SAVITRIBAI PHULE PUNE UNIVERSITY

(Formerly the University of Pune)

SYLLABUS FOR

SECOND YEAR B. ARCH.

2025 PATTERN

BOARD OF STUDIES IN ARCHITECTURE

FACULTY OF SCIENCE AND TECHNOLOGY

COURSE STRUCTURE

SECOND YEAR B.ARCH

(2025 Pattern)

Semester III

Subject Code	Course Title	No of Credits	Lecture hours	Studio hours	Total hours	SS marks	SV marks	Total marks
2202515	Architectural Design II	8	2	6	8		300	300
2202516	Building Construction and Materials III	4	1	3	4		150	150
2202517	Structures III	3	1	2	3	100		100
2202518	Building Services I	3	1	2	3		100	100
2202519	History of Architecture I	3	1	2	3	100		100
2202520	Climatology	2	1	1	2	50		50
2202521	Site Survey Systems	3	1	2	3	100		100
		26	8	18	26	350	550	900

Semester IV

Subject Code	Course Title	No of Credits	Lecture hours	Studio hours	Total hours	SS marks	SV marks	Total marks
2202522	Architectural Design III	8	2	6	8		300	300
2202523	Building Construction and Materials IV	4	1	3	4		150	150
2202524	Structures IV	3	1	2	3	100		100
2202525	Building Services II	3	1	2	3		100	100
2202526	History of Architecture II	3	1	2	3	100		100
2202527	Environmental Science	3	1	2	3	100		100
2202528	Indian Knowledge Systems Elective	2	1	1	2	50		50
		26	8	18	26	350	550	900

SEMESTER III

ARCHITECTURAL DESIGN II		
Semester III B.Arch.		
Course Code	2202515 (SV)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 8	Sessional (CIA 125+EA 125) Viva (INT 25+ EXT 25)	 250 50
Lecture Hours/ Week: 2	Total Marks	300
Studio Hours/ Week: 6	Total Credits	8

COURSE DESCRIPTION :

Architectural Design II focuses on various aspects of, and the process involved in, design of a Dwelling. Dwelling design is a complex and challenging design problem. Engaging students in micro-research activities will greatly enhance the understanding of these complexities.

Micro-research activities are small research explorations that involve formulating a query, identifying and collecting data required and methodically arrive at a plausible outcome that will help in the elaboration of the design exercise.

The institute may formulate such micro-research exercises to complement the design explorations. Such activities may belong to any of the units identified below.

The project could involve design of one or many dwelling units. The total built up area of the design demonstration should not be less than 250 sqm.

The focus should be on a clear and demonstrable design process. The design portfolio should focus on communicating the process along with the product.

COURSE OBJECTIVES :

1. To understand the role of micro-research activities in the design of buildings
2. Learn to frame the design problem and subsequently explore solutions to the framed design problem
3. To understand the schema of putting together a dwelling

BROAD COURSE OUTCOMES :

At the end of the course the students are expected to develop

1. Ability to analyse precedents and diagram the schema of putting together a house.
2. Ability to generate multiple design alternatives, compare and take decision based on a set of criteria
3. Ability to frame a design challenge and use that as a guide to solve the design problem.
4. Ability to frame and conduct a micro-research project related to the design of dwelling.
5. Ability to communicate the process and the final solution using graphical/ written, and verbal communication.

COURSE CONTENTS :

The design assignment and the micro-research activity should cover outcomes related to each of the following units:

Unit 1:Pre-Design Processes

1. Formulating Design Brief
2. Precedent Studies
3. Analysis of Schema
4. Framing the design challenge

Unit 2:Anthropometry and function

1. Analyse a given function into its smaller components and space requirements
2. Working out/ finding sizes of spaces and elements to facilitate the human occupants to carry out the functions efficiently and effectively.
3. Show the interrelationships between different functions as part of a whole.

Unit 2:Structural assemblies and materials

1. Explore possibilities of creating space using simple assemblies of structural elements; Understand through precedent studies the ways of using the same material in different ways.
2. Employing known materials to create an efficient and aesthetic assembly of structural and non-structural parts.
3. Arrange load transferring elements in the form of the building for a structurally viable solution

Unit 3:Thermal comfort

To achieve thermal comfort by applying passive design strategies which will focus on:

i. Reducing thermal loads
ii. Use of passive cooling strategies.

Unit 4:Building Services

1. To demonstrate a basic understanding of various services such as water supply, drainage, and daylighting in the design of a dwelling

Unit 5:Building Form and Context

1. To understand building form as part of an existing ensemble where shared visual grammar is important as well as built form as an individual building on the ground where novelty of the form overrides concerns of immediate architectural context.
2. The institute may choose either of the approaches to frame the design assignment.

SESSIONAL WORK :

It is recommended that each college define the course outcomes that are assessable through the sessional work.

Sessional work should comprise of:

1. Design proposal represented through adequate and technically drawn and presented drawings in hard copy and physical models. Digital models and visualisation may also be used.
2. The drawings and models should demonstrate the design process as well as the design solution.
3. Report of the micro-research activity related to any one or more Units above which may be conducted individually or in groups of students.
4. One time bound project of two weeks duration other than design of a residence and of an area not less than 100 sqm.

RECOMMENDED READINGS :

1. 9 Houses – Architecture of Girish Doshi.(2025). India Gido
2. Alexander, C., Ishikawa, S., Silverstein, M. (1977). A Pattern Language: Towns, Buildings, Construction. United Kingdom: OUP USA.
3. Bhatia, G. (2000). Laurie Baker. India: Penguin Books Limited.

4. Clark, R. H., Pause, M. (2012). Precedents in Architecture: Analytic Diagrams, Formative Ideas, and Partis. United Kingdom: John Wiley & Sons.
5. Desai, M., Desai, M. (2016). The Bungalow in Twentieth-Century India: The Cultural Expression of Changing Ways of Life and Aspirations in the Domestic Architecture of Colonial and Post-colonial Society. United Kingdom: Taylor & Francis.
6. Doshi, B. V. (2019) Kamala House. Spain: Apartamento Publishing
7. Rapoport, A. (1969). House Form and Culture. United Kingdom: Prentice-Hall.
8. Schoenauer, N. (1981). 6000 Years of Housing: The Pre-urban House. United States: Garland STPM Press.
9. Unwin, S. (2003). Analysing Architecture. United Kingdom: Routledge.
10. Walker, L. (2014). Designing a House: An Illustrated Guide to Planning Your Own Home. United Kingdom: Harry N. Abrams.

BUILDING CONSTRUCTION AND MATERIALS III		
Semester III B.Arch.		
Course Code	2202516 (SV)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 4	Sessional (CIA 50+EA 50) Viva (INT 25+ EXT 25)	 100 50
Lecture Hours/ Week: 1	Total Marks	150
Studio Hours/ Week: 3	Total Credits	4

COURSE DESCRIPTION :

Building Construction is an important stream and part of the core subjects of Architecture. It is spread across eight semesters as Building Construction and Materials I to VIII. The subject objective is to train students progressively from simple to complex & advanced building construction technologies and materials. Building Construction and Materials III exposes students to framed Construction primarily using Reinforced Cement Concrete (R.C.C.), while semester IV deals with structural Steel Constructions and advanced form-based construction systems such as Shells and Tensile structures. The course is also aimed at establishing a relationship between form, strength and suitable construction materials.

COURSE OBJECTIVES :

1. To introduce and explore the idea of framed construction, its principles, possibilities and limitations and its relevance in making design decisions.
2. To introduce students to the concepts of Reinforced Cement Concrete (R.C.C.) construction with respect to the material, structure and building envelope
3. To understand and explore conventional and alternative flat roofing and flooring systems (slabs) in R.C.C. Construction
4. To expose students to specialized flooring and waterproofing systems in buildings

BROAD COURSE OUTCOMES :

At the end of the course, students are expected to develop:

1. Ability to understand principles of framed construction, its components and load transfer in comparison with the Load bearing structures.
2. Understand R.C.C. As a composite material its advantages and limitations in construction.

3. Ability to define and draw various building components in RCC framed buildings and to understand the role of reinforcement in RCC, to understand different patterns of reinforcement layouts and its relevance to structural behaviour
4. Ability to employ various conventional and alternative flat roofing systems in RCC for different spans and type
5. Understanding of in-situ and specialized flooring systems and their application

COURSE CONTENTS :

All the units are to be taught with explorations in form, structure and type of construction wherever relevant. Principles of load transfer and its relationship with materials and construction details to be emphasised in the teaching methodology as well as setting up of studio exercises.

Unit 1: Material Theory: RCC

1. Concrete and. RCC (Reinforced Cement Concrete) as composite materials, it's Ingredients their role. Various types of Cement Concrete mixes, and re-inforement types (conventional as well as alternatives).
2. Study of cement concrete mix in terms of setting, curing, workability and its impact on the strength and finish
3. Various Tests deployed to determine quality, strength, workability of the concrete (PCC and RCC)

Unit 2: Framed Construction in RCC

1. Introduction to the concept of framed structures, rigid monolithic frames. Components of framed structure, idea of load transfer for each component and its behavior under different loading conditions.
2. Introduction to columns, beams and slabs as basic components of framed construction in R.C.C..
3. Various types and profiles of RCC columns, Footings and their construction technology, with focus on idea of structural grid leading to different column profiles, orientation, spacing etc.
4. Concept of shear wall
5. RCC spanning members such as beams, lintels, their behaviour and construction technology. Lintels as spanning members over openings to be explored along integrated weather shed (Chajja)
6. RCC flat roofing systems – Slabs. Various types RCC slabs based on spanning systems such as one-way, two-way and cantilever slabs. Realation ship between the span, slab profiles and design intentions to be explored
7. Iterations of RCC slabs as stairs and ramps their types (Single flight, dog legged, curved profiles) and their construction logic.

Unit 3: Specialized RCC Roofing Systems

1. Non-conventional and large span RCC roofing such as ribbed slabs, filler slabs, waffle, grid slabs and hollow core slabs. Structural and design advantages of the above-mentioned iterations to be discussed.
2. Concept of precast Construction Slabs.

Unit 4: Flooring

1. In-situ, mono lithic flooring such as Trimix floor and flooring for heavy duty activities with focus on surface preparation, materials, joints and its role. Comparison of in-situ flooring with tiled flooring.
2. Resilient flooring systems, it's need, systems. Shock absorbing mechanisms used for flooring in sports halls such as basketball / badminton courts

Unit 5: Waterproofing and Damp-proofing

1. Concept and need of waterproofing and damp-proofing in the buildings.
2. Various types of waterproofing and damp-proofing materials and agents (understanding application), surface preparation, process and response to joints, cracks, membrane waterproofing.

SESSIONAL WORK :

Notes and Sketches reflecting students understanding / learning for Unit 1 and 2

Sketches and Market Survey on Unit 4 and 5- Flooring and Water proofing

Studio exercises leading to Technical Drawings (sheets) on Unit 2 and Unit 3 (min 4 sheets).

The studio exercises and assignments to focus on interrelation between construction technology, materials and design development. They should also focus on comprehensive systems rather than independent components, covering the following:

1. Systemic drawings explaining construction from foundation to Roof and resulting form.
2. Analytical drawings/sketches expressing structural behavior of each element under different loading conditions
3. Building line-out, mapping of structural grid/ framing

RECOMMENDED READINGS :

A. Main Reference Books:

1. Building Construction -Punmia, B.C., Jain, A.K., Jain, A.K.
2. Building Construction-Rangwala, S.C.
3. Building Materials-Duggal, S.K,
4. Building Construction-Varghese, P.C.

B. Supplementary Reference Books, Manuals and Practice Documents

1. Building Construction Illustrated-Ching, Francis D.K..
2. Building Construction Handbook-Chudley, Roy,
3. Reinforced Concrete Structures-Punmia, B.C. et al,Laxmi
4. Reinforced Concrete Design-Pillai, S.U., Menon, D.
5. CPWD (Central Public Works Department)-Specifications for Civil Works
6. PWD / State Engineering Department Manuals (Maharashtra) (Relevant sections on RCC construction, flooring, waterproofing)

C. Indian Standards And Codes

1. Bureau of Indian Standards (BIS)
    i. IS 456: Plain and Reinforced Concrete – Code of Practice
    ii. IS 875: Code of Practice for Design Loads (Other than Earthquake)
    iii. IS 3370: Concrete Structures for Storage of Liquids
2. National Building Code of India (NBC), 2016

STRUCTURES III		
Semester III B.Arch.		
Course Code	2202517 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 50+EA 50)	100
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credits	3

COURSE DESCRIPTION :

Structures I to IV are designed to equip students with a comprehensive understanding of the safety, serviceability, and stability of structural systems. The course series enables learners to comprehend the fundamental structural behaviour of buildings and components, identify various modes of structural failure and explore appropriate remedial measures, estimate sizes of key structural members based on structural strength and loading systems, and employ appropriate materials, geometry, and support systems efficiently for the optimal structural performance.

COURSE OBJECTIVES :

1. To understand the behaviour of wooden joists and RCC structural members.
2. To estimate sizes of wooden joists and RCC structural members.
3. To estimate amount and placement of reinforcement in RCC structural members.
4. To implement the structural logic for placement of RCC structural members in a building.
5. To understand the effect of architectural planning on wind and seismic resistance of a structure.

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to estimate gravity loads
2. Ability to estimate cross sections of wooden joists.
3. Ability to estimate, amount and placement of reinforcement for spanning members
4. Ability to estimate cross-sectional area, amount and placement of reinforcement for columns.

5. Ability to estimate area of isolated and combined footing in plan.
6. Ability to place RCC structural members as per requirement in plan.
7. Ability to understand the effect of architectural planning to resist wind and seismic load

COURSE CONTENTS :

Unit 1:

1. Design of Wooden joists –Working Stress Method – Calculating section size and check for shear and deflection for 1) simply supported 2) cantilever – (assignment to identify primary and secondary beams)

Unit 2:

1. Introduction to IS456, Understanding Standard RCC section, Limit State Method, Classifying Under-reinforced, over-reinforced and balanced section based on given section size and reinforcement (no need to calculate position of neutral axis), load transfer for one way, two way and cantilever slab.

Unit 3:

1. Slabs –Design of simply supported one-way slabs, Design of cantilever slabs. Understanding structural behaviour and logic for provision of reinforcement for RCC two-way slab, overhanging slab, one-way continuous slab, estimation of slab depth based on span to depth ratio.
2. Types of Staircases based on supports – Structural behaviour and logic for provision of reinforcement for staircase with simply supported steps, dog-legged staircase (various beam positions), open well staircase, folded plate staircase, central spine beam staircase.

Unit 4:

1. Beams - Design of simply supported beam supporting one way slab, Design of cantilever beam. Understanding structural behaviour and applications of flanged and doubly reinforced beams, estimating beam depth based on span to depth ratio.

Unit 5:

1. Compression members – Design of short columns across multiple floors (G+4). Understanding structural behaviour of columns subjected to moments, concept of uniaxial and biaxial moment columns, concept of strong column weak beam for structural safety.
2. Design of foundation – Calculation of area of isolated footing in plan only, understanding of critical structural actions (bending, one-way shear, two-way shear) and behaviour of footing. Combined footing – necessity, calculation of area of footing in plan only. Introduction to types of footing for low soil bearing capacity (pile and raft foundation).

Unit 6:

1. Principles of architectural planning for improving wind and seismic resistance of structures – Effect of symmetry and irregularities in horizontal and vertical planning, seismic separation joints, pounding, effect of soft story, structural systems for resisting earthquake and their effective application– shear wall, moment resisting frames in RCC structures, introduction to ductile detailing and IS 13920.

SESSIONAL WORK :

All topics of the syllabus must be included in following assignments:

1. RCC framing plan G+1:
    i. Identify a key plan and indicate structural framing including slab, beam, column positions, slab spanning directions, slab and beam depth.
    ii. For the same plan, design a) Any one RCC slab, b) Any two RCC beams and c) Any one RCC short column
2. Minor Assignments – Any three assignments based on topics in the above Units
3. Minimum two tutorials to cover all the topics in the above Units

RECOMMENDED READINGS :

1. Illustrated Design of reinforced concrete building – Dr. V. L. Shah and Dr. S. R. Karve
2. Reinforced Concrete Vol. I By Dr. H. J. Shah
3. Limit State Design of Reinforced Concrete by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain

BUILDING SERVICES I		
Semester III B.Arch		
Course Code	2202518 (SV)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 25 + EA 25) Viva (INT 25 + EXT 25)	 50 50
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credit	03

COURSE DESCRIPTION :

Building services are essential components of buildings that make the building usable for various human activity and comfort. Building services have become complex with the increasing complexity and scale of buildings. The subject of Building Services is spread over four semesters and increases in scope and complexity in correspondence with the scope of the subject of Architectural Design. Semester III deals with basic services of water supply and drainage for simple and low rise buildings. This subject needs adequate exposure to the market to understand the basic and advanced fittings and appurtenances needed for providing these services.

COURSE OBJECTIVES :

1. To acquire knowledge, skills, and practices of essential building services for the effective functioning and utility of the building as a "whole" unit/entity.
2. To understand the domestic water supply & sanitation system (external & internal) and house drainage& disposal facilities.
3. To foster the integration of building services in the architectural design of low, medium rise buildings in students.

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to work out plumbing services in low and medium rise buildings and inculcate the systems for hot and cold water supply in a building premises required in architectural design.

2. Ability to comprehend drainage systems viz. collection, conveyance & disposal of sewage, sullage and effluents from building premises, including methods, components and apparatus involved.
3. Ability to identify appropriate waste-water management systems and the drainage for various building typology.

COURSE CONTENTS :

Unit 1 : Water supply

1. Principles and techniques of supplying water- concept of pressure, flow and control; localized and centralized supply systems
2. Water requirement in various buildings and their norms, estimation of water tank Capacity (Ground and overhead), sizing of water tanks, types of Water tanks such as HDPE, Precast, in-situ etc
3. Distribution systems of water in small scale, stand-alone buildings including piping, control valves and faucets. Circulation systems i.e. ring system, up-feed/ down-feed systems, Submersible and non-submersible Pumps and applications.
4. Types of Pipes, conventional materials (such as GI, Copper, PVC, HDPE) used, standard joinery and installation techniques.
5. Types of Taps, Faucets, Mixers and Fittings.

Unit 2 : Hot Water supply

1. Hot water supply systems using conventional and non-conventional energy sources such as Electricity, Thermal and Solar energy: Components, equipment, and space provisions for the same
2. Piping insulation, safety and considerations in piping network.
3. Failures, precautions, and safety measures.

Unit 3 : Vertical Drainage systems

1. Introduction to Building Drainage system and its components - sewage and sullage disposal systems.
2. Vertical drainage - Pipes and piping network systems.
3. - Single and double stack systems with part and full ventilation.
4. - Pipe materials such as PVC, HDPE, cement pipes and cast iron pipes; classification of pipes
5. - Joinery and methods of installation.
6. - Anti-syphonic system of ventilation in drainage system
7. - Ducts and shafts.
8. Introduction to various sanitary fittings and their Installations.
9. - Sanitary fittings like wash hand basins, sinks, bathing units, water-closets (Indian and European), urinals etc.

10. - Selection criteria and spatial and design considerations.
11. Introduction to all types of traps for residential buildings, their working, location and space provisions required for the same

Unit 4 : Horizontal Drainage systems

1. Design of underground drainage systems for sullage and sewage. Principle and concept of self-cleansing velocity in flow through pipes. Techniques in laying, leveling, planning, aligning, testing, inspection and maintenance
    i. Invert levels, Gradients, Access point planning
    ii. Types of Chambers, Sumps, Channels
    iii. Ventilation of drainage system.
    iv. Connection to treatment and disposal systems such as municipal drainage, soak pits, septic tanks and STPs
2. Stormwater drainage system
    i. Roof water drainage
    ii. Surface water drainage

Unit 6 : Sewage Treatment and Disposal

1. Disposal within the Premises.
    i. Septic tanks, its function, types and design (Sizing).
    ii. Maintenance of Septic tank.
2. Waste Water and Sewage treatment plant limited to building premises.
    i. - Introduction to Waste water treatment plant
    ii. - Introduction to sewage treatment plant

SESSIONAL WORK :

Sessional work should be planned to cover comprehensives understanding all the above-mentioned units.

Minimum four assignments involving resolution of the systems mentioned in the Units above and their application in the Architectural design (own or given situation) in the form of well annotated scaled drawings.

1. Market survey based on all units above focusing on application and current trends reflected in the below mentioned drawings
2. Preparing internal water supply and drainage layouts for toilets showing fixtures, finishes, and accessories including required calculations.
3. Preparing external water supply and drainage layouts for a small campus with one or two buildings with appropriate system and calculations, showing provision of connectivity to City Municipal/ local supply and drain.

RECOMMENDED READINGS :

1. NBC 2016 Vol 2, Part 9, Sections (1, 2, 3)
2. Handbook on Water supply and Drainage - BIS SP 35 1987
3. UDCPR-2020
4. IPC 2021 (International Plumbing Code)
5. Birdie G. S and Birdie J. S Water Supply & Sanitary Engineering, Dhanpat Rai Publishing Company (p) Ltd (2010)
6. Punmia, B. C., Jain, A. K. and Jain, A.K. (1998). Waste Water Engineering. New Delhi: Laxmi Publications.
7. Rangwala, S. C. (2005). Water Supply and Sanitary Engineering. Charoter Publishing.
8. G. Eric Mitchell. Revised by S E Thrower (1960) Sanitation, Drainage and Water Supply. George Newnes Ltd.
9. S G Deolalikar (2015) Plumbing – Design & Practice McGraw Hill Education
10. Peter Burberry(1977) Environment and Services -Batsford,

i. Any other learning resources as and when recommended by faculty.

HISTORY OF ARCHITECTURE I		
Semester III B.Arch.		
Course Code	2202519 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 50+EA 50)	100
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credits	3

COURSE DESCRIPTION :

History of Architecture I, II and III helps students to understand Architecture as a process as well as a product of several variables such as the geographic, socio-eco-cultural, political, aesthetic, and structural. The overarching aim is to teach students to work 'with' history of architecture in the design studios. This subject is seen as a decision making tool for design thinking.

History of Architecture offers a comprehensive exploration of architectural history, tracing the evolution of built environments from early civilisations to contemporary buildings. The course exposes students to various cultures across the world with salient examples of their architecture demonstrating the evolution of architecture across space and time.

The subject covers the breadth of historical architecture of the world with an emphasis on the architecture in India. The content is presented in 5 approximate slices of time in Sem III and IV. Contents of the Units mention the broad category of historical architecture to be studied. These are to be expanded with relevant and adequate examples as needed. The Units have been arranged geographically for convenience of instruction. However, the intention is also to give a comparative view of architecture synchronous with each other.

The History of Architecture other than serving as a window to the world's significant buildings can also be used as a tool for aiding design decision making through precedent studies. It also is a rich resource for developing critical thinking through interpretation of history through various standpoints. While History of Architecture in Sem VI will deal with critical thinking, it is recommended that History of Architecture in Semester III and IV and V is taught keeping in mind the aspects of design decision making like those mentioned below:

1. Geometry, ideal dimensions, proportioning systems, diagrams
2. Structural systems, Form Development, materials, details
3. Settings, Urban planning and urban design, landscape design
4. Art, Craft, literature, philosophy and other influences
5. Archetypes and theoretical arguments

COURSE OBJECTIVES :

1. To understand architecture as a process as well as a product of several variables
2. To understand evolution of the built environment from the pre-historic to vernacular and high-style architecture
3. To provide exposure to various cultures across the world as expressed in their built environment
4. To develop a comparative understanding of architecture at a given time across cultures.
5. To understand historical buildings are precedents for design decision making especially in relation to aspects mentioned above in the Course Description.

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to identify buildings as a product of space, time and people
2. Ability to understand the chronological development of architecture
3. Ability to compare parallel developments of architecture in any given period.
4. Ability to analyse historical buildings for various aspects used in design decision making.
5. Ability to record the experience of visiting a historical site through various media

COURSE CONTENTS :

A general understanding of the world geography and broad historic timeline is essential to understand the relationship between the contents of the Units.

Architecture @ 3500 BCE to @ 400 BCE

Unit 1:

1. Early civilisations of the Mesopotamian, Egyptian, Chinese people

Unit 2:

1. Indus Valley civilisation, Architecture of the Vedic period

Architecture @ 400 BCE to @ 100 CE

Unit 3:

1. Classical Greek and Roman architecture

Unit 4:

1. Buddhist religious architecture

Architecture @ 100 CE to @1100 CE

Unit 5:

1. Romanesque and Byzantine architecture of the Christian religion

Unit 6:

1. Hindu religious architecture

SESSIONAL WORK :

It is recommended that each college clearly define the intended learning outcomes for all Units specified in the course contents. These outcomes shall be made measurable and assessable through the following sessional work.

1. Analytical and/or Creative Assignments: Analytical drawings illustrating building typologies, spatial organization, and structural systems and any aspects of design mentioned in the Course Description. At least one assignment on each Unit.
2. Two tutorials based on the contents of the units mentioned above.
3. Site visit and report: At least one guided site visit to a site related to contents of any of the units mentioned above with a report by each student documenting site observations, photographs, and sketches/drawings.

It is recommended to conduct a tour to cover a variety of historical sites and buildings between the two semesters of II Year B.Arch.

RECOMMENDED READINGS :

1. Brown, P. (n.d.). Indian Architecture: Buddhist and Hindu. Delhi: Kiran Book Agency.
2. Ching, Francis D K, Mark Jarzombek, Vikramaditya Prakash. A Global History of Architecture. John Wiley and Sons, 2011.
3. Dhongde, S. R., & Ranade, J. (2009). Aurangabad: Culture, Art, Architecture. Aurangabad: INTACH Aurangabad Chapter.
4. Fergusson, J. History of Indian and eastern Architecture. London: John Murray. 1891
5. Fletcher, Sir Banister and Dan Cruickshank. Sir Banister Fletcher's A History of Architecture On The Comparative Method. Architectural Press, 1996.

6. Summerson, John. The Classical Language of Architecture. Thames and Hudson, 1980.
7. Tadgell, C. The History of Architecture in India. London: Phaidon.1994.
8. Ward-Perkins, J B. Roman Imperial Architecture. Yale University Press, 1992.

CLIMATOLOGY		
Semester III B.Arch.		
Course Code	2202520 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 2	Sessional (CIA 25+EA 25)	50
Lecture Hours/ Week: 1	Total Marks	50
Studio Hours/ Week: 1	Total Credits	2

COURSE DESCRIPTION

The built environment aims at providing a sheltered space from climatic elements for all human activity. Today, however, the scale and complexity of the built environment has grown such that it is one of the major contributors of climate change. The subject of Climatology exposes the students to both these aspects. It primarily aims to equip students towards understanding the effect of climatic elements on human comfort and develop design strategies to achieve it through passive means.

COURSE OBJECTIVES:

1. To introduce the fundamentals of climatology and their application in architectural design.
2. To create awareness about climate change, it's global and local impacts, and the critical role of architects in addressing these challenges.
3. To develop understanding of the relationship between climate, built form, and human comfort.
4. To provide hands-on exposure to data logging and analysis instruments/software.

BROAD COURSE OUTCOMES:

At the end of the course, the students are expected to develop:

1. Ability to interpret climatic data and apply it to building design.
2. Ability to demonstrate awareness of climate change and sustainable design approaches.
3. Ability to use data logging and analysis instruments/ software for observation and representation of data.

4. Ability to understand concept of thermal comfort.
5. Ability to understand passive design strategies and its use with reference to vernacular and contemporary architecture.

COURSE CONTENTS :

Unit 1 : Introduction to Climatology and Climate Change

1. Understanding the elements of climate and climate at different scales i.e. global, regional, macro and micro.
2. Introduction to climate change: causes with a focus on the role of the built environment, global and local impacts, and role of architects in addressing climate challenges.
3. Understanding the relevance of studying climatology for sustainable and climate-responsive design.
4. Understanding the classification and distribution of climate zones: global and Indian.

Unit 2 : Climatic Data and Tools of Analysis

1. Introduction to sources of climate data and its nature.
2. Introduction to graphical (Sun path diagrams, Psychrometric charts, Wind Rose) and software-based tools for climatic data representation and analysis.
3. Demonstrating the use of basic instruments for recording climatic data like ambient temperature, humidity, air movement, etc.

Unit 3 : Human Comfort in Buildings

1. Introduction to concept and components of human comfort in buildings: Thermal comfort, Indoor air quality, Visual/ Lighting comfort, Acoustic Comfort
2. Understanding context-based and perceived comfort considering cultural, socio-economic, and regional variations
3. Components of Thermal Comfort: Air temperature, Air velocity and relative humidity, Airflow, Radiant Temperature, activity

Unit 4 : Application of Strategies for Climatic Comfort

1. Analysis of traditional and vernacular buildings for climatic comfort and strategies
2. Analysis of contemporary architect-designed buildings for climatic comfort and strategies
3. To design fenestration patterns and appropriate shading devices thereof using sun-path diagram

Unit 5 : Passive Design Strategies

1. Introduction to passive design strategies at various scales i.e. urban, building and building component scale
2. Demonstrating the use of tools like sun path, wind rose, bioclimatic chart etc. to develop passive strategies for climate responsive buildings

SESSIONAL WORK :

1. Climate data collection and analysis exercise.
2. Lab-based assignments using instruments and charts.
3. Individual Assignment on the various tools like sun path and bioclimatic chart etc. Assignments should cover shadow analysis of buildings and design of shading devices.
4. Group work to study vernacular and contemporary architectural case studies in India with climate responsive architecture and passive design strategies.
5. Optimum assignments to cover each of the units.

RECOMMENDED READINGS :

1. G.Z.Brown and Mark DeKay; Sun,Wind and Light, John Wiley and Sons
2. O.H.Koenigsberger; Manual of Tropical Housing & Building, University Press
3. Arvind Krishnan: Climate Responsive Architecture
4. Bansal. N; Passive building design, London
5. Givoni; Man, Climate and Architecture
6. David Pearlmutter, Evyatar Erell, and Terence Williamson; Urban Microclimate: Designing the Spaces Between Buildings
7. Energy Conservation and Sustainable Building Code (ECSBC)
8. Climate consultant software

SITE SURVEY SYSTEMS		
Semester III B.Arch.		
Course Code	2202521 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 50+EA 50)	100
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credits	3

COURSE DESCRIPTION :

Site Survey Systems provides an in-depth exploration of traditional and modern site survey systems, equipping students of architecture with the skills to collect, analyse, and apply site data. Students learn manual survey techniques, and digital survey technologies including Total Station, GIS, LiDAR, and drone surveys. The course also introduces a unit on surveying existing buildings that may be part of the site and project. The course emphasises applying survey data to site planning, design, and decision making, preparing students for real-world architectural projects.

COURSE OBJECTIVES :

1. Understand the importance of site survey and analysis in architectural design.
2. Familiarize students with various traditional and digital site survey methods, tools, and techniques.
3. Develop skills in analyzing and interpreting site data to inform design decisions.
4. Apply site analysis principles to develop site-responsive design solutions.
5. Introduce digital tools for site survey, analysis, and visualization.

BROAD COURSE OUTCOMES :

Upon completing this course, the students are expected to develop:

1. Ability to identify and collect relevant site data using various survey methods and techniques.
2. Ability to analyze and interpret site data to inform design decisions.
3. Ability to develop site-responsive design solutions that respond to site constraints and opportunities.
4. Ability to apply digital tools for site survey, analysis, and visualization.

5. Ability to effectively communicate site analysis findings

COURSE CONTENTS :

Unit 1: Introduction to Site Survey Systems

1. Role and importance of site survey systems in architectural design
2. Introduction to land survey systems: measurements of distances, area of field, contour mapping, slope analysis and 3D scanning technologies
3. Introduction to environmental survey systems: measuring climate data, vegetation surveys, geological surveys for strata and water, surveys for noise, views, etc
4. Introduction to socio-cultural survey systems: surveys for assessing user needs, cultural context, and tools for community engagement
5. Introduction to infrastructure survey systems: access, utilities, and services

Unit 2: Traditional Site Survey Systems

1. Understanding manual survey techniques for sites:
    i. Chain and compass surveys
    ii. Plane table surveying
    iii. Levelling and contouring
2. Introduction to the use of survey instruments: Theodolite, dumpy level, ranging rods

Unit 3: Modern Digital Survey Systems

1. Understanding modern topographic survey systems:
    i. Total Station
    ii. GPS/ NavIC
    iii. Drone mapping and photogrammetry

Unit 4: Systems for Surveying Existing Buildings on Site

1. Purpose of survey: Documentation, assessment of state of damage or repairs, assessment of thermal comfort
2. Tools and techniques:
    i. Conventional: Plane table survey, measuring lengths, heights, and angles
    ii. Digital: Photogrammetry, LiDAR scanning, moisture and temperature data loggers, infrared cameras, GPR survey.

Unit 5: Site Constraints and Opportunities Analysis

1. Identifying site constraints: topography, environmental factors, and regulatory issues
2. Identifying site opportunities: natural features, solar access, and views
3. SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats)

Unit 7: Site Planning and Design

1. Site planning principles and strategies in sync with survey data
2. Design strategies in response to site analysis and constraints
3. Case studies of successful site-responsive designs

SESSIONAL WORK :

1. Prepare a contour drawing and perform slope analysis for the same based on actual site survey undertaken by the students using any traditional/ digital systems.
2. Documenting and representing a site with an existing building of some historical or architectural significance and/ or vegetation/ significant natural feature and preparing a set of drawings and / or digital model of the same (group project).
3. Preparing a SWOT analysis report with analytical drawings and suggesting site planning strategies. Data from any three types of surveys (as mentioned in Unit 1) of a given site should be used for the report (individual assignment).

RECOMMENDED READINGS :

1. Basak, N.N, Surveying and Levelling, McGraw Hill Education (India) New Delhi, 1994
2. Kanetkar, T.P, Kulkarni, S.V, Surveying and Levelling, Pune Vidyarthi Griha Prakashan, 2014
3. Lynch, K, Site Planning, Cambridge: The MIT Press, 1962

SEMESTER IV

ARCHITECTURAL DESIGN III		
Semester IV B.Arch.		
Course Code	2202522 (SV)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 8	Sessional (CIA 125+EA 125) Viva (INT 25+ EXT 25)	 250 50
Lecture Hours/ Week: 2	Total Marks	300
Studio Hours/ Week: 6	Total Credits	8

COURSE DESCRIPTION :

Architectural Design III studio may be approached in three distinct ways.

A. Design of a building as embedded in its social and cultural context.
B. Design of a building as an act of examining an issue that is perceived as relevant,
C. Design of a building as an exploration of a theoretical framework.

The three approaches outlined above need not be seen as exclusive categories but rather as fluid constructs with overlapping approaches and perspectives.

The design assignment may be framed for design of a single building or a group of at least three to five buildings. The total built up area should be between 500 and 1000 sqm.

The focus should be on a clear and demonstrable design process. The design portfolio should focus on communicating the process along with the product.

COURSE OBJECTIVES :

1. To understand the role of context in all the implications of the term (Cultural, Social, Architectural or focused on Climate) in the design of buildings
2. To define architectural language of a building in terms of Building massing, material palette, and articulation of openings
3. To understand importance of developing a program for outdoor areas and design the interface of built and open.

BROAD COURSE OUTCOMES :

At the end of the course the students are expected to develop:

1. Ability to design and discuss built form in terms of its massing, materiality and articulation.
2. Ability to communicate the process and the final solution using graphical, verbal and written communication.
3. Ability to frame a design challenge and use that as a guide to solve the design problem.
4. Any two outcomes from the following based on the approach selected :

A. Context based
   i. Ability to analyse a given context and represent it using graphical tools
   ii. Ability to use various strategies of responding to context to generate a range of design ideas and make informed choices.

B. Issue based
   i. Ability to identify and define an issue and its architectural implications
   ii. Ability to respond to the issue using the tools of design

C. Theory based
   iii. Ability to understand a theoretical perspective and discuss it in the context of the design assignment
   iv. Demonstrate the understanding of a theoretical perspective by its application to a given design problem

COURSE CONTENTS :

The design assignment should cover outcomes related to each of the following units:

Unit 1:Design of transition spaces

1. Analyse transition spaces as a series of design moves
2. Demonstrate the design of transition spaces using various elements of space making.

Unit 2:Building Form

1. Discuss the built form by applying the ideas of order, scale, and proportion
2. Articulate the built form using massing, materials, and openings

Unit 3:Thermal comfort

1. To achieve thermal comfort by applying passive design strategies which will focus on – a. reducing thermal loads, b. Use of passive cooling strategies, c. Use of active but efficient cooling strategies.
2. Incorporate climate response strategies in the making of form

Unit 4:Building Services

1. To demonstrate a basic understanding of various services such as water supply, drainage, and electricity in the design of a group of buildings
2. To indicate spatial and formal allocation for various services including sizing of shafts, and other service areas
3. To incorporate requirements of fire-fighting systems in the design of a building

Unit 5:Accessible Design

1. To design for universal accessibility

SESSIONAL WORK :

It is recommended that each college define the course outcomes that are assessable through the sessional work.

Sessional work should comprise of:

1. Design proposal represented through adequate and technically drawn and presented drawings in hard copy and physical models. Digital models and visualisation may also be used.
2. The drawings and models should demonstrate the design process as well as the design solution.
3. Project argument presented as a written/graphical narrative.
4. One time bound project of two weeks duration other than the semester long design assignment and of an area between 250 to 500 sqm.

RECOMMENDED READINGS :

1. Abel, C. (2000). Architecture and identity: responses to cultural and technological change. Boston: Architectural Press.
2. Alexander, C., Ishikawa, S., Silverstein, M. (1977). A Pattern Language: Towns, Buildings, Construction. United Kingdom: OUP USA.
3. Architecture and Identity. (2008). Germany: Lit.
4. Balmer, J., Swisher, M. T. (2012). Diagramming the Big Idea: Methods for Architectural Composition. United Kingdom: Routledge.
5. Ching, F. D. K. (2015). Architecture: Form, Space, & Order. Germany: Wiley.
6. Smith, K., Guitart, M. (2013). Introducing Architectural Theory: Debating a Discipline. United Kingdom: Taylor & Francis.

BUILDING CONSTRUCTION AND MATERIALS IV		
Semester IV B.Arch.		
Course Code	2202523 (SV)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 4	Sessional (CIA 50+EA 50) Viva (INT 25+ EXT 25)	 100 50
Lecture Hours/ Week: 1	Total Marks	150
Studio Hours/ Week: 3	Total Credits	4

COURSE DESCRIPTION :

Building Construction is an important stream and part of the core subjects of Architecture. It is spread across eight semesters as Building Construction and Materials I to VIII. The subject objective is to train students progressively from simple to complex & advanced building construction technologies and materials. Building Construction and Materials III exposes students to framed Construction primarily using Reinforced Cement Concrete (R.C.C.), while semester IV deals with structural Steel Constructions and advanced form-based construction systems such as Shells and Tensile structures. The course is also aimed at establishing a relationship between form, strength and suitable construction materials.

COURSE OBJECTIVES :

1. To introduce application of steel in construction
2. To study Steel as a material, its relevant properties, types and market forms
3. To introduce non conventional re-inforced building elements and technology.
4. To introduce students to long span structural systems such as shells and tensile structures
5. To introduce students to alternate materials in Construction industry such as polymers and resins

BROAD COURSE OUTCOMES :

At the end of the Course, students are expected to develop:

1. Ability to understand steel as a building material and its application in building construction including its joinery, possibilities and limitations of steel construction and its impact on design decisions.

2. Ability to have an understanding of compression and tensile buildings such as Shells and tensile structures.
3. Ability to have an understanding about alternative constructions systems and materials.

COURSE CONTENTS :

Unit 1: Introduction to Steel and Joineries

1. Steel as chief building construction material, its types, properties, possibilities and limitations
2. Market forms of steel in building industry such as Hot rolled, Cold rolled, cast, extruded pipes, rods, plates, bars etc.
3. Various types and grades of Steel used in building industry such as - Mild steel, High Carbon steels, Cold rolled Colloidal (CRC), HYSD, TOR reinforcement steels etc.
4. Joinery and Connection in steel such as riveting, Bolting and various types of Welding.
5. Basics of steel construction using Steel Stanchions, Rolled steel Beams, trusses etc.

Unit 2: Ferrocement

1. Concept of Ferrocement as alternative membrane material, its applications, advantages, disadvantages, behavior etc.
2. Importance of structural geometry, and form exploration in Ferro-cement/ concrete construction.
3. Use of ferrocement as structural element, in envelope design and its finish
4. Introduction to various work of designers, practitioners in Ferrocement, such as Pier Luigi Nervi, Vishnu D. Joshi.

Unit 3: Shells and Tensile Structures

1. Introduction to planar structural spanning members such as Shells and Tensile membrane
2. Structural geometry, spanning, applications, possibilities and limitations of these systems.
3. Various materials employed in construction of shells and tensile structures
4. Introduction to work of Frei Otto, Felix Candella, Nervi etc.

Unit 4: Glass and Polymers (plastics) in building industry.

1. Introduction to use of glass and Ploymers in building construction
2. Various types of Glass and plastics, their properties and application in building construction.

Unit 5: Elevators and Escalators

1. Mechanical movement systems such as Elevators, Travelators and Escalators their types, working and spatial requirements
2. Basis of selection of these system, their application, and relevant building codes.

SESSIONAL WORK :

Sessional work and studio projects shall be exploring the constructional detailing along with design implications of various systems introduced in the Semester.

1. Notes and Sketches reflecting students understanding / learning on Units 1, 2, and 3.
2. Sketches and Market Survey on Units 4 and 5.
3. Studio exercises leading to Technical Drawings Sheets on Units 1, 2 and 5 (min 4 sheets).

The studio exercises to explore the forms and their geometry of shells and tensile structures. Hands-on activities and making of scaled models are encouraged in addition to the above mentioned sessional work.

RECOMMENDED READINGS :

A. Main Reference Books

1. Building Construction-Punmia, B.C., Jain, A.K., Jain, A.K.
2. Building Construction-Rangwala, S.C.-
3. Building Materials-Duggal, S.K. New Age International Publishers, New Delhi
4. Building Construction-Varghese, P.C.

B. Supplementary Reference Books, Manuals And Practice Documents

1. Building Construction Illustrated-Ching, Francis D.K.
2. Building Construction Handbook-Chudley, Roy
3. Structure in Architecture: The Building of Buildings-Salvadori, Mario & Heller, Robert Prentice Hall
4. Structure Systems-Engel, Heino
5. Design of Steel Structures-Duggal, S.K.
6. Strength of Materials / Steel Structures-Bansal, R.K.
7. Ferrocement and Laminated Cementitious Composites-Naaman, A.E.
8. Case studies and publications on works of -Pier Luigi Nervi and V. D. Joshi
9. Case-based and visual references on works of:-Frei Otto, Félix Candela and Pier Luigi Nervi
10. Tensile Structures-Otto, Frei

11. Materials and Design-Ashby, M.F. & Johnson, K.

C. Manufacturer catalogues and technical manuals

1. Manual for Saint-Gobain, Asahi India Glass, etc.
2. Transportation Systems in Buildings-CIBSE Guide D:
3. Manufacturer manuals-Otis Elevator Company, KONE and Schindler Group
4. CPWD (Central Public Works Department) Specifications for Civil Works
5. Manufacturer Technical Data for:
    i. Structural steel sections
    ii. Tensile fabric systems
    iii. Glass façade systems
    iv. Elevator systems

D. Indian Standards And Codes

1. Bureau of Indian Standards (BIS)
    i. IS 800: General Construction in Steel – Code of Practice
    ii. IS 875: Design Loads
    iii. IS 1893: Earthquake Resistant Design
2. National Building Code of India (NBC), 2016
    i. Part 4: Fire & Life Safety
    ii. Part 8: Building Services (Section – Vertical Transportation)

STRUCTURES IV		
Semester IV B.Arch.		
Course Code	2202524 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 50+EA 50)	100
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credits	3

COURSE DESCRIPTION :

Structures I to IV are designed to equip students with a comprehensive understanding of the safety, serviceability, and stability of structural systems. The course series enables learners to comprehend the fundamental structural behaviour of buildings and components, identify various modes of structural failure and explore appropriate remedial measures, estimate sizes of key structural members based on structural strength and loading systems, and employ appropriate materials, geometry, and support systems efficiently for the optimal structural performance.

COURSE OBJECTIVES :

1. To understand the behaviour of gravity and RCC cantilever retaining wall, basement walls.
2. To evaluate the stability of RCC cantilever retaining wall.
3. To estimate sizes of steel structural members – girders, stanchions, purlins, tension and compression members of truss.
4. To analyse the structural system for long-span structures
5. To analyse the structural system for high-rise structures.
6. To implement the structural logic for placement of steel structural members in a building.

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to understand structural behaviour of retaining wall and basement walls.
2. Ability to evaluate stability of RCC cantilever retaining wall.
3. Ability to estimate size of steel girders and purlins.

4. Ability to estimate size and geometry of steel stanchions.
5. Ability to analyse truss.
6. Ability to estimate size of tension and compression members of a truss.
7. Ability to analyse structural system for long-span and high-rise structures.
8. Ability to place steel structural members as per requirement in plan.

COURSE CONTENTS :

Unit 1:

1. Retaining wall – Structural actions on gravity and cantilever retaining wall, proportioning* of gravity wall and RCC cantilever retaining wall. Stability check of RCC cantilever Retaining wall only.
2. Basement walls – structural actions

Unit 2:

1. Introduction to steel construction – load transfer from slab panels to steel framing to stanchions -> footing -> ground. Load transfer within steel truss, from truss to stanchion-> footing-> ground. Introduction to welded and bolted connections. Commonly used steel sections for girder, stanchion, purlin, sling, struts. Introduction to steel table & IS800.

Unit 3:

1. Steel girders – Design calculations only to find the section size based on BM. Steel stanchion – Design calculations only to find the section size. Purlin – calculation of size. Concept of girders and stanchions with added plates, Design of compound stanchion only for section size and geometry. Introduction to lacing and battening theory only.

Unit 4:

1. Analysis of Truss, Tension member – size calculation, Compression member – Size calculation
2. Structural actions in Portal frame

Unit 5:

1. Different structural systems- Roofing – structural actions in truss, arch, dome, vault, folded plate, tensile structures; Structural actions in long span elements- prestressed girder, plate girder, castellated girder, structural actions in tall and heavy columns - compound stanchion, structural system for high rise and Skyscrapers – braced frames, tube in tube, bundled tube, outrigger system, diagrid system.

SESSIONAL WORK :

All topics of the syllabus must be included in following assignments

1. Steel framing building with trussed roof:
    i. Make a drawing and indicate structural framing in plan and elevation, including position of purlin, type of truss, position of stanchion and girder.
    ii. For the same building, design
        a) Any one purlin,
        b) Any one tension member of truss and any one compression member of truss
        c) Any one girder
        d) Any one stanchion
2. Assignment based on case study- A case study for structural system to identify and analyse the structural system
3. Minor Assignments – Any two assignments based on topics mentioned in the above Units.
4. Minimum two tutorials to cover all the topics in the above Units.

RECOMMENDED READINGS :

1. Design of steel Structures by Prof. V.N. Vazirani and Dr. M. M. Ratwani
2. Design of Steel structures by S.S. Bhavikatti
3. Design of steel Structures by L.S. Negi

BUILDING SERVICES II		
Semester IV B.Arch.		
Course Code	2202525 (SV)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 25 + EA 25) Viva (INT 25 + EXT 25)	 50 50
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credit	3

COURSE DESCRIPTION :

Building services are essential components of buildings that make the building usable for various human activity and comfort. Building services have become complex with the increasing complexity and scale of buildings. The subject of Building Services is spread over four semesters and increases in scope and complexity in correspondence with the scope of the subject of Architectural Design. Semester IV deals with lighting and electrification of buildings including lighting standards, and illumination design based on calculations A supplementary unit of plumbing for mid-rise buildings is also included along with a unit on solid waste management. This subject needs adequate exposure to the market to understand the basic and advanced fittings and appurtenances needed for providing these services.

COURSE OBJECTIVES :

1. To acquire knowledge, skills, and practices of essential building services for the effective functioning and utility of the building as a "whole" unit/entity.
2. To encourage the integration of building services into the architectural design of high rise buildings.
3. To be cognizant of the solid waste scenario, and to understand the management of the solid waste at building and city level.
4. To understand the Day Lighting, Artificial Illumination and its application in buildings.
5. To know about basic laws and terminologies related to electrical services in buildings, Electrical requirements for given situation, its calculations and design.

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to explain and demonstrate an integrated design approach for day-lighting through passive design strategies, methods for predicting daylight and new technologies to access and control daylight
2. Ability to work out the process of electrical installations in a building focusing on wiring systems, control and safety devices through a detailed drawing as well required calculations
3. Ability to know about principles of waste management for organic and in-organic materials, focusing on collection, treatment and disposal.
4. Awareness of best practices for solid waste management.

COURSE CONTENTS :

Unit 1 : Water supply & Drainage

1. Requirement, Storage and distribution of water in building premises
    i. -Sizing of Water tanks, space and structural provisions etc.
    ii. -Submersible and non-submersible Pumps and applications
    iii. -Storage and Distribution in midrise buildings
2. Pipes and piping network with Joinery, Installation techniques
    i. Techniques of Vertical drainage system in shafts, ducts and external face of midrise buildings: Study of service Shafts, Ducts etc.

Unit 2 : Solid Waste Management

1. Collection- Garbage chutes and space requirement for manual mechanism
2. Treatment and Disposal -Introduction to Sustainable solid waste management such as vermicomposting, organic waste composters, practices at various level- small residential to campus level and space requirements on site and in building.
3. Introduction to Types of solid waste, the collection, treatment and disposal of organic and in-organic waste, Bio-Gas plant and its functioning; requirements as per bye laws.
4. Introduction to City Level Rules and Regulations related to solid waste management- Integrated solid waste management (ISWM)

Unit 3: Natural Lighting

1. Introduction to integrated design approach for daylighting to cover daylight factor, daylight factor standards, components of daylight factor, functional objectives of daylight
2. Choice of glazing material with reference to natural lighting
3. Advanced technologies to access and controlling daylight

Unit 4 : Illumination

1. Lighting fundamentals - Luminous intensity, Luminous flux, Illuminance etc.
2. Introduction to different sources of light, their characteristics (CRI, Color temperature and lamp life, energy consumption)
3. lighting systems (Direct Indirect & diffused) and their design considerations & applications in building projects
4. Lumen Method for designing appropriate illumination design as per Standards and Codes

Unit 5 : Electrification

1. A brief introduction to types of generation of electrical energy – conventional and nonconventional.
2. Electrical installations in a building from the supply company mains to individual outlet points including meter board, distribution board, circuits, and layout of points with load calculations as per bye laws.
3. Electrical wiring systems for single and triple connections including different materials involved
4. Provisions of Electrical Installations for Multistoried Building
5. Electrical control and safety devices – switches, fuse, circuit breakers, earthing, lightning conductors etc.
6. Introduction to alternative sources of energy such as Solar PV and integration in building design

Unit 6 : Low Voltage network systems

1. Introduction to Low Voltage electrical systems and its integration in BMS –
    i. Wi-Fi and LAN network EPABX & Telecommunication system
    ii. CCTV (Closed circuit TV and camera system)
2. Access systems (Access control, Tracking, planning and provisions made)
3. Concept of intelligent building and use of AI

SESSIONAL WORK :

Sessional work should be planned to cover all the above-mentioned units. Minimum 1-2 assignments should be planned based on each unit. Assignments should include hand-drafted/drawn sheets, Visits to construction sites and preparing site visit reports.

Focus of the drawing should be on location, space provisions as per norms with necessary details also student should be able to understand drawings received from MEP Consultants.

1. Market survey based on all units above focusing on application and current trends reflected in the below mentioned drawings

2. Preparing water supply and drainage layouts for a midrise building with appropriate system showing provision of rain water harvesting
3. Preparing internal electrical layouts and lighting plan of a building interior supported with necessary calculations
4. Information to understand load calculations, billing calculation and solar PV installation

RECOMMENDED READINGS :

1. National Building Code of India 2016-Volume 2 , Bureau of Indian Standards
2. Ashok L. Chhatre (2015) Building Services and Equipments , Nagpur Priyadarshini Institute of Architecture and Design Studies
3. Admir Jukanovic,(2018) Architectural Lighting Design: A Practical Guide, The Crowood Press Ltd
4. Basics Lighting Design Ed. by Bielefeld, Bert
5. Ching Frances D K(2001) Building Construction Illustrated Wiley,
6. Benjamin Evans (1981)Daylight in Architecture- McGraw-Hill Inc. US
7. Hervé Descottes and Cecilia Ramos.(2011) Architectural Lighting: Designing with Light and Space (Architecture Briefs),
8. Any other learning resources as and when recommended by faculty.

HISTORY OF ARCHITECTURE II		
Semester IV B.Arch.		
Course Code	2202526 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 50+EA 50)	100
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credits	3

COURSE DESCRIPTION :

History of Architecture I, II and III helps students to understand Architecture as a process as well as a product of several variables such as the geographic, socio-eco-cultural, political, aesthetic, and structural. The overarching aim is to teach students to work 'with' history of architecture in the design studios. This subject is seen as a decision making tool for design thinking.

History of Architecture offers a comprehensive exploration of architectural history, tracing the evolution of built environments from early civilisations to contemporary buildings. The course exposes students to various cultures across the world with salient examples of their architecture demonstrating the evolution of architecture across space and time.

The subject covers the breadth of historical architecture of the world with an emphasis on the architecture in India. The content is presented in 5 approximate slices of time in Sem III and IV. Contents of the Units mention the broad category of historical architecture to be studied. These are to be expanded with relevant and adequate examples as needed. The Units have been arranged geographically for convenience of instruction. However, the intention is also to give a comparative view of architecture synchronous with each other.

The History of Architecture other than serving as a window to the world's significant buildings can also be used as a tool for aiding design decision making through precedent studies. It also is a rich resource for developing critical thinking through interpretation of history through various standpoints. While History of Architecture in Sem VI will deal with critical thinking, it is recommended that History of Architecture in Semester III and IV and V is taught keeping in mind the aspects of design decision making like those mentioned below:

1. Geometry, ideal dimensions, proportioning systems, diagrams
2. Structural systems, Form Development, materials, details
3. Settings, Urban planning and urban design, landscape design
4. Art, Craft, literature, philosophy and other influences
5. Archetypes and theoretical arguments

COURSE OBJECTIVES :

1. To understand architecture as a process as well as a product of several variables
2. To understand evolution of the built environment from the pre-historic to vernacular and high-style architecture
3. To provide exposure to various cultures across the world as expressed in their built environment
4. To develop a comparative understanding of architecture at a given time across cultures.
5. To understand historical buildings are precedents for design decision making especially in relation to aspects mentioned above in the Course Description.

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to identify buildings as a product of space, time and people
2. Ability to understand the chronological development of architecture
3. Ability to compare parallel developments of architecture in any given period.
4. Ability to analyse historical buildings for various aspects used in design decision making.
5. Ability to record the experience of visiting a historical site through various media

COURSE CONTENTS :

A general understanding of the world geography and broad historic timeline is essential to understand the relationship between the contents of the Units.

Architecture @ 1100 CE to @ 1500 CE

Unit 1:

1. Architecture in Americas, Japan, China, South East Asia

Unit 2:

1. Gothic and early Renaissance architecture

Unit 3:

1. Pre-Mughal Islamic architecture in India

Architecture @ 1500 CE to 1800 CE

Unit 4:

1. Renaissance and Baroque architecture

Unit 5:

1. Mughal architecture

Unit 6:

1. Regional architecture under the Rajputs, Marathas, Vijaynagar, and other dynasties

SESSIONAL WORK :

It is recommended that each college clearly define the intended learning outcomes for all Units specified in the course contents. These outcomes shall be made measurable and assessable through the following sessional work.

1. Analytical and/or Creative Assignments: Analytical drawings illustrating building typologies, spatial organization, and structural systems and any aspects of design mentioned in the Course Description. At least one assignment on each Unit.
2. Two tutorials based on the contents of the units mentioned above.
3. Site visit and report: At least one guided site visit to a site related to contents of any of the units mentioned above with a report by each student documenting site observations, photographs, and sketches/drawings.

It is recommended to conduct a tour to cover a variety of historical sites and buildings between the two semesters of II Year B.Arch.

RECOMMENDED READINGS :

1. Anderson, Christy. Renaissance Architecture.Oxford University Press, 2013
2. Asher, C. B. Architecture of Mughal India. Cambridge: Cambridge University Press. 1992.
3. Brown, P. (n.d.). Indian Architecture: Islamic. Delhi: Kiran Book Agency.
4. Ching, Francis D K, Mark Jarzombek, Vikramaditya Prakash. A Global History of Architecture. John Wiley and Sons, 2011.
5. Dengle, Narendra; Sagare, Minal; Sahasrabudhe, Chetan; SOHONI, PUSHKAR. Architecture in Maharashtra tradition and journey-Vol 1-2. Maharashtra State Board for Literature and Culture. 2024

6. Dhongde, S. R., & Ranade, J. (2009). Aurangabad: Culture, Art, Architecture. Aurangabad: INTACH Aurangabad Chapter.
7. Fergusson, J. History of Indian and eastern Architecture. London: John Murray. 1891
8. Fletcher, Sir Banister and Dan Cruickshank. Sir Banister Fletcher's A History of Architecture on the Comparative Method. Architectural Press, 1996.
9. Juneja, M. Architecture in Medieval India. Delhi: Permanent Black. 2008
10. Kanhere, G. K. Temples of Maharashtra. Mumbai: Maharashtra Rajya Sahitya va Sanskriti Mandal. 1989.
11. Kanhere, G. K. Temples, Wadas, and Institutions of Pune: A Legacy and Symbolism in Architecture. Pune: BNCA Publication Cell. 2013.
12. Koch, E. Mughal Architecture. New York: Midpoint Trade Books.2014.
13. Mate, M. S. Islamic Architecture of the Deccan. Pune: Deccan College Research Institute.1961.
14. Mate, M. S. Maratheshahi Vastushilpa. Pune: Continental Prakashan. 2008
15. Michell, G., & Zebrowski, M. (1999). Architecture and Art of the Deccan Sultanates. Cambridge: Cambridge University Press.
16. Sohoni, P. The Architecture of a Deccan Sultanate. London: I.B.Tauris.2018.
17. Tadgell, C. The History of Architecture in India. London: Phaidon.1994.
18. Tillotson, G. The Rajput Palaces. Delhi: Oxford University Press.1999.

ENVIRONMENTAL SCIENCE		
Semester IV B.Arch.		
Course Code	2202527 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 3	Sessional (CIA 50+EA 50)	100
Lecture Hours/ Week: 1	Total Marks	100
Studio Hours/ Week: 2	Total Credits	3

COURSE DESCRIPTION :

The course on Environmental Sciences aims to develop environmental literacy amongst students, enabling them to recognise the interconnectedness of built and natural systems and to design with ecological sensitivity. The emphasis of the course is on understanding contextual relationships, life cycle thinking, circularity of resources, and optimisation of resources through design.

COURSE OBJECTIVES :

1. To understand basic environmental principles and their significance to the design of the built environment.
2. To explore the impact of human settlements on ecosystems at multiple scales.
3. To introduce the concepts of life cycle assessment and resource circularity and optimisation in design.
4. To create awareness about environmental frameworks, legislation and policies.
5. To nurture observation, analysis, and contextual response to the environment as design tools.

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to identify ecological patterns and processes in a given geo-climatic context.
2. Ability to understand concepts of life cycle and circularity in evaluating materials and systems.
3. Ability to understand environmentally responsible strategies for architecture.
4. Ability to analyse the environmental impact of the built environment.
5. Ability to discuss environmental frameworks, legislation and policies.

6. Ability to inculcate environmental sensitivity in themselves as an essential aspect of responsible design.

COURSE CONTENTS :

Unit 1: Introduction to Environmental Science & Contextuality

1. Understanding the multidisciplinary nature of environmental science and its significance in creating built and unbuilt environments.
2. Contextuality: Understanding the local climate, culture, geography, and different ecosystems and bio–diversity in different geo-climatic zones of India.

Unit 2: Natural Resources & Life Cycle Assessment (LCA) of Building Material

1. Types of resources: renewable & non-renewable.
2. Depletion, conservation, and responsible utilisation of resources
3. Life Cycle Assessment (LCA): introduction and methodology (Life cycle stages: material extraction, manufacturing, transportation, use, and disposal.) Embodied energy, carbon footprint of buildings, Material Passport
4. Understanding Circularity – Refuse, Reduce, Reuse, Recycle and closing resource loops.

Unit 3: Environmental Pollution & Impact of Built Environment

1. Types of pollution: air, water, soil, noise, light.
2. Climate change, Urbanisation and environmental degradation.
3. Impact of construction activities on environment

Unit 4: Introduction to Environmental Legislation

1. Global and National Legal frameworks, policies, and bodies
2. Introduction to EIA - Environmental Impact Assessment

Unit 5: Introduction to Sustainable Building Practices

1. Traditional Sustainable Building practices
2. Community-led environmental initiatives
3. Introduction to various Building Rating Systems

SESSIONAL WORK :

It is recommended that each college defines the outcomes of the Units specified in the Course Contents. These outcomes need to be assessable through the following sessional work:

1. Field visits to hills, lake side, forest, river side, scrub land etc. for observation and identification of biotic and abiotic components of the ecosystem covering Unit 1
2. Case studies in architecture to understand resource circularity covering Unit 2
3. Life Cycle Assessment (LCA) of a common building material and building components covering Unit 2
4. Case studies highlighting impact of construction activities on environment covering Unit 3
5. Studio discussion and short write up including summary and inferences based on above topics covering Unit 4
6. A studio discussion followed by a concise write-up summarizing the topics from Unit 5 and presenting the key observations and conclusions.

Emphasis of the assignments should be on quality of observation, depth of analysis, and contextual application.

Assessment should be based on understanding of core concepts and their application in design, demonstration of the same through comprehensive documentation and/or analytical write ups/ reports/ infographics

RECOMMENDED READING :

1. Pandey, G. N. (2015). Environmental Management. Vikas Publishing.
2. Bharucha, Erach. (2005). Textbook of Environmental Studies for Undergraduate Courses. University Grants Commission (UGC). (Ideal for foundational Indian context.)
3. Yeang, Ken. (1995). Designing with Nature: The Ecological Basis for Architectural Design. McGraw Hill.
4. Divan, S., & Rosencranz, A. (2002). *Environmental Law and Policy in India: Cases, Materials and Statutes.* Oxford University Press.
5. Oliver, P. (Ed.). (2006). *Built to Meet Needs: Cultural Issues in Vernacular Architecture.* Architectural Press.
6. Life Cycle Assessment (LCA) of Environmental and Energy Systems. (2021). Switzerland: MDPI.
7. Urban Pollution: Science and Management. (2018). United Kingdom: Wiley
8. Ecology and Sustainable development - Working with knowledge systems - P.S. Ramakrishnan (2023) National Book trust India Available at: https://www.nbtindia.gov.in/
9. Ecosystems of India (2001) Alfred, J. R. B; Das, A. K. (Asok Kumar); Sanyal, A. K; ENVIS Centre (Zoological Survey of India)
10. What is life cycle analysis (LCA)? - https://www.rit.edu/sustainabilityinstitute/blog/what-life-cycle-assessment-lca Books on Mud and Brick by COSTFORD
11. The Marvelously Muddy - COB by Saurabh Phadke \

12. Wrong Theory by Girish Abhyankar
13. Environmental Science: Earth as a Living Planet by Daniel B. Botkin and Edward A. Keller
14. Climate Responsive Architecture ,2017 by Arvind Krishan
15. Handbook of Environmental Law in India (2nd Edition) P.B. Sahasraanaman
16. EIA Pdfs - MoEFCC
17. Permaculture , A Designers Manuel , Bill Mollison
18. State of India’s Environment 2024- (Down To Earth)
19. Various online references

INDIAN KNOWLEDGE SYSTEMS ELECTIVE		
Semester IV B.Arch.		
Course Code	2202528 (SS)	
Teaching Scheme	Examination Scheme	
Total Contact Hours/ Week: 2	Sessional (CIA 25+EA 25)	50
Lecture Hours/ Week: 1	Total Marks	50
Studio Hours/ Week: 1	Total Credits	2

COURSE DESCRIPTION :

The Indian knowledge system is regarded as a vast repository of knowledge and wisdom, with a strong philosophical foundation and practical applications. It encompasses diverse disciplines that govern multiple aspects of human life and existence, such as philosophy, astronomy, medicine, mathematics, art, and aesthetics. The elective course aims to provide a comprehensive overview and understanding of the traditional wisdom embedded in the creation of the built environment.

This is a professional elective subject and offers choices to students so as to enable them to gain an insight of a particular aspect of the broad field of Indian Knowledge Systems pertaining to the built environment. Themes from traditional and vernacular architecture, including the knowledge of materials, building techniques, and crafts, as well as landscape, interiors, environment, planning, and cultural contexts, are a part of this subject. The colleges expected to design their content under any selected topics listed below.

COURSE OBJECTIVES :

1. Understand the essence, principles, and values of Indian traditional knowledge systems (ITKS).
2. Promote critical appreciation of traditional materials, construction systems, and design philosophies.
3. Explore indigenous architectural practices and their relevance to sustainability and contemporary practice
4. Investigate the cultural, environmental, and spiritual dimensions of traditional Indian built environments.
5. To develop an inquiry and analyze the governing interdisciplinary relationships (space, cosmos, literature, philosophy, art, etc)

BROAD COURSE OUTCOMES :

At the end of the course, the students are expected to develop:

1. Ability to understand the Indian traditions in architecture with respect to concepts, practices, and buildings.
2. Ability to understand buildings as embedded in their cultural context.
3. Ability to grasp the long building tradition in India.

COURSE CONTENTS :

A list of suggested courses is given below. Colleges may choose to offer courses from this list. Each student is expected to complete one of the courses through the entire semester. Each course may aim at a three-fold understanding of the subject through the Indian perspective of knowledge *Dṛṣṭiḥ* (perspective), *Paramparā* (tradition), *Laukikaprayojanam* (practical utility). The courses intend to highlight the significance of culture, context, and values in creating a physical setting for human beings.

1. 'Jeernoddhar'
2. 'Vastushastra'
3. Architectural Heritage of India
4. Architecture of Forts
5. Architecture of Water-related Structures
6. Indian Crafts
7. Indian Texts on Architecture
8. Indian Towns and Settlements
9. Temple Architecture
10. Traditional Building Crafts
11. Traditional Indian Landscapes
12. Vernacular Architecture

SESSIONAL WORK :

Total no of assignments: 3 (One Major, one Minor assignment, and a tutorial). One assignment to be based on a field visit / onsite work.

RECOMMENDED READINGS :

A list of recommended readings should be prepared by each college depending on the courses they offer and the scope and emphasis of the selected courses.