoods and public spaces, environmental cognition.</p>						
<p>Module 4 METHODS FOR BEHAVIOURAL STUDIES Social survey and social research, Cognitive mapping, activity/adjacency relationship matrices, Area use frequency program, charts, pictograms.</p>						
<p>Module 5 APPLICATIONS ENVIRONMENTAL BEHAVIOUR IN ARCHITECTURE Case studies, fieldwork.</p>						
<p>Reference 1. Burnette, C. (1971). Architecture for human behaviour. Philadelphia Chapter : AIA. 2. Canter, D. and Lee, T. (1974). Psychology and the built environment. New York : Halstead Press. 3. Christopher, A. et al. (1977). A Pattern Language. New York : Oxford University Press. 4. Clovis, H. (1977). Behavioural Architecture. McGraw Hill. 5. Lynch, K. (1973). The image of a city. Cambridge : MIT. 6. Sanoff, H. (1991). Visual Research Methods in Design. New York : John Wiley & Sons. 7. Zeisel, J. (1984). Enquiry by design: Tools for Environment-Behaviour Research. Cambridge: Cambridge University Press. 8. Zeisel, J. and Eberhard, J. P. (2006). Inquiry by Design-Environment/Behaviour/ Neuroscience in Architecture, Interiors, Landscape and Planning. New York : W. W. Norton & Company.</p>						

Course Outcomes:

- CO 1: Analyze the relationship of sociology and architecture
 CO 2: Evaluate the basic knowledge about elements of society and their role in planning
 CO 3: Demonstrate the knowledge about user psychology of society and their role in neighborhood and public place planning
 CO 4: Express the data representation for studies
 CO 5: Demonstrate the knowledge through case-studies

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	1	2	1	2	1	2	2	1
CO2	2	3	-	2	1	2	1	2	1	2	2	1
CO3	2	3	-	2	1	2	1	2	1	2	2	1
CO4	2	3	-	2	1	2	1	2	1	2	2	1
CO5	2	3	-	2	1	2	1	2	1	2	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	3	-	2	1	2	1	2	1	2	2	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05006	Architectural Design - III	09	0	0	9
<p>Objective To enable capability of designing buildings of specific categories for multiple user group and understanding the allied structural and building services requirement.</p>						
<p>1. MAJOR DESIGN PROBLEM</p> <p>Designing for multifunctional environments within specific categories (Medium scale)</p> <p>INTENT To let the students explore design possibilities of multifunctional environments with group of facilities supporting variety of user-groups; To expose the students to the challenges of site planning and designing buildings with varied functions, having an array of activities and services; To familiarize the students to the task of coordinating integration of structural design and specialized building services in the framework of architectural design. Students are required to be well versed with all the building structural systems, so that they will be able to categorize and choose structural systems for a multistoried (2-3 storied) building. This could be done through literature study/ lectures/ discussions/ videos, study models, presentation etc. Students should explore various new building materials appropriate for the building typology – An exhaustive list of materials could be prepared through market survey/ case studies/ books/ papers/ reports, presentation, display etc.</p>						
<p>FOCUS AREAS</p> <ul style="list-style-type: none"> • Considerations for planning of campuses/group of built-up spaces • Zoning and orientating patterns • Spatial integration • Functional efficiency (utilitarian parameters, space optimization, integration of structural systems and building services (HVAC, electrical, plumbing etc.) • Man - Environment relationship 						
<p>ALLIED KNOWLEDGE REQUIRED</p> <ul style="list-style-type: none"> • Site planning techniques • Sustainable Design • Barrier free environments • Building services • Landscape design 						
<p>Examples of Major Studio Projects School, Vocational training institute, School for special categories, Hospitality buildings (Hotels, Resorts, Motels), Multi-specialty clinic and diagnostic center, Small commercial or office complex, Interpretation center, Cultural center, Art and Craft Centre</p>						
<p>Examples of Minor Studio Project Auditorium, Gymnasium, or any small-scale building of approximate area of 200 sqmt., Small scale place of worship.</p>						
<p>PROCESS Learning outcome could be achieved after completing the initial design process steps as stated below:</p> <ul style="list-style-type: none"> • Introducing Design Problem • Site Visit • Site Analysis • Designing the design Program • Collecting and analyzing Data for various spaces 						

<ul style="list-style-type: none"> • Area Programming • Flow diagram (relation of various spaces) • Bubble diagram (locating various zones on site) • Site Zoning • Try and Re-create (Analyzing spaces in all dimensions through Block Models) • Single line Graphics • It is preferable if the students communicate the application of all services in their design. • Students must make enlarged drawings showing all architectural drawings, details for any part of the building. • Study model of the Design to be made • Students may integrate the knowledge gained from previous theory based subjects (like building services mathematics for architecture, building materials and construction, structures etc.) and apply in their design during design development/ detail stage. • Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc. • Summative assessment of the studio work could be achieved through Panel discussion, presentation, criteria based evaluation
<p>Note</p> <ul style="list-style-type: none"> • Study tour of one-week duration is mandatory for conducting case study and field study related to the Architectural Design project. • End Semester evaluation will be done by external jury member (from Academics or Professional Architect) other than the University faculty.
<p>Reference</p> <ol style="list-style-type: none"> 1. Baiche, B. and Walliman, N. (2012). Neufert Architects Data, 4th Ed. Oxford : Wiley-Blackwell. 2. Chiara, J. D. and Michael, J. C. 2001. Time Savers Standards for Building Types. Singapore: McGraw Hill Professional. 3. Gauzin-Muller, D. (2002). Sustainable Architecture and Urbanism: Concepts, Technologies, Examples. 1st Ed. Basel: BirkhauserVerlag AG. 4. National Building Code 2005

Course Outcomes:

CO1	Analyze and explore design possibilities of multifunctional environments
CO2	Evaluate the challenges of site planning and designing buildings with varied functions
CO3	Demonstrate the knowledge about Spatial integration
CO4	Demonstrate the importance of Barrier free environments in design.
CO5	Implement the concept of knowledge Landscape design in design process

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05007	Landscape Design Studio	02	0	0	1
<p>Objective To enable the students to design landscapes with implementations of principles of site planning, site analysis techniques, understand the elements and their practical use in landscape design.</p>						
<p>Elements of Designed Landscapes</p> <ul style="list-style-type: none"> Brief overview of the use of landforms, water, plants, built elements, application of materials, street furniture in a designed landscape. Hard landscapes, paving details, design of paths, roadways, streets, terraces etc and use of land form effectively Soft landscapes, design of lawns, shrubs, hedges, trees, in relation to buildings and other landscape elements. <p>Design and Construction Details</p> <ul style="list-style-type: none"> Design concepts related to use of sculpture, outdoor lightings, Architectural feature, steel furniture and grouping them into meaningful compositions for visual and functional effects. Study of landform, its technical expression through grading plan, sections and earthwork computations. Constriction of structure in landscape circulation roads, parking paths, level changes, walls, steps, lamps, construction of screens, trellis, wall fences, gales decks, pools etc, Contemporary concepts and concerns, contemporary attitude to development and design of open spaces like urban landscape, parks, rural landscape etc. Introduction to concepts of green architecture and micro climate planning, the role of landscape components in modifying micro climate with respect to temperature, humidity, precipitation and percolation <p>Assignments Simple exercises in using plants and landscape elements Studio exercise and emphasizing relationship between built form and outdoor areas and site planning issues</p>						
<p>Reference</p> <ol style="list-style-type: none"> Appleton. (1996). The Experience of Landscape. Wiley. Geoffrey, and Jellico, S. (1987). The Landscape of Man. Thames and Hudson. Holl, G. P. (2006). Questions of Perception Phenomenon logy of Architecture. Richmond : William Stout Publishers. Laurie. (1986). An Introduction to Landscape Architecture. Elsevier. Lynch, K. (1962). Site Planning. Cambridge : The MIT Press. Reid, G. (2002). Landscape Graphics. New York : Watson-Guptill. Simonds, J. O. (2006). Landscape Architecture: A Manual of Land Planning and Design. Man and Nature by George Perkins Marsh and David Lowenthal 						

Course Outcomes:

CO1	Analyze the use of landforms.
CO2	Evaluate the design of Hard landscapes and soft landscapes
CO3	Demonstrate the knowledge about design of lawns and pathways
CO4	Demonstrate concepts of green architecture and micro climate planning.
CO5	Implement the concept of knowledge Landscape in design process

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	2	2	1	1	1	2	1	2
CO2	3	3	-	2	2	2	1	1	1	2	1	2
CO3	3	3	-	2	2	2	1	1	1	2	1	2
CO4	3	3	-	2	2	2	1	1	1	2	1	2
CO5	3	3	-	2	2	2	1	1	1	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	2	2	2	1	1	1	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
5TH	BAR05008	Working Drawing and Detailing- I	04	0	0	4
<p>Objective To introduce Working drawings and their significance in the construction of buildings. To teach students the essential components of working drawings, notations, drawing standards, and strengthen students' knowledge about preparing working drawings for various stages of building construction and for details of building elements.</p>						
<p>Introduction to various building components and precise purpose of set of working drawings. Study of each drawing with reference to specification & schedules of various building materials.</p> <ul style="list-style-type: none"> • Preparations of check list as guide for list of working drawings. • Study of building byelaws for various construction details. • Method of representing various contents & specific information in working drawings. • Preparation of municipal drawings and importance of working drawing as a legal document and tenderdocument. <p>Load Bearing Structure One set of working drawing of any load bearing structure along with large-scale details of any specifically designed situations. The following set of drawings may be prepared for the same.</p> <ul style="list-style-type: none"> • Corporation drawing • Site plan • Center lineplan • Excavation plan • Foundation plan • Foundation Details • Sill level plan • Schedule of openings • Lintel level plan • Slab level plan • Terrace level plan & terracing detailing • Electrical layout • Plumbing layout • Sections • Elevations • Toilet layout 						
<p>Reference</p> <ol style="list-style-type: none"> 1. Building and Construction Authority. (2005). CONQUAS-21. Singapore : The BCA Construction Quality Assessment System. 2. Jefferis, A. and Madsen, D.A. (2005). Architectural Drafting and Design. 5th Ed. New York : Thomson Delmar Learning. 3. Joe, B. (Ed). (2002). Details in Architecture: Vol. I-V. Victoria : The Images Publishing group. 4. Osamu, A. W., Linde, R. M. and Bakhoun, N. R. (2011). The professional practice of architectural working drawings. 4th Ed. Hoboken : John Wiley & Sons. 5. Weston, R. (2004). Plans Sections Elevations – Key buildings of the twentieth century. London : Laurence King Publishing. 						

Course Outcomes:

CO1	Analyze Working drawings and their significance in the construction of buildings
CO2	Demonstrate the knowledge about essential components of working drawings
CO3	Analyze the concept of load bearing structures
CO4	Demonstrate working drawings of various floor plans
CO5	Implement various service layouts in the working drawing set

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	3	1	2	3	2	1	1	-	1
CO2	2	2	2	3	1	2	3	2	1	1	-	1
CO3	2	2	2	3	1	2	3	2	1	1	-	1
CO4	2	2	2	3	1	2	3	2	1	1	-	1
CO5	2	2	2	3	1	2	3	2	1	1	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	2	2	3	1	2	3	2	1	1	-	1

**SIXTH SEMESTER
BARCH PROGRAMME**

SIXTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR06001	Theory of Design	3-0-0	3	WE			
2.	BAR06002	Human Settlement Planning and Housing	3-0-0	3	WE			
3.	BAR06003	Estimation Valuation and Specification	3-0-0	3	WE			
4.	BAR06004	HVAC Systems	2-1-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR06005	Architectural Design - IV	0-0-9	9		IA	VV	TP
2.	BAR06006	Interior Design	1-0-4	3		IA	VV	TP
3.	BAR06007	Working Drawing and Detailing - II	0-0-4	4		IA	VV	
TOTAL			11-1-17 = 29	28				

**DETAIL SYLLABUS
SIXTH SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
6TH	BAR06001	Theory of Design	03	03	0	0
<p>Objective To enable the students to understand the principles of site planning, site analysis techniques and its application in design of different landscape types.</p>						
<p>Module 1 INTRODUCTION TO DESIGN Definition of design, Value Judgments in Design (Design and Morality/Ethics, Socially Responsive Design Process, Inclusive Design), evaluation of design, Design Skills, General discussion on Manmade and Nature elements/structures</p>						
<p>Module 2 DESIGN PROCESS AND THINKING Context for architectural design problems Design process - stages in the design process, different ideas of design methodology, analysis and synthesis, simulation, action ability and implementation of intentions. Understanding the terms - creativity, imagination, etc. Theories on thinking, convergent and divergent thinking, lateral and vertical thinking, creative techniques like checklists, brainstorming, syntactic, etc., blocks in creative thinking.</p>						
<p>Module 3 DESIGN THEORIES A chronological overview of principles and philosophy of architectural movement in art, design and architecture, worldview, theories & perceptions of time and space, mode of reasoning through discussion on works of notable architects</p> <ul style="list-style-type: none"> • Theories of perception and variability of perception, Phenomenology of perception - Merleau-Ponty • Modernism Related to works of Walter Gropius, Le Corbusier, Mies van der Rohe, Frank Lloyd Wright, Louis Sullivan • Postmodernism Work of Michael Graves, Robert Venturi, Philip Johnson 						
<p>Module 4 DESIGN CONCEPTS AND PHILOSOPHIES A chronological overview of principles and philosophy of architectural movement in art, design and architecture, worldview, theories & perceptions of time and space, mode of reasoning through discussion on works of notable architects</p> <ul style="list-style-type: none"> • Structuralism Charles Alexander Jencks, Aldo van Eyck, Herman Hertzberger, Kenzō Tange, Claude Lévi-Strauss • Post-structuralism/Deconstruction Bernard Tschumi, Peter Eisenman, Henri LeFebvre, Frank Gehry, Daniel Libeskind, Zaha Hadid. • Biomimicry/biomimetics Antoni Gaudi, Norman Foster 						

Module 5

Book review, seminars and discussions

READING:

- *Louis Sullivan (Form Follows Function)*
- *Le Corbusier (Towards a new Architecture)*
- *Bernard Tschumi (deconstructivism)*

Reference

1. Geoffrey Broadbent - Design in Architecture - Architecture and the human sciences - John Wiley & Sons, New York, 1981
 2. Nigel Cross - Developments in Design Methodology, John Wiley & Sons, 1984
 3. Bryan Lauson - How Designers Think, Architectural Press Ltd., London, 1980.
 4. Tom Heath - Method in Architecture, John Wiley & Sons, New York, 1984
 5. Johnson, P, Wigley, M, (1988). "Deconstructivist Architecture" in Deconstructivist Architecture, New York: Museum of Modern Art, pp 10-20.
 6. C. Jencks, (1991). "The Language of Post Modern Architecture" Wiley Academy.
 7. P. Eisenman, (1999). "Diagram Diaries". Universe, New York.
 8. Merleau-Ponty, M., (1964). "The primacy of perception". In The Primary Perception and other essays on phenomenological psychology, the philosophy of art, history, and politics, (J. M. Edie Trans), Northwestern University Press.
1. Robert Venturi, (1966) "Complexity and Contradiction in Architecture". New York: The Museum of Modern Art.
 2. Tschumi, B. (1994). "Architecture and disjunction. Cambridge", Mass: MIT.

Course Outcomes

CO1	Develop knowledge about theories of design
CO2	Analyze the process of design
CO3	Develop knowledge about various design concepts
CO4	Analyze various design philosophies
CO5	Reviewing books

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	2	3	-	-	-	3	-
CO2	3	2	-	2	2	2	3	-	-	-	3	-
CO3	3	2	-	2	2	2	3	-	-	-	3	-
CO4	3	2	-	2	2	2	3	-	-	-	3	-
CO5	3	2	-	2	2	2	3	-	-	-	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	2	2	2	3	-	-	-	3	-

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
6TH	BAR06002	Human Settlement Planning and Housing	03	03	0	0
<p>Objective The course aims to impart a comprehensive knowledge of urban planning and housing as means of understanding architecture in the macro scale. The students are exposed to concepts of public realm, understanding of the city as a three dimensional entity and perception of spaces at multiple scales; Planning concepts, settlement planning, housing policies, planning policies, different levels of urban planning, familiarize with the implementation processes through various statutory and non-statutory guidelines.</p>						
<p>Module I Origin and evolution of early human settlements, factors responsible for development of various settlement forms, types of settlements (urban and rural) classification of areas within the urban settlements in terms of types of land uses, densities, administrative division, land Sociological aspects, essential elements of society rural and urban communities.</p>						
<p>Module 2</p> <ul style="list-style-type: none"> Principles of Ekistics, brief introduction to the theory of 'Ekistics'. Introduction to the concepts of green belts, satellite towns, Introduction to rural settlements planning, Urban-rural fringe, problems of migration 						
<p>Module 3 URBAN PLANNING Levels of planning and steps of preparation of Master Plan, Structure plan and Zonal development plan. Land-use Classification of a city. Land-use subdivision, regulation and zoning. Smart City concepts; Compact City and Sustainable City; Concepts of Transit Oriented Development, Public Participation in Planning.</p>						
<p>Module 4 INTRODUCTION TO TRANSPORTATION PLANNING Introduction to Transportation planning and traffic design, potential and limitations of roadways, railways, airways and waterways in the development of a settlement, Introduction to Urban roads, Elements and Hierarchy of Urban Roads, Road Intersections, Interchanges, Grade Separators</p>						
<p>Module 5 HOUSING Introduction to housing and community facilities. Role of F.S.I and densities in housing. Housing schemes in India, Urban renewal and urban sprawl; Brief introduction to Slums, redevelopment schemes, concepts regarding Slum clearance, redevelopment, rehabilitation and resettlement.</p> <p><i>Note:</i> Field studies of Slums, Study of policies and guidelines on recent housing schemes, Review of Master Plans of Different Cities.</p>						

Reference

1. Larice, M. and Macdonald, E. Ed. (2013). The Urban Design Reader. 2nd Ed. The Routledge
2. Urban Reader Series, Abingdon, Oxon : Routledge.
3. Carmona, M., Heath, T., Oc, T. and Tiesdell, S. (2010). Public Places Urban Spaces. Oxford: Architectural Press.
4. Marshall, S. (2009). Cities design and evolution. New York : Routledge.
5. Lang, J. T. (2005). Urban Design: A Typology of Procedures and Products. Oxford: Elsevier/Architectural Press.
6. Moughtin, C., Cuesta, R., Sarris, C. and Signoretta, P. (2003). Urban Design - Methods and
7. Techniques. Oxford : Architectural Press.
8. Watson, D., Plattus, A. and Shibley, R. (2003). Time-Saver standards for urban design. New York: McGraw Hill.
9. Joseph De Chiarra and Lee Coppleman, "Planning Design Criteria", Van Nostrand Reinhold Co., New York, 1968
10. Town Planning, A.Bandopadhyay, Books and Allied, Calcutta 2000.
11. Babur Mumtaz and Patweikly, Urban Housing Strategies, Pitman Publishing, London, 1976.
12. Geoffrey K.Payne, Low Income Housing in the Development World, John Wiley and Sons, Chichester, 1984.
13. John F.C.Turner, Housing by people, Marison Boyars, London, 1976.
14. Martin Evans, Housing, Climate and Comfort, Architectural Press, London, 1980.
15. Forbes Davidson and Geoff Payne, Urban Projects Manual, Liverpool University Press, Liverpool, 1983.
16. Rangwala, Town Planning, Charotar publishing house.
17. G.K.Hiraskar, Town Planning.
18. Rame Gowda, Urban and Regional planning.
19. N.V.Modak, V.N.Ambedkar, Town and country planning and Housing, Orient Longman,

Course Outcomes

CO1	Develop knowledge about origin and evolution of human settlement.
CO2	Analyze the principles and concepts related to human settlement
CO3	Demonstrate knowledge about Urban Planning.
CO4	Apply knowledge about Transportation Planning.
CO5	Acquire knowledge about Housing.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	2	3	-	-	2	3	2
CO2	3	2	-	2	2	2	3	-	-	2	3	2
CO3	3	2	-	2	2	2	3	-	-	2	3	2
CO4	3	2	-	2	2	2	3	-	-	2	3	2
CO5	3	2	-	2	2	2	3	-	-	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	2	2	2	3	-	-	2	3	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
6TH	BAR06003	Estimation, Valuation and Specification	03	03	0	0
Objective: The course intends to provide knowledge of methods of estimation and valuation for building industry. Students get equipped with practical and working knowledge in areas of building construction and specification, quantifying materials and rate analysis.						
Module 1 ESTIMATION Introduction to the subject, definition, aim and objective. Scope and importance of the subject, principles of and methods of estimating. Different types of estimation. Approximate and detailed estimation						
Module 2 Methods of approximate estimating- Built in or Carpet area method, Cubic content method and numerous systems. Rates of materials, Rate analysis, Pricing of bill of quantities, Abstract and detailed estimate. Taking out quantities of various items. Common abbreviations. Cost estimates, standards modes of measurements, writing schedules, elements of cost accountancy and book keeping.						
Module 3 VALUATION Principles of valuation of real properties for the purpose of sale and purchase, mortgage, lease, Free hold and lease hold, interest, forms of rents, seller's values, fair value, mortgage values, distress sale values, buyer's value, fancy value, annual value, year's purchase, depreciation value. Methods of valuation- Valuation of land, methods of belting, methods of front land, land building methods of valuation, shop premises properties.						
Module 4 Valuation of residential offices, commercial, industrial, lease hold agricultural properties, valuation of municipal rate, and compulsory acquisition valuation of industries as going concern factories, mills, easement rights and valuation thereof, development of properties. Arbitration- litigation laws						
Module 5 Complete estimation of a small scale building as decided by the faculty.						
Reference 1. Birdie, G. S. (2005). Text Book of Estimating and Costing. Dhanpat Rai Publishing. Chakraborty, M. Estimating, Costing, Specification & Valuation 2. C.P.W.D. Standard Schedule of Rates. 3. 3. Dutta, B. N. (1998). Estimating and Costing in Civil Engineering. 24th Ed. UBS Publishers Distributors Ltd.						

Course Outcomes

CO1	Develop knowledge about basic process of estimation.
CO2	Applying various methods of approximate estimation.
CO3	Analyse valuation of preprojects.
CO4	Applying process of valuation for residential and commercial buildings
CO5	Demonstrate estimation process for live projects

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	1	-	-	3	-	-	-	3	2
CO2	2	-	2	1	-	-	3	-	-	-	3	2
CO3	2	-	2	1	-	-	3	-	-	-	3	2
CO4	2	-	2	1	-	-	3	-	-	-	3	2
CO5	2	-	2	1	-	-	3	-	-	-	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	-	2	1	-	-	3	-	-	-	3	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
6TH	BAR06004	HVAC Systems	03	02	1	0
<p>Objective This course aims to impart fundamental understanding about heating, ventilation and air-conditioning in buildings. Basic principles of thermodynamics and air-conditioning process is covered with a specific orientation towards human comfort. the course enables the student to calculate and estimate heating or cooling load of a building and design the air-conditioning system in an effective manner. Different types of air-conditioning system and ducting system are also taught in the course.</p>						
<p>Module 1 DEFINITIONS AND LAWS Definition & Units of Thermodynamic quantities - Heat (Specific heat & Latent heat), Pressure (Absolute, Gauge & Atmospheric Pressure), Absolute Temperature (Scales & measurement). PH diagram of water to understand Latent heat, Sensible heat, Superheat & Enthalpy, Degree of Superheat & Dryness Fraction. Laws of Thermodynamics with respect to refrigerators & heat pumps, COP & EER of HVAC systems. Working principle of a Vapor Compression Refrigeration system with schematics & TS diagram. Application, Properties & Dupont Nomenclature of refrigerants.</p>						
<p>Module 2 AIRCONDITIONING PRINCIPLES Heat Gains in Building Systems – Thermal Conductivity and U value of Building Materials. Conductive heat transfer through composite walls & pipes. Solar Heat Gain through Fenestration systems. Numerical Sensible and Latent Gains, Humidification & Dehumidification, Thermal comfort conditions & Comfort Chart. Classification, Principle, construction and working of Summer and Winter Air-conditioning systems. Cooling load calculations. Numerical using Psychometric chart.</p>						
<p>Module 3 HEATING SYSTEMS Space Heating: Conventional & Unconventional Heating systems, Radiant panel and Hydronic Heating systems. Passive heating and cooling techniques, Green heating systems.</p>						
<p>Module 4 COOLING SYSTEMS Air Distribution Systems – Natural & Mechanical ventilation systems, Supply, Return and Recirculation Ducts. Indoor air quality and Air Filters. Thermostats and Humidistat. Centrifugal blowers and Exhausters. Different types of air-conditioning systems. Window, split, ductable AC, etc. Introduction to central air conditioning systems. Understanding 2 pipe & 4 Pipe CV and VAV systems. Chilled Air and Water systems, Spatial requirement of HVAC plants and duct layout.</p>						
<p>Module 5 Design of Air-conditioning system for a small office or commercial building.</p>						

References

1. Bovay, H. E. (1981). Handbook of Mechanical & Electrical systems for Buildings. McGraw-Hill Higher Education.
2. Sawhney, G. S. (2006). Fundamentals of Mechanical Engineering: Thermodynamics, Mechanics and Strength of Materials. New Delhi : Prentice Hall of India.
3. Willim, J. McG. (1971). Mechanical & Electrical Equipment for Buildings.
4. Ambrose, E.R. (1968). Heat pumps and Electric Heating, John and Wiley and Sons Inc, New York.
5. Handbook for Building Engineers in Metric systems (1968), NBC, New Delhi.
6. William H. Severns and Julian R. Fellows. Air conditioning and refrigeration. John Wiley and sons, London
7. Khurmi, Gupta & Arora. Refrigeration and Air Conditioning, S Chand & Co.

Course Outcomes

CO1	Develop knowledge about terminologies and laws related to air conditioning.
CO2	Develop knowledge about Air conditioning system.
CO3	Evaluating heating system.
CO4	Evaluating cooling system.
CO5	Designing of Air Conditioning system.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	-	2	2	3	-	-	1	3	2
CO2	3	-	2	-	2	2	3	-	-	1	3	2
CO3	3	-	2	-	2	2	3	-	-	1	3	2
CO4	3	-	2	-	2	2	3	-	-	1	3	2
CO5	3	-	2	-	2	2	3	-	-	1	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	2	-	2	2	3	-	-	1	3	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
6TH	BAR06005	Architectural Design - IV	09	0	0	9
<p>Objective The objective of this studio is to expose the students to the complexities of providing built up space in an urban setting. To expose the students to the challenges of bigger scale site planning involving a group of buildings, space programming, complexities of providing building services and infrastructure facilities and economic feasibility. To enable the students to understand how to design in compliance with building regulations and space standards.</p>						
<p>INTENT To generate an understanding within the students to deal with the complexities of mixing various user groups (economic and socio-cultural) in living environments. While designing socio-economic determinants and technological alternatives shall be studied in detail. Special emphases to put on structural aspects of high rise buildings, utilitarian parameters, space optimisation, conformance with regulatory requirements, integration of structural systems and building services. They are also expected to be conscious about the need for climate sensitive passive design techniques. Design and standards for different physical infrastructure such as, roads/streets, pedestrian pathways, parking provision (basement parking, other covered and open parking), site drainage, solid waste management facilities, water conservation systems.</p> <p>ALLIED KNOWLEDGE REQUIRED</p> <ul style="list-style-type: none"> • Building regulations and codes • Building and site services (technical) • Sustainable architecture <p>EXAMPLES OF MAJOR DESIGN PROBLEM</p> <p>Design-problem may focus but not limited to a multi-functional, service (advanced services) oriented building like Group housing (Housing types based on height of buildings, and occupancy densities, Gated community, housing types based on affordability, etc.) Multi-speciality Hospitals, High end star category Hotels, Shopping complex/Malls, Office building, Mixed use occupancy buildings etc. in an urban setting including application of urban development, controls, codes and bye-laws.</p> <p>Emphasis may also be laid on site planning as well as on advanced services at building and at site level. The focus would be on understanding how to design for an urban setting.</p> <p>EXAMPLES OF MINOR STUDIO PROJECT</p> <p>Club house, Meditation hall, Multi-level parking, Foot over bridge, Small scale design in a heritage context.</p> <p>PROCESS</p> <ul style="list-style-type: none"> • This module can be started with a warm-up exercise/ literature review (group or individual). Students could be sensitized (social-cultural sensitization) through documentary/ movies/ photos etc. • Students may visit site for collecting context specific data for getting better understanding of real- life project details. The collected data may be analyzed and presented for evaluation. • The above-mentioned module teaching methods are suggestive. Faculty may choose other pedagogical approaches for design thinking process. 						

- Readings/ short movies/ Discussion on designers' philosophies could be initiated for idea generation. Further approaches for design iterations may involve more common techniques like Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, try and re-create for analysing spaces in all dimensions through Block Models and single line graphics and study models for choosing the right option.
- It is preferable if the students communicate the application of all services in their design.
- Students must make enlarged drawings showing all working details for superstructure.
- Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc.
- Summative assessment of the studio work could be achieved through panel discussion, presentation.

Note

- Study tour of one-week duration is mandatory for conducting case study and field study related to the Architectural Design project.
- End Semester evaluation will be done by external jury member (from Academics or Professional Architect) other than the University faculty.

Reference

1. Baiche, B. and Walliman, N. (2012). Neufert Architects Data, 4th Ed. Oxford : Wiley-Blackwell.
2. Chiara, J. D. and Michael, J. C. 2001. Time Savers Standards for Building Types. Singapore: McGraw Hill Professional.
3. Gauzin-Muller, D. (2002). Sustainable Architecture and Urbanism: Concepts, Technologies, Examples. 1st Ed. Basel : BirkhauserVerlag AG.
4. Huxtable, A-L. (1984). Tall Buildings Artistically Reconsidered.
5. Kloft, E. and Johann, E. (2003). High-rise Manual: Typology and Design, Construction and Technology, 1st Ed. Basel: Birkhauser Verlag AG.
6. Markus, K., Rollbacher, R., Herrmann, E., Wietzorrek, U. and Ebner, P. (2009). Typology+ :
7. Innovative Residential Architecture. Basel : BirkhauserVerlag AG.
8. Parker, D. And Wood, A. (2013). The Tall Buildings Reference Book. New York : Routledge.
9. Wood, A. and Ruba, S. (2012). Guide to Natural Ventilation in High Rise Office Buildings. New York : Routledge.
10. Correa, C. (2010). A Place in the Shade: The New Landscape and Other Essays. New Delhi : Penguin Books.
11. Ferre, A. and Tihamer, S. H. (2010). Total Housing: Alternatives to Urban Sprawl. New York : ACTAR Publishers.
12. Brooks, R. G. (1988). Site Planning: Environment, Process and Development. Michigan.
13. Richard Untermann and Robert Small, "Site planning for cluster housing", Van Nostrand Reinhold Company, 1977.

Course Outcomes

CO1	Generate and understanding within the students to deal with the complexities of mixing various user groups
CO2	Develop knowledge about Building regulations and codes Building and site services (technical)
CO3	Develop knowledge about site services (technical)
CO4	Evaluating design process of multi-functional, service (advanced services) oriented building
CO5	Analysing site planning as well as on advanced services at building and at site level

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
6TH	BAR06006	Interior Design	03	01	0	4
Objective						
To familiarize students about the need of interior design; its principles and theories with specific reference to color, texture, light and their effects. To explore creativity and innovative design options with the basic knowledge of anthropometrics, building materials and finishes and construction details.						
Module 1						
Interior space programming, Introduction to basic physical factors/ elements of interior design i.e walls, floors, ceiling, doors, windows etc. Historical evolution of interior styles and furniture, vernacular interior elements (design and materials used) Usage of modern, traditional as well as cost effective materials						
<ul style="list-style-type: none"> An assignment to be submitted on market survey of various interior materials. 						
Module 2						
Study of the relationship between furniture and spaces, human movements & furniture design as related to human comfort. Function, materials and methods of construction, changing trends and lifestyles, innovations and design ideas. Study on furniture for specific types of interiors like office furniture, children's furniture, residential furniture, display systems, etc.						
<ul style="list-style-type: none"> Assignment on different furniture types and product design. 						
Module 3						
Study of daylight and artificial lighting for specific functions; different types of interior lighting their effects; types of lighting fixtures; Electrical layout , Other elements of interiors like accessories used for enhancement of interiors, paintings, objects-de-art, etc. Interior landscaping elements like rocks, plants, water, flowers, fountains, paving, artefacts, etc.						
<ul style="list-style-type: none"> Assignment on two interior schemes of different functional types: residential/commercial /Public buildings at different scales 						
Module 4						
Details like false ceiling, partition, flooring, wall paneling/cladding; color scheme; furnishings.						
Module 5						
<ul style="list-style-type: none"> Presentation on eminent interior designers' work One time problem of 3 hours (one week) to be conducted. 						
Reference						
<ol style="list-style-type: none"> Ching, F. D. K. (1987). <i>Interior Design Illustrated</i>. New York : V.N.R. Publications. Doshi, S. (Ed.) (1982). <i>The Impulse to adorn - Studies in traditional Indian Architecture</i>. Marg Publications. Kathryn, B. H. and Marcus, G. H. (1993). <i>Landmarks of twentieth Century Design</i>. Abbey Ville Press. Penero, J. and Zelnik, M. (1979). <i>Human Dimension and Interiorspace: A Source Book of Design Reference Standards</i>. New York : Whitney Library of Design. Slesin, S. and Ceiff, S. (1990). <i>Indian Style</i>. New York: Clarkson N. Potter. Dorothy, S-D., Kness, D. M., Logan, K. C. and Laura, S. (1983). <i>Introduction to Interior Design</i>. Michigan : Macmillan Publishing. 						

Course Outcomes

CO1	Develop knowledge about Interior space programming
CO2	Develop knowledge of the relationship between furniture and spaces, human movements & furniture design
CO3	Develop knowledge about natural and artificial lighting for specific functions
CO4	Planning and designing of various design elements
CO5	Analysing the works of eminent designers.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
6TH	BAR06007	Working Drawing and Detailing- II	04	0	0	4

Objective

To train the students to prepare detailed Working drawings for effective execution at construction site, preparation of integrated services drawings, and detailing of building components, and methods of transmittals and record keeping.

Introduction to various allied services drawings, building components and precise purpose of set of working drawings. Study of each drawing with reference to specification & schedules of various building materials.

Frame Structure

One set of working drawing of any frame structure along with large-scale details of any specifically designed situations with basement. The following set of drawings may be prepared for the same.

- Corporation drawing
- Site plan
- Centre lineplan
- Excavation plan
- Footing plan
- Footing details
- Ground beam & plinth beam details
- Sill level plan
- Schedule of openings
- Lintel level plan
- Slab level plan
- Terrace level plan
- Electrical layout
- Plumbing layout
- Sections
- Elevations
- Toilet & Kitchen layout
- Sewerage & drain layout
- Rainwater harvesting system
- Flooring pattern & finishes
- Wall pattern & finishes
- Wood finishes & fixates
- Fabrication details
- Boundary Wall drawing

Reference

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

Course Outcomes

CO1	Develop knowledge about drawings required for site execution
CO2	Develop knowledge of the site issues
CO3	Producing quality drawings for execution at site
CO4	Applying computer added skills for mitigating errors
CO5	Compiling various administrative and working drawings.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	3	1	2	3	2	1	1	-	1
CO2	2	2	2	3	1	2	3	2	1	1	-	1
CO3	2	2	2	3	1	2	3	2	1	1	-	1
CO4	2	2	2	3	1	2	3	2	1	1	-	1
CO5	2	2	2	3	1	2	3	2	1	1	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	2	2	3	1	2	3	2	1	1	-	1

**SEVENTH SEMESTER
BARCH PROGRAMME**

SEVENTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR07001	Introduction to Urban Design	3-0-0	3	WE			
2.	BAR07002	Advanced Building Systems and Services	2-1-0	3	WE			
3.		Professional Elective -II	3-0-0	3	WE			
4.		Open Elective -I	3-0-0	3				
SESSIONAL SUBJECTS								
1.	BAR07003	Architectural Design - V	0-0-9	9		IA	VV	TP
2.	BAR07004	Research Methods and Seminar	1-0-4	3		IA	VV	TP
3.	BAR07005	Non-Conventional Building Technologies	0-0-4	4		IA	VV	TP
TOTAL			12-1-17 = 30	28				

**DETAIL SYLLABUS
SEVENTH SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAR07001	Introduction to Urban Design	03	03	0	0
<p>Objective: To introduce Urban design as a professional discipline situated at the interface between architecture, landscape architecture and urban planning; To sensitise the students about the concept of public realm, understanding of the city as a three dimensional entity and perception of spaces at multiple scales; familiarize with the implementation processes through various statutory and non-statutory guidelines.</p>						
<p>Module 1 INTRODUCTION AND SCOPE Relationship between Architecture, Urban Design and Urban Planning; Brief review of the evolution of the urban design as a discipline, basic principles and theories. Broad understanding of urban forms and spaces at various spatial scales through examples from historic cities, examples of medieval, industrial, renaissance). Philosophies and concepts of different pioneers of town planning (Patrick Geddes, Ebenezer Howard, Patrick Abercrombie, Raymond Unwin, Soria Y. Mata, etc.)</p>						
<p>Module 2 TYPOLOGIES AND PROCEDURES Concept and characteristics of Neighbourhoods (Clarence Perry), Neighbourhood Unit- Size , Boundaries, Social relevance and Meaning, Social mixed and Balanced Communities; Concepts of public and private realm; Concept of public open space; Understanding different types and procedures of urban design interventions their scale relationships.</p>						
<p>Module 3 ELEMENTS OF URBAN DESIGN Understanding the city as a three dimensional element; Urban form as determined by interplay of masses, voids, order, scale, harmony, symmetry, colour and texture; Organization of spaces and their articulation in the form of squares, streets, vistas and focal points; Image of the city and its components such as edges, paths, landmarks, street features.</p>						
<p>Module 4 URBAN DESIGN AND SUSTAINABILITY Sustainability concept; Relationship of urban design with economic, environmental and social sustainability; Environmental Design- Microclimate, Wind shading, Designing for Sun and Shade, Natural Lighting, Compact City, Healthy City and Walkable City.</p>						
<p>Module 5 URBAN DESIGN IMPLEMENTATION Urban design and its control; Institutional arrangements for design and planning; Urban renewal; Concepts of Transit Oriented Development; Parking, Servicing and Infrastructure</p>						

References

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

Course Outcomes

CO1	Implement the basic meaning of Urban design and its history
CO2	Analyze the concept of different theories and concepts
CO3	Analyze the concept of elements of Urban design
CO4	Demonstrate basic principles of interrelation of Urban design and sustainability
CO5	Analyze the concept of implementation of Urban design in practical concepts

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	2	3	-	-	2	3	2
CO2	3	2	-	2	2	2	3	-	-	2	3	2
CO3	3	2	-	2	2	2	3	-	-	2	3	2
CO4	3	2	-	2	2	2	3	-	-	2	3	2
CO5	3	2	-	2	2	2	3	-	-	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	2	2	2	3	-	-	2	3	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAR07002	Advanced Building Systems and Services	03	02	01	0
<p>Objective: To develop know-how and understanding of important advanced systems and services in buildings, their definitions and terms used, functioning and their applications in building.</p>						
<p>Module 1 FIRE SAFETY Classification of Fires & Extinguishers, Dry Riser, Wet Riser & Down Comer systems, Sprinkler & Drencher systems, Fire detection systems, Fire Lifts & Fire Escape Plan, Fire prevention, safety and security measures and regulations. Fire fighting layout, Reflected ceiling plan of smoke detectors / sprinklers, etc.</p>						
<p>Module 2 PARKING AND CIRCULATION SYSTEMS Multilevel Parking Systems, Semi-automatic and automatic parking systems, Elevator types and spatial requirements with respect to Passenger, Service & Fire lifts, Escalators and Travellators, Applications of Raised Floor systems.</p>						
<p>Module 3 BUILDING UTILITIES Building Automation - Objectives & advantages, Smart devices used in Illumination, Climate control, Building Security systems etc., Laundry & Garbage chutes, Understanding Bio Medical Waste and their disposal, Chemical and Biological Toilets, Hot water systems for apartments and hotels, Cooking gas distribution system for residences. Communication systems: space and connection facilities for LAN, computer server, PABX and telephone.</p>						
<p>Module 4 STANDARDS AND REGULATIONS Study of building services with reference to NBC (National Building Code), ECBC (Energy Conservation and Building Code) and BIS regulations (Bureau of Indian Standards).</p>						
<p>Module 5 APPLICATIONS Case studies on applications of building systems and services.</p>						

References

1. Stein Reynolds Mc Guinness – Mechanical and Electrical equipment for buildings, Vols 1 & 2, John Wiley & sons.
2. Francisco Asensio Cerver – The architecture of Skyscrapers, Hearst Book International, New York, 1997
3. Bennetts Ian & Joseph Burns – Structural systems for Tall building
4. William, J. McG. (1971). Mechanical & Electrical Equipment for Buildings
5. Bovay, H. E. (1981). Handbook of Mechanical & Electrical systems for Buildings. McGraw-Hill Higher Education.
6. Bureau of Indian Standards. (2005). Code of Practice for Electrical Wiring Installations IS-732.
7. Kloft, E. and Johann, E. (2003). High-rise Manual: Typology and Design, Construction and Technology, 1st Ed. Basel: Birkhauser Verlag AG.
8. National Building Code
9. Energy Conservation and Building Code

Course Outcomes

CO1	Demonstrate basic principles of fire-safety in buildings
CO2	Express the concept of circulation and parking system in buildings
CO3	Analyze the concept of building utilities
CO4	Implement principles of standard rules and regulations
CO5	Demonstrate knowledge through case studies

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	-	2	2	3	-	-	1	3	2
CO2	3	-	2	-	2	2	3	-	-	1	3	2
CO3	3	-	2	-	2	2	3	-	-	1	3	2
CO4	3	-	2	-	2	2	3	-	-	1	3	2
CO5	3	-	2	-	2	2	3	-	-	1	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	2	-	2	2	3	-	-	1	3	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BARPE701	Professional Elective (PE) – II Green building and Infrastructure	03	03	0	0
<p>Objective: The objectives include creating awareness and understanding of the concept of sustainable architecture, green building techniques and energy efficiency in buildings that respond to the climate, material and natural resources. To develop analytical skills to understand the energy consumption and hence cater to reduction. To create awareness about tools and practices to calculate energy consumption</p>						
<p>Module 1 SUSTAINABLE PRINCIPLES AND PRACTICES Introduction to the ideas, issues and concepts of sustainable development; principles of environmentally and ecologically sensitive architecture; Importance of water, energy, materials and community in architecture for sustainable development; Brief introduction to green rating systems and criteria for evaluation of different categories of built development - IGBC, GRIHA and LEED rating systems.</p>						
<p>Module 2 GREEN BUILDING DESIGN Sustainable site planning and landscape design; Building form and orientation for sun and Wind; Building envelope design- Fenestration design, shading devices, facade treatment, efficient use of daylighting; Integrated Use of Landscape: Vertical Landscape, Green Wall, Green Roof.</p>						
<p>Module 3 SOLAR PASSIVE TECHNIQUES Passive Heating techniques : General principles – Direct gain systems - Glazed walls, Bay windows, Attached sun spaces etc. Indirect gain systems - Trombe wall and Solar Chimney Passive Cooling techniques : General principles – Evaporative cooling, Nocturnal radiation cooling, Passive Desiccant cooling, induced ventilation, earth sheltering, Wind Towers, Earth-Air tunnels, Air Vents. Case studies on buildings designed with passive heating and cooling techniques.</p>						
<p>Module 4 GREEN PRACTICES AND TECHNOLOGIES Energy utilization in buildings, Renewable and Non-Renewable energy sources. Integration of non-conventional energy systems from renewable source of energy-solar (photo voltaic), wind and biomass Water conservation practices- Rainwater Harvesting systems; Recycling of waste water: Physical, Chemical and Biological treatment methods, Rootzone treatment, Use of recycled water. Environment friendly materials (paints, light sensitive glass, etc), Embodied energy of materials, Bio-degradable materials, Recycling and Reuse of materials.</p>						
<p>Module 5 Introduction to building performance simulation software (as decided by the faculty)</p>						

Example- Ecotect, IES (Integrated Environmental solutions), Radiance.

References

1. Sustainable design manual, Vols. 1& 2, The energy and resource institute, New Delhi.
2. Krishan, A. and Nick Baker, Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, McGraw Hill Education Private Limited, India, 2001.
3. Energy Conservation Building Code (ECBC), USAID-INDIA.
4. Szokolay, S.V., Introduction to Architectural Science - The Basis of Sustainable Design, Architectural Press.
5. Ralph Lebens M., Passive Solar Architecture in Europe – 2, Architecture Press, London 1983.
6. Mendler S. & Odell W., The Guide Book Of Sustainable Design, John Wiley & Sons, 2000.
7. Lawson B., Building Materials, Energy And The Environment; Towards Ecologically Sustainable Development Raia, Act, 1996.

Course Outcomes

CO1	Implement principles of sustainability
CO2	Analyze the concept of green building design process
CO3	Apply basic principles of solar impacts in building
CO4	Demonstrate basic principles of green practices in modern building
CO5	Apply basic principles of simulation software

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	3	2	3	3	-	-	2	3	3
CO2	3	-	1	3	2	3	3	-	-	2	3	3
CO3	3	-	1	3	2	3	3	-	-	2	3	3
CO4	3	-	1	3	2	3	3	-	-	2	3	3
CO5	3	-	1	3	2	3	3	-	-	2	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	1	3	2	3	3	-	-	2	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BARPE702	Professional Elective (PE) – II Architecture and Urbanism in Asia	03	03	0	0
<p>Objective: To provide an overview about dynamic urban transformation and resultant architectural developments taking place in major developing countries in Asia – and thus gain a non-Western perspective; To provide a platform for the students to contextualize the architectural and urban development processes in India with the neighbouring countries; Think from a holistic and multidisciplinary perspective about common problems.</p>						
<p>Module 1 SETTING THE CONTEXT Understanding and Asia’s urban shift and its multiple dimensions; Evolution of the Asian cities: Morphology of pre-modern, market, colonial and contemporary Asian cities.</p>						
<p>Module 2 OPPORTUNITIES AND CHALLENGES Understanding contemporary issues: Demographic transition, urbanisation trends, economic momentum and environmental consequences.</p>						
<p>Module 3 LOOKING TOWARDS EAST AND SOUTHEAST ASIA Understanding underlying socio-political dynamics and critiquing new architecture and urban development patterns in Asian metropolises such as Sri Lanka, Tokyo, Beijing, Shanghai, Hong Kong, Singapore, Bangkok and Jakarta.</p>						
<p>Module 4 LOOKING TOWARDS SOUTH AND WEST ASIA Understanding underlying socio-political dynamics and critiquing new architecture and urban development patterns in Asian metropolises such as Dubai, Abu Dhabi, Karachi, Dhaka and Paro. Locating Indian cities in changing Asia: Economic transformation and settlement patterns</p>						
<p>Module 5 SIMILARITIES AND DISSIMILARITIES Locating Indian cities in changing Asia: Economic transformation and settlement patterns – informal and formal cities, Issues of sustainability, resilience and urban form; Roles of state and non-state actors in India’s urban development process.</p>						

References

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

Course Outcomes

CO1	Express the concept of social changes in Asia which had an impact on architecture
CO2	Demonstrate basic knowledge about opportunities and challenges
CO3	Analyze the concept of socio-political scenario of east and south-east Asia
CO4	Apply basic principles of socio-political scenario of west and south Asia
CO5	Demonstrate basic principles of about forms, process and issues

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	2	3	-	-	2	3	2
CO2	3	2	-	2	2	2	3	-	-	2	3	2
CO3	3	2	-	2	2	2	3	-	-	2	3	2
CO4	3	2	-	2	2	2	3	-	-	2	3	2
CO5	3	2	-	2	2	2	3	-	-	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	2	2	2	3	-	-	2	3	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BARPE703	Professional Elective (PE) – II Set Design for Events	03	03	0	0
<p>Objective Students will learn how to analyse scripts for proper scenery, how to conceptualize designs that will translate into actual sets, and develop visual thinking within the creative process. The course imparts understanding of designing stage and event setting through language, colour, and architectural styles.</p>						
<p>Module 1 HISTORY OF PERFORMING ART, SOCIETY AND SET DESIGN Insight into the representation of culture and society through performing arts and films in different period of history. Modern interpretations of different performing art forms. Investigation of production methods, dramatic theory and conventions, and scene design of various medium of performance for motion picture and different forms of other performing arts in the 20th and 21st century.</p>						
<p>Module 2 GRAPHIC DESIGN AND TYPOGRAPHY FOR EXHIBIT DESIGN Principles of layout for creating effective visual signage and explore the unique problems, technique, theory, and approaches of designing signage for films, theatre, and other forms of events and exhibition.</p>						
<p>Module 3 CONCEPTS FOR SET DESIGN Introduction to the basic concepts, through theory and practice of scene design for theatre, film, other performing arts, events and entertainment media. Script analysis, visual arts analysis (colour and graphics, research skills, and application of principles and elements of design.</p>						
<p>Module 4 PROCESS OF SET DESIGN Stage design process from inception to performance, Materials and techniques used for erecting different types, Creative Lighting design, acoustic provisions, modern equipment used for stage control.</p>						
<p>Module 5 Study visit to a film studio or any event as decided by the subject teacher.</p>						
<p>References 1. Baiche Bousmaha & Walliman Nicholas. Neufert Architect’s data. Blackwell science ltd.</p>						

2. Chiara De Joseph & Crosbie, J. Michael. 1990. Time saver standards for building types. McGraw Hill company.

Course Outcomes

CO1	Express the concept of history of set design and arts
CO2	Apply basic principles of layout and signage
CO3	Demonstrate the principles, theories and concepts involved in set design
CO4	Apply basic principles of materials and techniques
CO5	Analyze the concept of site visits about practical approach

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	1	2	3	1	1	-	1	2
CO2	3	2	-	2	1	2	3	1	1	-	1	2
CO3	3	2	-	2	1	2	3	1	1	-	1	2
CO4	3	2	-	2	1	2	3	1	1	-	1	2
CO5	3	2	-	2	1	2	3	1	1	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	2	1	2	3	1	1	-	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BARPE704	Professional Elective (PE) – II Architectural Journalism	03	03	0	0
<p>Objective To enhance writing skills and awareness about architectural journalism. To equip students with digital and 3D presentation techniques, fundamentals of photography, basic skills about architectural photography, and documentation.</p>						
<p>Module 1 ARCHITECTURAL JOURNALISM Introduction to Architectural journalism, Skill improvement in reporting, writing, editing, criticism of architecture, descriptive and analytical writing, book reviews, reporting, review and analysis of historical and contemporary architectural examples and news, Page composition.</p>						
<p>Module 2 DIGITAL PRESENTATIONS Introduction of various software available for Architectural presentation such as Photoshop & Coral. Basic Tools for Editing and Creating Graphics. Rendering AutoCAD drawings with appropriate materials. Compiling and arranging drawings on sheet for presentation or portfolio. Image doctoring and manipulation using computer software for graphics and animation (Photoshop and Flash).</p>						
<p>Module 3 COMMUNICATION TECHNIQUES Advertising - Typography, artwork, Multimedia - digital graphic design techniques, surface decoration such as print, Printmaking – photo screen-printing and etching, scanning and laser printing.</p>						
<p>Module 4 3D DIGITAL PRESENTATIONS Movie making Flash movies, animation graphics, and walkthroughs, 3D Printing.</p>						
<p>Module 5 PHOTOGRAPHY Introduction to photography, types of Cameras, equipment- cameras & lenses, Principles of photo composition, properties & priorities: Exposure, Aperture, Speed, colour, black & white photography. Architectural Photography- Exterior and Interior photography. Practical exercises to understand composition, photo documentation of buildings, highlighting quality of architectural spaces.</p>						

References

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

Course Outcomes

CO1	Implement principles of about writing, editing and criticism
CO2	Express the process of digital representation
CO3	Demonstrate different types of communication techniques
CO4	Express the concept of 3D presentation techniques
CO5	Implement principles of photography and its role in architectural journalism

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	-	1	1	2	1	2	3	2	2	2
CO2	1	3	-	1	1	2	1	2	3	2	2	2
CO3	1	3	-	1	1	2	1	2	3	2	2	2
CO4	1	3	-	1	1	2	1	2	3	2	2	2
CO5	1	3	-	1	1	2	1	2	3	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	1	3	-	1	1	2	1	2	3	2	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAROE701	OPEN ELECTIVE-I FURNITURE DESIGN	03	03	0	0
<p>Objective To learn how to design furniture using various principles of design.</p>						
<p>Module 1 INTRODUCTION TO FURNITURE DESIGN Development of Furniture design concepts - a historic review. <ul style="list-style-type: none"> • Elements of design – visual grammar and principles of design • Different techniques for form studies. </p>						
<p>Module 2 ERGONOMICS Application of ergonomics in human-furniture interaction <ul style="list-style-type: none"> • Design of ergonomic model for specific user-problem • Usability study of product form </p>						
<p>Module 3 UNIVERSAL DESIGN FURNITURE <ul style="list-style-type: none"> • Understanding physically challenged users • Furnitures for different category of disability </p>						
<p>Module 4 APPLICATION OF MATERIALS IN FURNITURE DESIGN <ul style="list-style-type: none"> • Study of properties of various types of materials • Application of material for various furniture </p>						
<p>Module 5 FURNITURE MAKING <ul style="list-style-type: none"> • Tools and equipment • Hardware • Architecture detailing </p>						
<p>References 1. Ching, F. D. K. (1987). <i>Interior Design Illustrated</i>. New York : V.N.R. Publications. 2. Doshi, S. (Ed.) (1982). <i>The Impulse to adorn - Studies in traditional Indian Architecture</i>. Marg Publications. 3. Kathryn, B. H. and Marcus, G. H. (1993). <i>Landmarks of twentieth Century Design</i>. Abbey Ville Press. 4. Penero, J. and Zelnik, M. (1979). <i>Human Dimension and Interior space: A Source Book of</i></p>						

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

Course Outcomes

CO1	Demonstrate knowledge about concepts and elements of furniture design
CO2	Implement principles of about ergonomics and its application in furniture design
CO3	Express the concept of about furniture design for physically challenged persons
CO4	Analyze the concept of materials
CO5	Demonstrate knowledge about tools and equipment.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	2	3	1	2	-	2	3
CO2	3	3	-	-	-	2	3	1	2	-	2	3
CO3	3	3	-	-	-	2	3	1	2	-	2	3
CO4	3	3	-	-	-	2	3	1	2	-	2	3
CO5	3	3	-	-	-	2	3	1	2	-	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	-	-	2	3	1	2	-	2	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAROE702	Open Elective - I Art Appreciation	03	03	0	0
<p>Objective Disseminating a broad overview of Art and Design and enabling students to understand visual awareness, creativity and cultural understanding of Design as a Multidimensional creative Art.</p>						
<p>Module 1 INTRODUCTION- DEFINING THE DISCIPLINARY DIFFERENCES Introduction to various types of Art, Concept of beauty and Aesthetics. Evolution of art and design.</p>						
<p>Module 2 ART AND DESIGN- A HISTORICAL PERSPECTIVE History of Art. Art through ages. Importance of Visual perception, Design elements from nature.</p>						
<p>Module 3 EXPRESSION OF ART AND DESIGN Relationship between Art and Design with man, space and environment. Concept of space. Articulation of form, sense of enclosure, Organisation of spaces.</p>						
<p>Module 4 INTRODUCTION TO THEORIES Golden proportion, Theories of scale and proportion, Vitruvian theory, Modular man, principles of Design and elements of Architecture.</p>						
<p>Module 5 RELATIONS IN ART, DESIGN AND ARCHITECTURE Factors influencing the process of Art, Design and Architecture. Form and function. Review of selected examples.</p>						
<p>References</p> <ol style="list-style-type: none"> 1.Cantanese, A. J. and Snyder, J. C. (1988). <i>Introduction to Architecture</i>. New York : McGraw hill Books Co. 2.Ching, F. D. K., Jarzombek, M. and Prakash, V. (2010). <i>A Global History of Architecture</i>. 2nd Ed. John Wiley & Sons. 3.Fred, S. K. (2009). <i>Art through the ages a Global History</i>. 3rd Ed. Clark Baxter. 4.Heidegger, M. (1993). <i>The origin of the work of Art-Basic writings</i>. Harper Collins. 5.Heskett, J. (2002). <i>Design-A very short introduction</i>. Oxford University Press. 6.Rapoport, A. (1969). <i>House Form and Culture</i>. New Jersey : Prentice Hall. 7.Salingaros, N. (2009). <i>A Theory of Architecture</i>. Umbau-Verlag. 8.Vitruvius, Translation: Morris, H. M. (1960). <i>The Ten Books on Architecture</i>. 						

Course Outcomes:

- CO 1: Demonstrate knowledge about evolution and type of arts
- CO 1: Analyze the concept of history of arts
- CO 2: Demonstrate relationship of art and design
- CO 3: Apply basic principles of different theories of Art
- CO 4: Demonstrate the influencing factors

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	1	2	2	2	2	1	-	1
CO2	3	3	-	2	1	2	2	2	2	1	-	1
CO3	3	3	-	2	1	2	2	2	2	1	-	1
CO4	3	3	-	2	1	2	2	2	2	1	-	1
CO5	3	3	-	2	1	2	2	2	2	1	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	2	1	2	2	2	2	1	-	1

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAROE703	Open Elective - I Industrial Architecture	03	03	0	0
<p>Objectives The course aims to focus on the study of design considerations, environmental factors, structural considerations and safety controls for industrial buildings. To make the students aware of the requirement of adaptability and flexibility in design to accommodate new technology and changes necessary in industrial development.</p>						
<p>Module1 INTRODUCTION TO INDUSTRIAL ARCHITECTURE Historic development of industrial architecture; Role of architects in the design of modern industrial buildings; Basic knowledge of types and categories of industries; Considerations for development of master plan for industrial areas and site selection; Design criteria for site layout, loading and unloading area.</p>						
<p>Module 2 DESIGN CONSIDERATIONS Design consideration in development of industrial buildings - flexibility, adaptability, structural selection. Integration of structure and services, roof lighting, internal circulation and material handling; Alternative technologies and materials for industrial use.</p>						
<p>Module 3 ENVIRONMENTAL CONSIDERATIONS Working environment for industrial workers which will contribute to comfort and productivity by considering - work space and ergonomic, use of colour, lighting design, noise and vibration, thermal comfort conditions, ventilation, building fabric, Visual environment and landscaping.</p>						
<p>Module 4 SOCIAL CONSIDERATIONS Safety, security and warning control. Consideration of other facilities like: rest room, locker room, sanitary, changing room, cafeteria, recreational etc. Health, welfare and child care in industrial premises.</p>						
<p>Module 5 STRUCTURE Large Span Construction-flat slabs-shell structures, folded plates, portal frames, space frame & trusses, tensile structures. Pre-fabricated construction & Pre-engineered building; New Material in Construction, Cold form sections.</p>						
<p>References</p> <ol style="list-style-type: none"> 1. Adam, J., Hausmann, K., and Juttner, F., A Design Manual- Industrial Buildings 2. Blum, M.L., and Naylor, J.C., Industrial Psychology, CBS, Delhi 3. Philips, A., The Best in Industrial Architecture 4. Sinha, R.K., and Heart, S., Cleaner Production-Greening of Industries for Sustainable Development. 5. Drury, J., Factories- Planning, Design and Modernization. 						

Course Outcomes:

- CO 1: Demonstrate knowledge about history of industrial architecture and factors
 CO 2: Demonstrate the design considerations and structural aspects
 CO 3: Analyze the environmental consideration
 CO 4: Express views on social impact, safety and security aspects, general needs
 CO 5: Demonstrate about industrial structures and construction techniques

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	1	2	3	2	1	2	2	2
CO2	3	2	-	1	1	2	3	2	1	2	2	2
CO3	3	2	-	1	1	2	3	2	1	2	2	2
CO4	3	2	-	1	1	2	3	2	1	2	2	2
CO5	3	2	-	1	1	2	3	2	1	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	1	1	2	3	2	1	2	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAR07003	ARCHITECTURAL DESIGN -V	09	0	0	9

Objective

The objective of this studio is to focus on functionality, creativity in form, understanding of different structural solutions, and integration of advanced technology and services. To expose the students to the challenges of bigger scale site planning involving a group of buildings, space programming, complexities of providing building services and infrastructure facilities and economic feasibility. The Design studio also aims to inculcate the techniques of designing for sustainability, and to enable the students to understand how to design in compliance with building regulations, codes and space standards.

1. MAJOR DESIGN PROBLEM

INTENT

To let the students explore the possibilities of innovation through designing and knowledge of structure, and understand how multiple users behave in large scale developments. The intent is to develop designing abilities to handle buildings with complex spatial organizations, multifunctional spaces, large spans and variable circulation patterns. Various techniques of energy-efficient design and recycling technologies for water & wastes is essential as these have to be incorporated in the design proposals. Environmental issues are to be emphasized and awareness about best practices in profession is expected. Students are required to do the landscape layout in detail to develop appreciation of a holistic environmental design. Site planning exercise should depict understanding of vehicular and pedestrian movement patterns, land grading and conservation of ecologically sensitive features.

FOCUS AREAS- Large Span Structures/Built-ups consuming large volumes

- Spatial organisation
- Structural innovations
- Sustainable design

ALLIED KNOWLEDGE REQUIRED

- Advanced concepts of structures
- Advanced building services
- Building automation and intelligent buildings

EXAMPLES OF STUDIO PROJECTS

Educational campus, Industrial Township, Stadiums, Convention centers, Exhibition pavilions, Museum complex.

EXAMPLES OF MINOR STUDIO PROJECT

Small scale design in a heritage context.

PROCESS

- This module can be started with a warm-up exercise/ literature review (group or individual). Students could be sensitized (social-cultural sensitization) through documentary/ movies/ photos etc.

- Students may visit site for collecting context specific data for getting better understanding of real- life project details. The collected data may be analyzed and presented for evaluation.
- The above-mentioned module teaching methods are suggestive. Faculty may choose other pedagogical approaches for design thinking process.
- Readings/ short movies/ Discussion on designers' philosophies could be initiated for idea generation. Further approaches for design iterations may involve more common techniques like Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, try and re-create for analysing spaces in all dimensions through Block Models and single line graphics and study models for choosing the right option.
- It is preferable if the students communicate the application of all services in their design.
- Students must make enlarged drawings showing all working details for superstructure.
- Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc.
- Summative assessment of the studio work could be achieved through panel discussion, presentation.

Note

- Study tour of one-week duration is mandatory for conducting case study and field study related to the Architectural Design project.
- End Semester evaluation will be done by external jury member (from Academics or Professional Architect) other than the University faculty.

Reference

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

Course Outcomes

CO1	Generate and understanding within the students to deal with the complexities of mixing various user groups
CO2	Develop knowledge about Building regulations and codes Building and site services (technical)
CO3	Develop knowledge about site services (technical)
CO4	Evaluating design process of multi-functional, service (advanced services) oriented building
CO5	Analysing site planning as well as on advanced services at building and at site level

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAR07004	RESEARCH METHODS AND SEMINAR	03	01	0	4
Objective						
<ul style="list-style-type: none"> The subject exposes the students to a general understanding of research and different research methodologies To emphasize on the development of critical and technical writing and composing skills by inculcating an attitude towards analytical reading. It is a seminar-type course where the focus is on library research, regular presentation of students' work and group discussions. 						
INTENT						
<ul style="list-style-type: none"> It is expected that the students will acquire, skills to do research, understanding about different research methodologies. Research Methodology- methods of data collections (literature review, physical and social surveys), its tools and analysis techniques, referencing & citation etc. This course will also help students to understand how research projects/topics can be converted to design projects/ proposals and writing research paper. 						
The seminar would lead to bringing out research paper of a subject of theoretical/ philosophy / current issues related to any aspect of Architecture, Urban design, Landscape Architecture, Sustainable Architecture, Architectural Conservation.						
<ul style="list-style-type: none"> The paper word count can range from 3000 to 5000 words. Individual guidance can be provided by respective subject experts within the faculty of the institution. Submission of report containing aim, design objectives, literature review, preliminary case studies analysis, findings, suggestions and conclusions. The course is to progress by delivering regular presentations and preliminary submissions of writings on the seminar topic by the students. 						
Reference						
<ol style="list-style-type: none"> Sanoff, H. (1991). Visual Research Methods in Design. New York : John Wiley & Sons. Kothari, C.R. and Garg, G., Research Methodology: Methods and Techniques, New Age International Publishers. Anderson, J. and Poole, M. (1998). Thesis and assignment writing. Brisbane : John Wiley. Borden, I. and Ray, K. R. (2006). The dissertation: an architecture student's handbook. 2nd Ed. Oxford : Architectural Press. Fink, A. (1998). Conducting research literature reviews: from paper to the Internet. Thousand Oaks : Sage. Murray, R. (2005). Writing for academic journals. Berkshire: Maidenhead, Open University Press. 						

Course Outcomes

CO1	Demonstrate skills to do research.
CO2	Analyze the concept of different research methodologies.
CO3	Express views on methods of data collections.
CO4	Express views on various analysis techniques.
CO5	Demonstrate understanding of writing academic papers related to design ideas.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
7TH	BAR07005	Non-conventional Building Techniques	04	0	0	4
<p>Objective The subject aims to familiarize students with the non-conventional building techniques, their need, their performance, scope and limitations. It will also enable the students to understand the use of different kind of new materials with reference to the climatic context as well as cost optimization.</p>						
<p>Module 1 EARTHEN CONSTRUCTION Study of construction techniques involving mud, i.e. COB walls, Rammed earth construction technique, adobe construction, wattle and daub technique, their material specification, limitations, shuttering details, stabilization techniques, technical specifications.</p> <ul style="list-style-type: none"> • Assignment on any existing building constructed using any of these technology • Preparation of technical drawings and reports 						
<p>Module 2 BAMBOO CONSTRUCTION Study of bamboo as a building material, structural specifications of bamboo, bamboo construction in India, Bamboo construction as a solution in earth-quake prone region, treatment of bamboo, joinery details, scope and limitations of Bamboo base construction techniques.</p> <ul style="list-style-type: none"> • Preparation of technical drawings and reports 						
<p>Module 3 ENVIRONMENT FRIENDLY WOOD ALTERNATIVES Cellulose fibre boards made out of recycled papers, engineered and composite wooden panels, particle boards, medium density fibre boards, low density fibre boards (thermal and acoustic insulation for walls and ceilings)</p> <ul style="list-style-type: none"> • Preparation of technical drawings and reports 						
<p>Module 4 NON-CONVENTIONAL CONCRETE ALTERNATIVES Self-Healing (Bacterial) Concrete Study of Self-Healing (Bacterial) concrete, role of Alkaliphilic bacteria, Preparations of bacterial concrete, method of direct application, encapsulation method, its mechanism, advantages and disadvantages, applications Cellular Lightweight Concrete Study of Cellular Lightweight Concrete (CLC), its use in construction of schools, hospitals, industrial and commercial buildings, air-curing process of lightweight concrete with fly-ash as a major ingredient, shuttering and installation details, scope and limitations.</p> <ul style="list-style-type: none"> • Preparation of technical drawings and reports 						
<p>Module 5 Study of Govt. policies and initiatives to promote Non-conventional construction techniques, role of BMTPC, Use of Non-conventional construction techniques in natural disaster-prone regions.</p> <ul style="list-style-type: none"> • Assignment on any techniques developed by BMTPC • Preparation of technical drawings and reports 						

Reference

1. Krahn T, Eng P. (2019). *Essential Rammed earth Construction*. New Society Publishers.
2. Jules J.A. (1995). *Building with Bamboo*. Practical Action Publications.
3. Uffelen C.V. (2014). *Bamboo Architecture & Design*. Braun Publishing.
4. Clarke J.L. (2002). *Structural Lightweight Aggregate Concrete*. CRC Press.
5. Short A. (1963). *Lightweight Concrete*. C.R. Books.

Course Outcomes

CO1	Apply basic principles of Earthen Construction.
CO2	Analyze the concept of Bamboo Construction.
CO3	Express views on Environment friendly wood alternatives.
CO4	Analyze the concept of Non-Conventional Concrete Alternatives
CO5	Demonstrate understanding of Govt. policies to promote Non-conventional construction techniques

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	3	3	3	-	2	-	3	3
CO2	3	2	-	-	3	3	3	-	2	-	3	3
CO3	3	2	-	-	3	3	3	-	2	-	3	3
CO4	3	2	-	-	3	3	3	-	2	-	3	3
CO5	3	2	-	-	3	3	3	-	2	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	-	3	3	3	-	2	-	3	3

**EIGHTH SEMESTER
BARCH PROGRAMME**

EIGHT SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR08001	Disaster Resilient Architecture	3-0-0	3	WE			
2.	BAR08002	Professional Practice	3-0-0	3	WE			
3.		Professional Elective -III	3-0-0	3	WE			
4.		Open Elective-II	3-0-0	3				
SESSIONAL SUBJECTS								
1.	BAR08003	Architectural Design - V	0-0-9	9		IA	VV	TP
2.	BAR08004	Pre-Thesis Dissertation	1-0-4	3		IA	VV	
3.	BAR08005	Advanced Building Technology	0-0-4	4		IA	VV	TP
TOTAL			13-0-17 = 30	28				

**DETAIL SYLLABUS
EIGHTH SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BAR08001	Disaster Resilient Architecture	03	03	0	0
<p>Objectives The course is framed to provide an overview of the occurrence, causes and consequences of disaster and understanding of fundamental concepts and application of disaster resilient design. It introduces formulation of management plan and disaster mitigation strategies</p>						
<p>Module-1 INTRODUCTION Overview of disaster, major natural disasters - flood, tropical cyclone, droughts, landslides, heat waves, earthquakes, fire hazards etc; Hazard (earthquake and cyclone) map of the world and India.</p>						
<p>Module 2 DESIGN FOR CYCLONE Climate change and its impact on tropical cyclone; Nature of cyclonic wind; Behaviour of structures in past cyclones and wind storms, case studies. Cyclonic retrofitting - strengthening of structures and adaptive sustainable reconstruction; Life-line structures such as temporary cyclone shelter. General planning/design considerations, Norms and Standards for wind storms & cyclones; Coastal zoning regulation for construction & reconstruction phase in the coastal areas; innovative construction materials & techniques; traditional construction techniques in coastal areas.</p>						
<p>Module 3 DESIGN FOR EARTHQUAKE Causes of earthquake; Past effects of earthquake on ground and building - Behaviour of various types of buildings, structures, and collapse patterns; Seismic retrofitting - Weakness in existing buildings, concepts in repair, restoration and seismic strengthening. General Planning and design consideration, Norms and Standards; Various types and construction details - Foundations, retaining walls, plinth fill, flooring, walls, openings, roofs and boundary walls. Innovative construction materials and techniques, traditional regional practices</p>						
<p>Module 4 DISASTER MANAGEMENT Strategies for disaster prevention and mitigation; Disaster management plan; National crisis management committee; state management group</p>						
<p>Module 5 Exercises on design and construction techniques for disaster resilient buildings</p>						

Reference

1. Aga Khan Award for Architecture. Ed. Shelter. (1996). The Access to Hope. AKDN, Istanbul and Geneva.
2. Agarwal, P. and Shrikhande, M. (2009). Earthquake Resistant Design of Structures. New Delhi: PHI Learning.
3. Singh, P. P. and Sharma, S. (2006). Modern dictionary of natural disaster. Deep & Deep Publications.
4. Simiu E. and Scanlan R. H. (1996). Wind Effects on Structures-Fundamentals and Applications to Design. 3rd Edn., John Wiley.
5. Sinha, P. C. (2006). Disaster Mitigation, preparedness, recovery and Response. New Delhi : SBS Publishers.
6. Talwar, A. K. and Juneja, S. (2009). Cyclone Disaster Management. Commonwealth Publishers.
7. Taranath, B. S. (2004). Wind and Earthquake Resistant Buildings: Structural Analysis and Design. CRC Press.
8. U.N.D.P. (2004). Reducing Disaster Risk: A Challenge for Development. New York : UNDP.
9. World Bank. (2009). Handbook for Reconstructing after Natural Disasters.
10. Seismic Design hand book for Buildings
11. Earth quake Architecture: New construction techniques for quake disaster Prevention.

Course Outcomes

CO1	Develop knowledge about natural disasters and hazards.
CO2	Analyse design of cyclone resistant structures.
CO3	Analyse design of earthquake resistant structures.
CO4	Analyse the process of disaster management.
CO5	Planning and designing of disaster resilient buildings.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	2	2	2	2	-	-	2	3	3
CO2	3	-	1	2	2	2	2	-	-	2	3	3
CO3	3	-	1	2	2	2	2	-	-	2	3	3
CO4	3	-	1	2	2	2	2	-	-	2	3	3
CO5	3	-	1	2	2	2	2	-	-	2	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	1	2	2	2	2	-	-	2	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BAR08002	Professional Practice	03	03	0	0
<p>Objectives To enable the students to understand the logistics of state & central govt. in enhancing better living conditions to all without losing the interest of self. It lays down the criteria for constructing built up spaces in cities & sub-urban; good ph & sanitation; safety & security, etc. and familiarize the students about current professional practice guidelines, codes, ethics as well as norms of professional fees & charges. It will expose them to skills and techniques for organizing a particular project, its preparation and execution etc. The same course will also contribute in getting acquainted with project management, contractual implication as well as legal formalities.</p>						
<p>Module 1 PRACTICING ARCHITECTURE Introduction to Architects duties and liabilities, salient features of architect's act 1972, the council of architecture Understanding office management and project awarding; organization structure, responsibility towards employees, consultants & associates; maintenance of accounts; filing of records; balance sheet, Income tax; Service tax; Professional tax. Various architectural services, additional services and scale of professional fees. Building regulations related to submission of approval drawings to concerned public bodies.</p>						
<p>Module 2 ARCHITECTURAL COMPETITIONS & LEGISLATIONS Regulations governing the conduct of competitions, open & closed competitions Role of development authorities & urban arts commissions, Environmental acts & laws, special rules governing hill area development & coastal area management, heritage act of India etc. Pre-requisite for Indians to work in other countries & vice versa, emerging trends in architectural collaborations.</p>						
<p>Module 3 TENDER Types of tenders, invitation of tender and conditions of tender documents, submission, scrutiny, recommendations & award of tender.</p>						
<p>Module 4 CONTRACT Definitions and general principles of Indian Contract Act and building, contract documents, conditions of contract, Execution of contract, various certifications, defects liability.</p>						
<p>Module 5 ARBITRATION Need for Arbitration, Principles of Indian Arbitration Act-1974, role of arbitrators, umpire etc, excepted matters, arbitral award. Municipal Acts, Fire prevention, safety and security measures in buildings.</p>						

References

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

Course Outcomes

CO1	Develop knowledge about rules and regulation of CoA and professional conduct.
CO2	Develop knowledge about rules and regulation of architectural competition
CO3	Develop knowledge about process involved in tender.
CO4	Analyse about process involved in contracts.
CO5	Analyse about process involved in arbitrations.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	3	3	3	-	-
CO2	-	-	-	-	-	-	-	3	3	3	-	-
CO3	-	-	-	-	-	-	-	3	3	3	-	-
CO4	-	-	-	-	-	-	-	3	3	3	-	-
CO5	-	-	-	-	-	-	-	3	3	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	-	-	-	-	-	-	-	3	3	3	-	-

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BARPE801	Professional Elective (PE) – III Architectural Conservation	03	03	0	0
<p>Objective: This course gives a brief introduction to the subject of Architectural Conservation. It discusses the history, theory and best practices in Architectural conservation. Moving from basic theories, the course touches upon the technical aspects and ethics of conservation.</p> <ul style="list-style-type: none"> • Explore the history, philosophy and science of architectural conservation through lectures and seminar discussions. • Encourage appropriate methodologies and tools for recording, documentation and inventorying of heritage structures. • Develop sensitivity to design in heritage environment. 						
<p>Module 1 INTRODUCTION TO ARCHITECTURAL CONSERVATION Definition of Conservation and its socially accepted Meanings. Justification for conservation. Development of Theory of conservation and various charters of International, Role of organisations such as UNESCO and INTACH. Concepts of Values, Significance, Authenticity and Integrity.</p>						
<p>Module 2 CRITICAL ANALYSIS OF HERITAGE COMPONENTS Understanding the concepts to analysis heritage sites and structures. Understanding the Scales of various heritage components: Buildings, Areas, Towns, Region (Local, National, International).</p>						
<p>Module 3 DECAY AND REMEDIES Introduction to Decay in Cultural property, Materials and Structural failures. Internal and External environment of historic buildings. Climatic causes of decay. Botanical, biological and microbiological causes of decay. Insects and other pests as causes of decay. Man-made causes of decay.</p>						
<p>Module 4 DEGREES OF INTERVENTION IN HISTORIC BUILDINGS AND MONUMENTS Prevention of deterioration. Preservation of the existing state. Consolidation of the fabric. Restoration. Rehabilitation.</p>						
<p>Module 5 DOCUMENTATION</p>						

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

Reference:

1. Fielden, Bernard, 2003, Conservation of Historic Buildings, Architectural Press.
2. Fielden, Bernard, 1989, Guidelines for Conservation, INTACH, New Delhi.
3. Historic England, Practical Building Conservation: Conservation Basics, 2013, Routledge.
4. Salvador Munoz-Vinas, 2005, Contemporary Theory of Conservation, Elsevier.
5. Letellier, Robin, 2007, Recording, Documentation, and Information Management for the Conservation of Heritage Places- Guiding Principles by, Getty Conservation Institute. Los Angeles.
6. Chandler, I. (1992). *Repair and Renovation of Modern Buildings*. McGraw-Hill.
7. Danish Standards Association. (2004). *Repair of Concrete Structure to En 1504: A guide for renovation of concrete structures repair materials and systems according to the EN 1504 series*.
8. *Boston* : Elsevier.
10. Guha, P. K. (2011). *Maintenance and Repairs of Buildings*. New Delhi: New Central Book Agency.
11. Nayak, B. S. (2013). *A Manual of Maintenance Engineering*. New Delhi: Khanna Publishers.
12. Roger, G. and Hall, F. (2013). *Building Services Handbook*. New York : Routledge.

Course Outcomes

CO1	Develop knowledge about philosophy and science of architectural conservation.
CO2	Analyse critical evaluation of heritage components.
CO3	Analyse the cause of deterioration.
CO4	Apply suitable methodology with reference to given context.
CO5	Acquire skills for documentation, survey, photography and research.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	2	3	2	-	1	2	3	2
CO2	3	3	-	2	2	3	2	-	1	2	3	2
CO3	3	3	-	2	2	3	2	-	1	2	3	2
CO4	3	3	-	2	2	3	2	-	1	2	3	2
CO5	3	3	-	2	2	3	2	-	1	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	-	2	2	3	2	-	1	2	3	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BARPE802	Professional Elective (PE) – III Transportation Planning	03	03	0	0
<p>Objective The course imparts basic concepts and theories related to transportation planning and traffic engineering. To expose students to forecasting techniques that are relevant to transportation planning. To introduce students to geometric design of roads and environmental issues and policy related to transportation.</p>						
<p>Module 1 INTRODUCTION TO TRANSPORTATION SYSTEMS Transportation systems and modes; Demand and supply of transportation services; Physical structure of the city and transportation system.</p>						
<p>Module 2 TRANSPORTATION PLANNING Inter-relationship of land use and transportation; Transportation planning process; Systems approach to transport planning; Travel demand forecasting; Planning for public transport system, goods transportation.</p>						
<p>Module 3 TRAFFIC STUDY AND DESIGN Traffic flow characteristics; Transportation survey: Type of surveys, origin destination survey, Traffic analyses and design considerations; Design of intersections; Traffic signals and signs; Street design: street lighting, street furniture; street plantation; Parking: Parking problems, Parking space requirement standards.</p>						
<p>Module 4 ENVIRONMENT AND POLICY ASPECT Environmental impact of traffic; Energy issues in transportation, Transportation policies and safety standards.</p>						
<p>Module 5 APPLICATION Transit oriented development; Study of different transportation proposals (Bus Rapid Transit System- BRTS, Metro rail)</p>						
<p>References</p> <ol style="list-style-type: none"> 1. Khisty, C. J. and Lal, B. K., Transportation Engineering: An Introduction. 2. Papacostas, C. S., Fundamentals of Transportation Engineering. 3. Bruton, M. J., Introduction to Transportation Planning. 4. Khanna, S. K., and Justo, C. E. G., Highway Engineering. 						

Course Outcomes

CO1	Develop knowledge about the modes, demand and supply relationship, physical structure.
CO2	Analyse process of transport planning and factors.
CO3	Develop knowledge about design and study of traffic
CO4	Develop knowledge about environmental policies
CO5	Evaluating in terms of practical applications in terms of planning of TOD, BRTS and metro rail

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	2	2	2	3	-	-	-	3	3
CO2	3	-	1	2	2	2	3	-	-	-	3	3
CO3	3	-	1	2	2	2	3	-	-	-	3	3
CO4	3	-	1	2	2	2	3	-	-	-	3	3
CO5	3	-	1	2	2	2	3	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	1	2	2	2	3	-	-	-	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BARPE803	Professional Elective (PE) – III Environmental Impact Assessment	03	03	0	0
<p>Objective Introduce tools and techniques of EIA and its application; Ensure that environmental factors are considered as a part of decision making process; to identify possible adverse impacts so as to avoid or mitigate them.</p>						
<p>Module 1 INTRODUCTION Definition, concepts, need & relevance of Environmental Impact assessment in decision making process; Evolution of EIA and its importance in global, Indian and local context; Principles of EIA; Classification of EIA projects.</p>						
<p>Module 2 PROCESS AND METHODOLOGIES Measurement of environmental impact, Process of EIA in India & Abroad; Importance of scoping & screening in EIA process; Role of public participation at various levels of decision making; Methodologies, checklists, matrices, network & social cost-benefit analysis, habitat evaluation systems, comprehensive study of various project types, impact calculation & ways to mitigate.</p>						
<p>Module 3 ENVIRONMENTAL AUDIT AND MANAGEMENT Definitions & concepts of audits, GHG Emissions, energy foot print, carbon foot print, partial audits, compliance audits, methodologies & regulations.</p>						
<p>Module 4 VARIOUS OTHER ASSESSMENT TECHNIQUES PRA techniques, definition & concepts, objectives, techniques, advantages & limitations; SEA, evolution need and relevance, scope and tasks.</p>						
<p>Module 5 EIA IN INDIA EIA regulations in India, initiatives, environmental appraisal procedure, problems associated with relocation, resettlement, refugees & environmental justice, future strategies. Study of an environmental appraisal report and EIA statement of any two projects of national importance.</p>						

References

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

Course Outcomes

CO1	Develop knowledge about basic definitions and need of EIA
CO2	Develop knowledge about process and methodology of EIA
CO3	Develop knowledge about environmental audits, management and its methodology
CO4	Analyse various assessment tests
CO5	Recognising scenario of EIA in India with its practical implementation

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	2	2	2	3	-	-	-	2	2
CO2	3	-	2	2	2	2	3	-	-	-	2	2
CO3	3	-	2	2	2	2	3	-	-	-	2	2
CO4	3	-	2	2	2	2	3	-	-	-	2	2
CO5	3	-	2	2	2	2	3	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	2	2	2	2	3	-	-	-	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BAROE801	OPEN ELECTIVE – II Application of GIS in Urban Planning	03	03	0	0
Objective To understand about the application of GIS and its uses in the field of research and innovation.						
Module 1 INTRODUCTION Remote sensing for detection of urban features – Scale and resolution – Scope and limitations – Interpretation from Aerial and satellite images – Digital image processing techniques – Image fusion – Casestudies.						
Module 2 SETTLEMENT MAPPING Classification and settlement – settlement structure – Segmentation of Built-up areas – Classification algorithms – Land use/ Land cover mapping – change detection – high resolution remote sensing – case studies.						
Module 3 ANALYSIS AND PLANNING Urban morphology – Housing typology – Population estimation from remote sensing – Infrastructure demand analysis – Urban renewal Land suitability analysis – Plan formulation – Regional, Master and detailed development - Use of remote sensing and GIS in plan preparation - case studies.						
Module 4 TRANSPORTATION PLANNING Mapping transportation network – Classification – Optimum route/ shortest route – Alignment planning – Traffic and parking studies – case studies.						
Module 5 CURRENT TRENDS Urban growth modelling – Expert systems in planning – 3D city models– case studies.						
References 1. Juliana Maantay, John Ziegler, John Pickles, GIS for the Urban Environment, Esri Press 2006. 2. Allan Brimicombe, GIS Environmental Modeling and Engineering, CRC; 1 edition 2003. 3. Paul Longley, Michael Batty, Spatial Analysis: Modeling in a GIS Environment Wiley,1997. 4. Michael F. Goodchild, Louis T. Steyaert , Bradley O. Parks, Carol Johnston, David Maidment, Michael Crane , Sandi Glendinning, GIS and Environmental Modeling: Progress and Research Issues, Wiley; 1 edition, 1996. 5. Roland Fletcher, The Limits of Settlement Growth: A Theoretical Outline (New Studies in Archaeology) (First edition), Cambridge University Press; 2007.						

Course Outcomes

CO1	Develop knowledge about Remote sensing and its application
CO2	Analyse settlement mapping and its components
CO3	Develop knowledge about analyzing and planning method of data
CO4	Demonstrate Transportation planning through GIS availed data
CO5	Analyse the current trends of urban planning using GIS

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	3	2	2	3	-	-	-	2	2
CO2	3	-	3	3	2	2	3	-	-	-	2	2
CO3	3	-	3	3	2	2	3	-	-	-	2	2
CO4	3	-	3	3	2	2	3	-	-	-	2	2
CO5	3	-	3	3	2	2	3	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	3	3	2	2	3	-	-	-	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BAROE802	OPEN ELECTIVE-II Real Estate Management	03	03	0	0
Objective To acquaint the students with the issues, regulations and functioning of Real of Estate market, economic concepts, land acquisition, legal matters concerning land and property. To make the students aware about different concepts of real estate development in Indian context.						
Module1 Type of land and property; Land use planning & Urban Land Management; Land as a resource of Urban Development (supply and demand of land); Basic components of Urban Land Policy; Land assembly; Land Pooling techniques; Land Holding (Free Hold and Lease Hold).						
Module 2 Land and Building related regulations; Building Bye-laws, Real Estate laws; Apartments' Act, Land registration and Society Registration Act.						
Module 3 Comparision of Housing policies and Real Estate development in India; Master Plan guidelines in relation to real estate growth; Real Estate management concepts.						
Module 4 Introduction to real estate market; potential and challenges <ul style="list-style-type: none"> • Land economics; Concept of economics, Types of land holding and tenure systems • Factor affecting demand and supply of housing • Relationship between land use, location and land value (Theory of location and growth pole theory) • Land use constraints, reservations and Land acquisition act, 2013 • Land economics and feasibility analysis for housing projects • Models of land development in real estate market (Land pooling and sharing) 						
Module 5 Concepts of mixed use development; condominium; Gated Community and serviced apartments.						
References <ol style="list-style-type: none"> 1. Gelbtuch, H.C., Mackmin, D. and Milgrim, M.R., Real Estate Valuation in Global Markets, Amazon Books 2. Rangwal, S. C., Valuation of Real Properties, Charotar Publishing House, 2003 3. Chapin, S., and Keeble, L., Urban Land Use Planning 4. Urban Development management- I.T.P.I. Journal 5. Reading Material on Land Economics- I.T.P.I. Journal 						

Course Outcomes

CO1	Develop knowledge about basic elements of housing, neighbourhood, community, slums and real estate market
CO2	Apply zoning regulations and sub-division techniques and computation for density, FAR, built-up area, MOS, as per development norms
CO3	Outline various housing policies and programmes.
CO4	Interpreting cause and effects housing demand and supply
CO5	Analyse different categories of housing scheme in terms of quality of life

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	2	3	-	2	-	2	2
CO2	3	-	-	-	-	2	3	-	2	-	2	2
CO3	3	-	-	-	-	2	3	-	2	-	2	2
CO4	3	-	-	-	-	2	3	-	2	-	2	2
CO5	3	-	-	-	-	2	3	-	2	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	-	-	2	3	-	2	-	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BAROE803	OPEN ELECTIVE-II Building Repair and Restoration	03	03	0	0

Objective

Building construction industry is energy intensive and therefore knowledge of maintenance, restoration and retrofitting of buildings are important in the context of sustainable development. Need for building repair and maintenance, cause and effect of building deterioration and defects, and material, methods and techniques of maintenance, repair and restoration are covered in the course.

Module 1

ENVIRONMENTAL IMPACT ON BUILDINGS

Life expectancy of different types of buildings – influence of environmental elements such as heat, moisture, precipitation and frost on buildings- Effect of biological agents like fungus, moss, plants, trees, algae, - termite control and prevention - chemical attack on building materials and components- - Impact of pollution on buildings.

Module 2

DEFECTS AND STRENGTHENING METHODS

Common defects in buildings; Building failures- Causes and effects; Cracks in buildings: types, classification, investigation;
Measures to prevent and control common defects in building; Maintenance philosophy, phases of maintenance: routine preventive and curative maintenance; Fundamental Strengthening measure: beam strengthening, column strengthening, shoring, under pinning and jacketing.

Module 3

MATERIALS FOR REPAIR

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

Module 4

RESTORATION

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

Module 5

INTRODUCTION TO CONSERVATION

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

References

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

Course Outcomes

CO1	Develop knowledge about the environmental impact of Buildings.
CO2	Develop knowledge about factors affecting strength of building, defects.
CO3	Analyze the materials and techniques of repair.
CO4	Develop knowledge about restoration and retro-fitting.
CO5	Apply techniques of conservation, its scope and case study

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	-	2	-	2	2	-	-	3	3
CO2	3	-	2	-	2	-	2	2	-	-	3	3
CO3	3	-	2	-	2	-	2	2	-	-	3	3
CO4	3	-	2	-	2	-	2	2	-	-	3	3
CO5	3	-	2	-	2	-	2	2	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	2	-	2	-	2	2	-	-	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BAR08003	ARCHITECTURAL DESIGN -VI	09	0	0	9

Objective

The design studio aims to enable students to understand spaces and activities in urban spaces in the public domain, where students will be exposed to complexities of understanding architectural intervention in a larger scale. Secondly, to equip the students to develop architectural design by contextualising and harmonizing with the built fabric and the urban environment.

1. MAJOR DESIGN PROBLEM

Designing in urban context/Designing for Public Spaces

INTENT

To facilitate understanding and conceptualising design in spaces involving group of buildings in a public realm and having multiple stakeholders. To study all aspects of external environment, understand the interface between public and private realm and explore the multitude of activities and the spaces they define in the urban environment. These observations are expected to be applied to design interventions within the context of the given urban setting.

The students are expected to carry out field study, documentation of the built fabric and area analysis of a given area within a city. The study is required to consider its context, physical features, views, orientation, volumetric analysis and figure ground characteristics, visual imageries, streetscape and skyline analysis, pedestrian and vehicular circulation pattern, and utility networks. To understand the relationship among, physical, socio-cultural, environmental and socioeconomic dimensions of the built environments, so as to identify opportunities and constraints associated with large-scale urban interventions. Students are then expected to apply this understanding to create physical environments through movement networks, open spaces, suggestive built form, infrastructure network in compliance with planning norms.

FOCUS AREAS

- Density and Land use optimization
- Contextualisation of architectural intervention
- Vehicular and pedestrian movement
- Urban aesthetics
- Socio-economic and cultural characteristics

ALLIED KNOWLEDGE REQUIRED

- Urban planning and urban design principles
- City level services
- Social anthropology
- Sustainable development

EXAMPLES OF STUDIO PROJECTS

Transportation nodes like bus terminus and railway stations, water front developments, development in heritage zones/context of urban conservation, city centre, administrative and legislative areas, streetscape, urban markets, etc.

Note

- Study tour of one-week duration is mandatory for conducting case study and field study related to the Architectural Design project.
- End Semester evaluation will be done by external jury member (from Academics or Professional Architect) other than the University faculty.

Reference

1. Carmona, M., Heath, T., Oc, T. and Tiesdell, S. (2010). Public Places Urban Spaces. Oxford: Architectural Press.
2. Lang, J. T. (2005). Urban Design: A Typology of Procedures and Products. Oxford: Elsevier/Architectural Press.
3. Lynch, K. (1984). Good city form. Boston : MIT Press.
4. Marshall, S. (2009). Cities design and evolution. New York : Routledge.
5. Moughtin, C., Cuesta, R., Sarris, C. And Signoretta, P. (2003). Urban Design - Methods and Techniques. Oxford : Architectural Press.
6. Watson, D., Plattus, A. and Shibley, R. (2003). Time-Saver standards for urban design. New York : McGraw Hill.
7. Whyte, W. H. (1980). The social life of small urban spaces. Washington D.C : Conservation Foundation.

Course Outcomes

CO1	Facilitate understanding and conceptualising design in spaces involving group of buildings in a public realm
CO2	Develop knowledge about design interventions within the context of the given urban setting.
CO3	Analysing scenario through carrying out field study, documentation of the built fabric and area analysis of a given area within a city
CO4	Develop knowledge about relationship among, physical, socio-cultural, environmental and socioeconomic dimensions of the built environments.
CO5	Planning physical environments through movement networks, open spaces, suggestive built form, infrastructure network in compliance with planning norms.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	2	2	1	2
CO2	3	3	3	3	2	2	3	2	2	2	1	2
CO3	3	3	3	3	2	2	3	2	2	2	1	2
CO4	3	3	3	3	2	2	3	2	2	2	1	2
CO5	3	3	3	3	2	2	3	2	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	3	3	2	2	3	2	2	2	1	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8TH	BAR08004	Pre Thesis Dissertation	03	01	0	4

Objective

Dissertation shall be a pre-thesis research on a topic of student's interest related to any aspect of Architecture, Urban design, Landscape Architecture, Sustainable Architecture, Architectural Conservation, which the student shall subsequently take up as Thesis topic. The student will conduct in depth analysis, so as to develop and strengthen the topic leading to the architectural design thesis.

The selected topic of each student shall be considered as the first phase of the Design Thesis where the students will finalise their area of interest and the subsequent research will act as the primary literature review for the Design Thesis. By the end of the semester along with the research paper the students are required to prepare their preliminary proposal for the Design Thesis, further, more specific research and case studies can be done on their respective topics during the professional training semester.

Broad Course Structure

1. Introduction, overview of subject, Research Methodology, critical reading, writing, referencing etc.
2. Lectures/ seminars to clarify/discuss common mistakes/doubts among the students, and to discuss the common topics students would be dealing with.
3. Research Proposal, including the Research Problem, Background, Aim, Objectives and Research questions, Panel review to finalise the research topics.
4. Critical Reading/ Literature Review, continuous assessment and assignments.
5. Writing, Referencing and Citations with review of stage wise submissions.
6. Submission of a final paper.

Course Outcomes

CO1	Develop knowledge about aspects of architectural research
CO2	Analyse the topics leading to the architectural design thesis.
CO3	Develop knowledge about primary literature review for the Design Thesis.
CO4	Applying critical Reading/ Literature Review, continuous assessment and assignments.
CO5	Conducting case studies.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	3	-	2	2	3	3	3
CO2	3	2	-	-	-	3	-	2	2	3	3	3
CO3	3	2	-	-	-	3	-	2	2	3	3	3
CO4	3	2	-	-	-	3	-	2	2	3	3	3
CO5	3	2	-	-	-	3	-	2	2	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	-	-	3	-	2	2	3	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
8th	BAR08005	Advanced Building Technology	04	0	0	4

Objective

Construction industry is very dynamic with new technologies constantly replacing the older ones and the same techniques being adapted for newer applications. The wide range of magnificent structures / buildings designed by architects and their team of consultants are physically realized through these construction systems only. There are specific requirements/ implications on design & construction process associated with each of these technologies. Knowledge of these systems will help these to-be architects to consider appropriate construction technologies while designing and also in dealing with other professionals in the field.

- This course is designed to familiarize the students with latest construction technologies and their integration with architectural designs as they have already completed all their lessons in conventional construction systems.
- Construction equipment has revolutionized our execution speeds so it is pertinent to discuss the different types of construction equipment being used currently in the construction industry and the various issues associated with them.

Module 1:

FORMWORK SYSTEMS

- Concrete Formwork: An Introduction
- Integrated Concrete / Formwork Life Cycle
- Horizontal Formwork Systems
- Vertical Formwork Systems
- Selection Criteria for Formwork System

Students to prepare technical drawings

Module 2:

CONCRETE TECHNOLOGY

- Concrete: Past, Present and Future.
- Concrete Admixtures.
- Concreting under extreme conditions.
- Ready Mix Concrete.
- Application specific varieties of concrete.

Students to prepare report of materials and specification

Module 3:

LONG SPAN STRUCTURES

- Introduction to Long Span Structures.
- Structural Systems for Long Span: their application in buildings and associated issues.
- Pre and post Tensioning.
- Segmental Construction.
- Composite Construction.
- Pre-engineered Construction.

Students to prepare technical drawings and reports

Module 4:

HIGH RISE BUILDINGS

- Evolution of High Rise Buildings
- Structural Systems and their integration with architectural designs.
- Service Installations in High-rise buildings.
- Construction related issues.

Apply the systems in a given multi storied building

Module 5:**CONSTRUCTION EQUIPMENT**

- Evolution of Heavy Construction Equipment.
- Different types of Construction Equipment.
- Estimating Productivity.
- Introduction to Replacement Models.
- The Buy, Lease or Rent Decision.
- Construction Equipment Site Safety.

Site visit and preparation of report

Course Outcomes

CO1	Develop knowledge about formwork system.
CO2	Evaluating various concrete technology.
CO3	Analysing long span structure.
CO4	Develop knowledge about high rise buildings.
CO5	Develop knowledge about construction equipment.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	3	3	3	-	-	-	2	2
CO2	3	-	-	3	3	3	3	-	-	-	2	2
CO3	3	-	-	3	3	3	3	-	-	-	2	2
CO4	3	-	-	3	3	3	3	-	-	-	2	2
CO5	3	-	-	3	3	3	3	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	3	3	3	3	-	-	-	2	2

**NINTH SEMESTER
BARCH PROGRAMME**

NINTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
SESSIONAL SUBJECTS								
1.	BAR09001	Professional Training	3-0-0	23			VV	
2.	BAR09002	Field Observation Studies	3-0-0	3			VV	
TOTAL				26				

**DETAIL SYLLABUS
NINTH SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
9TH	BAR09001	Professional Training	23	3	0	0
<p>OFFICE TRAINING This semester would comprise compulsory practical professional training for the entire academic session of the Ninth Semester. The chief Architect in the firm should be registered with the Council of Architecture and have a minimum of five years of practical/professional experience after her/his graduation. Students are required to be involved in all aspects of office works-conceptual design; presentation drawings and detail working drawings; 3 D modelling; estimation and specification of small buildings; interaction with clients, structural consultant and other building services consultants. The students are also expected to familiarize themselves with coordination of structural and services drawing with architectural drawings.</p> <p>SITE SUPERVISION WORK The aim of this training is to give exposure to the students on different stages of construction on the site and to learn how drawings are executed at the construction site. It is desired that the students undertake site visits and understand construction practices.</p> <p>At the end of the practical training, the students are required to present selected works, which are best representative of the training undergone in the form of drawings. The students are also required to submit a report describing various concepts learnt during training, experiences of site visit and estimation / costing activities etc. Training attendance log sheets shall also be submitted as part of the report.</p>						
<p>EVALUATION The detailed report and drawings prepared during practical training by students will be evaluated through viva-voce by a jury consisting of one external and one internal faculty member.</p>						

Course Outcomes

CO1	Demonstrate knowledge about different stages of construction
CO2	Analyze the process of designing in firms
CO3	Demonstrate estimation / costing activities
CO4	Apply basic principles of Consulting management and construction practices
CO5	Demonstrate the understanding of how drawings are executed

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	3	2	2	3	3	3	3	2	2
CO2	2	3	3	3	2	2	3	3	3	3	2	2
CO3	2	3	3	3	2	2	3	3	3	3	2	2
CO4	2	3	3	3	2	2	3	3	3	3	2	2
CO5	2	3	3	3	2	2	3	3	3	3	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2	3	3	3	2	2	3	3	3	3	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
9TH	BAR09002	Field Observation Studies	3	3	0	0
<p>Case study and field study has to be undertaken during the period of Professional Training.</p> <ol style="list-style-type: none"> 1. Technical Study of any one of the topics given in the Training Manual. Critical appraisal and detail technical study of the selected projects to be done. The study is to be presented in the form of a report comprising drawings, photographs supported by brief analysis and observation etc. 2. Field study and Documentation of any one of the topics given in the Training Manual. The study is to be presented in the form of a report comprising drawings, photographs supported by brief analysis and observation etc. 						
<p>EVALUATION The detail report and drawings prepared during practical training by students will be evaluated through viva-voce by a jury consisting of one external and one internal faculty member.</p>						

Course Outcomes

CO1	Demonstrate knowledge Technical Study
CO2	Express the understanding of Critical appraisal
CO3	Demonstrate knowledge on Field study
CO4	Apply basic knowledge gained through critical appraisal
CO5	Demonstrate the documentation of work

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	3	3	3	3	2	2	-	2	2
CO2	3	2	-	3	3	3	3	2	2	-	2	2
CO3	3	2	-	3	3	3	3	2	2	-	2	2
CO4	3	2	-	3	3	3	3	2	2	-	2	2
CO5	3	2	-	3	3	3	3	2	2	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	3	3	3	3	2	2	-	2	2

**TENTH SEMESTER
BARCH PROGRAMME**

TENTH SEMESTER								
SL. NO.	COURSE CODE	SUBJECTS	CONTACT HOURS (L-T-P)	CREDIT	SEMESTER EVALUATION (WE, IA, VV, TP)			
THEORY SUBJECTS								
1.	BAR10001	Building Economics and Project Management	3-0-0	3	WE			
SESSIONAL SUBJECTS								
1.	BAR10002	Architectural Design Thesis	0-0-18	18		IA	VV	
2.	BAR10003	Research inThesis	1-1-6	5		IA	VV	
TOTAL			4-1-24 = 29	26				

**DETAIL SYLLABUS
TENTH SEMESTER BARCH PROGRAMME**

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
10TH	BAR10001	Building Economics and Project Management	03	03	0	0
<p>Objective</p> <ul style="list-style-type: none"> To make the students aware of the effect of economics on architectural considerations, and to familiarize the students to various economic concepts that come within the purview of architecture. To equip students with a practical approach to implement building projects, basic knowledge about construction industry, project management techniques needed for managing and coordinating building projects in a professional manner 						
<p>Module 1 GENERAL AND PROJECT ECONOMICS</p> <ul style="list-style-type: none"> The market, demand and supply, choice, budget, consumer satisfaction, monopoly and oligopoly, choice of production technology and returns, profit maximization and cost minimization, production welfare and public good. Economics of building construction projects - land, labour, capital and Material. Labour intensive v/s capital intensive projects. Financing for projects, sources of capital, Agencies and Institutions influencing project economics, public private participation 						
<p>Module 2 ECONOMIC ANALYSES OF PROJECTS</p> <p>Basic concepts of Interest and Capital, prices and rentals on investment, (PV) Present Value of assets, Cost – Control, Cash - Flow Analyses, Cost – Projection, Cost – Benefit, Feasibility, Estate Investments & returns, Valuation, Law relating to properties & Buildings. Finance and Risk management - Financial analysis of projects, Project direct and indirect costs.</p>						
<p>Module 3 INTRODUCTION TO PROJECT MANAGEMENT</p> <p>Introduction to Construction Industry-Significance, objectives and functions, stakeholders, roles, responsibilities and functional relationships; Construction projects - objectives and lifecycle, existing construction practices & project management systems; Project scale. Project Team, organization, roles, responsibilities, Management Ethics (human aspects) in construction projects, Labour welfare, applicable labour legislations.</p>						
<p>Module 4 PROJECT SCHEDULING AND RESOURCES MANAGEMENT</p>						

Concepts of project planning, scheduling & controlling.
 Scheduling: Definition, advantages, methods of scheduling: Bar chart, Milestone chart;
 Controlling, Work Break-down Structure (WBS)
 Project Management through Networks- Introduction, objectives, advantages, terms and definitions, types of networks, rules for drawing a network;
 Introduction to PERT, CPM, difference between PERT and CPM, Network analysis – forward and backward passes, finding critical path;
 Methods of material/resource management- Project time reduction and optimization, resource levelling & resource allocation.

Module 5

PROJECT MONITORING AND CONTROL

Construction equipment types, characteristics & applications, Quality tests for construction material and processes, Quality control inspections.
 Site organization, Project progress tracking.
 Crashing Project Schedules, its impact on time, cost and quality. Safety in Construction Projects.

Reference

1. Chaudhuri, S. and Sen, A. (2010). *Economics*. McGraw Hill.
2. Dewett, K. K. (2009). *Modern Economic Theory*. S. Chand Publications.
3. Ferry, J. D. and Brahdon, S. P. (1994). *Cost Planning of Buildings*. BSP Professional Books.
4. Koutsoyiannis, A. (1994). *Modern Microeconomics*. 2nd Ed. MacMillan Press.
5. Nobbs, J. and Hopkins, I. (1995). *Economics: a core text*. 4th Ed. London : McGraw-Hill.
6. Smell, M. *Cost – benefit Analysis – a practical guide*. Thomas Telford Publishing.
7. Stone, P. A. (1976). *Building Economy: Design Production and Organisation a synoptic view*, 2nd Ed. Oxford : Pergamon Press.
8. Teck, H. and Hian, O. (1998). *Economics: theory and applications*. Taiwan : McGraw-Hill.
9. Punmia, B. C., and Khandelwal, K. K. (2006). *Project planning and control with PERT and CPM*. New Delhi: Laxmi Publications.
10. Wiest, J. D., and Levy, F. K. (1982). *A Management Guide to PERT/CPM*. New Delhi: Prentice Hall of India.
11. Chandra, P., *Projects: Planning, Analysis, Selection, Financing, Implementation and Review*, McGraw Hill Education (India) Private Limited.
12. Mukhopadyay, S.P., (1974), *Project Management for Architect's and Civil Engineers*, IIT, Kharagpur.
13. Callahan, M. T., Quackenbush, D. G., & Rowings, J. E. (1992). *Construction Project Scheduling*. McGraw-Hill.
14. Chitkara, K. K. (2004). *Construction Project Management: Planning, Scheduling and Controlling*. Tata McGraw-Hill Education.
15. O'Brien, J. J., and Plotnick, F. L. (2009). *CPM in Construction Management*. McGraw-Hill Professional.
16. National building code of India, Indian standard institution, New-Delhi, 1970

Course Outcomes

CO1	Develop market economics and construction costs
CO2	Organise the process of economic analysis of projects
CO3	Define process of project management
CO4	Analyse resource management and project scheduling
CO5	Evaluate and monitor project quality control

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	2	1	2	1	3	3	3	2	2
CO2	3	-	-	2	1	2	1	3	3	3	2	2
CO3	3	-	-	2	1	2	1	3	3	3	2	2
CO4	3	-	-	2	1	2	1	3	3	3	2	2
CO5	3	-	-	2	1	2	1	3	3	3	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	-	-	2	1	2	1	3	3	3	2	2

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
10TH	BAR10002	Architectural Design Thesis	18	0	0	18

Objective

Each student is expected to prepare a design thesis under a department approved guide/ advisor. The thesis should be a design-oriented project approved by the department. The thesis should reflect the knowledge gained from the entire course taken by the student in all the previous semesters.

The topic should be related to the student's Dissertation topic. The time schedule, content presentation, format etc. as decided by the department, from time to time, shall be strictly followed.

The scope and extent of the thesis work shall be substantial and realizable in application or concept as appropriate to the selected area of work.

At the end of the semester each student is expected to submit all original drawings prepared as per the department specification, 3 copies of thesis report in the specified format and a model to the department after obtaining the approval of the respective guide / advisor.

The department shall schedule the final viva voce, which is to be conducted by external jury panel after the Thesis submission.

Module 1

SYNOPSIS

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

Module 2

CASE STUDY, SITE ANALYSIS AND AREA PROGRAMMING

- **Case Study**

The students have to conduct literature study and case studies – live & literature, to form a basis for their own design.

- Literature Review: It includes gathering the relevant standards and other information from all the available sources related to their thesis topics that will help them during the later stages of their thesis programme.
- Case Studies: The students have to conduct live and literature studies of similar projects. Instead of mere documentation of these projects, information must be collected about the requirements; salient design features clearly stating the positive and negative aspects of the design. Idea of the case study is to form a base for candidates own design.

- **Site Analysis**

The purpose of the site analysis is to record and evaluate information on the site and its surroundings, and to use this evaluation in the design response. The site analysis should identify issues that will influence the design of a development in order to make a considered response to both site opportunities and constraints, to provide a good quality living environment, and respect, acknowledge and improve the character of the area.

- **Area Analysis and Programme**

The students are required to prepare a comparative statement of the various available design standards, areas provided in the various case studies and the area requirements stated in the project brief, so that the area requirements for the various functions / spaces for the proposed building can be finalized. This area programme should be an exhaustive list and will form the basis of the design process to be undertaken in upcoming stages.

Module 3
SCHEMATIC DESIGN

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

Module 4
DESIGN FINALIZATION

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

Module 5
PRE-FINAL DESIGN

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

Module 6
FINAL THESIS SUBMISSION

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

Course Outcomes:

Students will be able to:

- Design a Thesis project responsive to the contextual and program requirements
- Combines the systematic/methodological learning from various stages of study and analysis in design process towards culmination of an informed design.
- Communicate the ideas clearly using writing, verbal and visual presentation.

- Demonstrate self-reliance when working independently
- Integrate ideas with design requirements
- Compare data and information gathered from Pre-design research
- Evaluate data and information gathered from Pre-design research and summarizes the information used for design
- Apply various codes, standards and regulations governing the project.
- Demonstrate synthesis of creativity and technical knowledge
- Demonstrate the ability for decision making required to progress the understanding already developed.
- Demonstrate the ideas clearly using detailed physical Model.

Course Outcomes

CO1	Develop the research ability and skills of writing research proposal
CO2	Analyse environment and sites
CO3	Evaluate built environment
CO4	Implement Design proposals
CO5	Demonstrate skills of presentation techniques and writing thesis report

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	3	3	2	2	1	3	3
CO2	3	3	2	3	3	3	3	2	2	1	3	3
CO3	3	3	2	3	3	3	3	2	2	1	3	3
CO4	3	3	2	3	3	3	3	2	2	1	3	3
CO5	3	3	2	3	3	3	3	2	2	1	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	3	2	3	3	3	3	2	2	1	3	3

SEMESTER	COURSE CODE	COURSE TITLE	CREDIT	L	T	P/S
10TH	BAR10003	Research in Thesis	5	01	01	06
<p>Objective</p> <p>This course is a researchable component with design connection which would help the students to acquire a depth of knowledge about the required design details of their thesis. The students would reflect the learning of this course through its application in the Thesis Project. The outcome would be predominantly value based and may be evaluated based on the application in design. The exploration may include a report/ additional sheets on interior design/ landscape design/ servicedetails/ structuraldetails/ cost efficiency of building and other relevant links with the design project.</p>						
<p>Module 1 INTRODUCTION TO RESEARCH AREAS</p> <ul style="list-style-type: none"> To identify and outline research threads that could be explored in the thesis To comprehend and interpret the research component of the thesis. To select the most relevant research component. 						
<p>Module 2 RESEARCH SYNOPSIS AND METHODOLOGY</p> <ul style="list-style-type: none"> To define and outline aims, objectives and limitations of the research area. To illustrate appropriate methodology for conducting the research To identify and outline appropriate tools and methods for conducting the research. 						
<p>Module 3 SECONDARY/ PRIMARY STUDIES</p> <ul style="list-style-type: none"> To select and outline relevant literature sources. To comprehend and infer best practices available through secondary sources. To conduct primary studies relevant to research area. 						
<p>Module 4 APPLICATION TO THESIS- STAGE I</p> <ul style="list-style-type: none"> To outline various parameters for analysis relevant to thesis project. To infer conclusions from analysis. 						
<p>Module 5 APPLICATION TO THESIS- STAGE II</p> <ul style="list-style-type: none"> To recognise and link conclusions to the thesis project. To demonstrate comprehensively the application of research area to the thesis project through report/ additional sheets demonstrating concepts, innovative idea and technical details. To evaluate the impact of the research area in the students' specific research project. 						

Course Outcomes

CO1	Develop ability to understand research processes and techniques
CO2	Attain skill to conduct field survey and experiments
CO3	Analyse natural and built environment
CO4	Evaluate spatial and socio-economic data
CO5	Demonstrate research findings for application in architectural thesis

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	3	3	3	-	-	-	2	3	3
CO2	3	2	-	3	3	3	-	-	-	2	3	3
CO3	3	2	-	3	3	3	-	-	-	2	3	3
CO4	3	2	-	3	3	3	-	-	-	2	3	3
CO5	3	2	-	3	3	3	-	-	-	2	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	3	2	-	3	3	3	-	-	-	2	3	3