Annexure IV

**SECOND YEAR FOURTH SEMESTER**

**1. Building Construction – III (Code – 21242201)**

**Objectives –**

The course aims to obtain knowledge about doors, windows, different types of materials and their use in construction, the different waterproofing, damp proofing materials & technology available & their application, the vertical transportation designing & detailing

| S. No. | Course Code | Category Code | Course Name | Maximum Marks Allotted | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Learning | Mode of Exam. | Duration of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Block | | | | Practical Block | | | | | | | | | |
| | | | | Continuous Evaluation | | | Major Evaluation | Continuous Evaluation | Major Evaluation | | L | T | P | | | | |
| | | | | Minor Evaluation I | Minor Evaluation II | Quiz/ Assignment | | Lab Work & Sessional | | | | | | | | | |
| 1. | 21242201 | BSC | Building Construction III | 25 | 25 | 20 | 30 | - | - | 100 | 2 | - | - | 2 | Face to Face | PP | 3 Hr |

**UNIT-1 BUILDING MATERIALS**

Ferrous and Non-Ferrous metals & Plastics

• Properties and uses: Aluminum, zinc, lead, copper.

• Properties and Architectural uses of plastics: Thermoplastics, thermosetting plastics and, Structural plastics – Reinforced plastics and Decorative laminates-plastic coatings, Adhesives, and sealants – Modifiers and Plasticizers – Fabrications of plastics.

• Primary plastic building products for walls, roof, and partitions.

**UNIT- 2 DETAILS OF DOORS, WINDOWS & VENTILATORS**

• Timber Doors and its Joints: Single, double-leaf, ledged braced & battened door, framed ledged braced battened door, Paneled door, flush door, and Composite door.

• Timbers Windows & ventilators: Casement(side hug & top hug), Sliding pivoted (horizontal and vertical) folding and bay windows, fixed light of different sizes and shapes.

• Combined doors and windows and ventilators.

**UNIT-3 STAIRCASES AND LIFT**

• Staircases: Types according to profile–straight flight, dog legged, quarter-turn half-turn, bifurcated, spiral & Helical.

• Lift: Vertical transportation. Types and details.

**UNIT-4 DAMP PROOFING AND WATERPROOFING**

• Damp proofing: Hot applied and cold-applied–Emulsified asphalt, Bentonite clay. Butyl rubber, silicones, Vinyl's, Epoxy resins and metallic waterproofing materials, their properties, and uses.

• Waterproofing: waterproofing membranes such as rag, asbestos, glass felt, plastic and synthetic rubber vinyl, butyl rubber, neoprene, polyvinyl chloride – prefabricated membranes sheet lead, asphalt their properties and uses.

• Application: Application of the above in the basement floor, swimming pool, and terraces.

**UNIT-5 CLADDING SYSTEMS & FINISHES**

• Types of Cladding systems – Stone, timber, weatherboard, Fiber cement, Brick, Vinyl, Metal (aluminum composite panels (ACP), Precast concrete cladding panel, Curtain wall, Rain screen wall system. Exterior insulation & Finishes.

| COs & LOs for Building construction-II | | | |
|---|---|---|---|
| Overall Course Outcome: Students will be able to **understand** the knowledge about doors, windows, different types of materials and their use in construction, the different waterproofing, damp proofing materials & technology available & their application, the vertical transportation designing & detailing. | | | |
| CO1 | Students will be able to **understand** the role of metal in structure technology . | LO1 | **Remember** basic concepts metal, and its uses. |
| | | LO2 | **Learn** the properties of different metals. |
| | | LO3 | **Understand** its uses in the architecture industry. |
| | | LO4 | **Analyze** the types of Reinforced plastics and Decorative laminates-plastic coatings, Adhesives, and its uses. |
| | | LO5 | **Evaluating** its role for rooms, windows, roof lights, domes, gutters, and handrails.. |
| CO2 | Students will be able to **demonstrate and apply** their understanding in design and detailing of doors, windows & ventilators. | LO1 | **Remember** basic concepts regarding detailing of doors, windows & ventilators. |
| | | LO2 | **Learn** its types according to uses. |
| | | LO3 | **Understand** the detailing of doors, windows & ventilators. |
| | | LO4 | **Analyze** the various types of doors, windows & ventilators, their extensive uses in building construction. |
| | | LO5 | **Draw** all the elements of doors, windows & ventilators. |
| CO3 | Students will be able to **demonstrate and apply** their understanding in design and detailing of staircase & lifts. | LO1 | **Remember** basic concepts regarding detailing of R.C.C staircases and masonry. |
| | | LO2 | **Learn** its types according to profile. |
| | | LO3 | **Understand** the detailing of staircases and Lift. |
| | | LO4 | **Analyze** the various types of staircases and masonry, their extensive uses in Building construction. |
| | | LO5 | **Draw** all the elements of staircases and lifts. |
| CO4 | Students will be able to **analyze** damp proofing and waterproofing in the building with its application. | LO1 | **Learn** basic concepts about damp roofing & waterproofing. |
| | | LO2 | **Understand** its various types of damp roofing. |
| | | LO3 | **Apply** it on a given live project. |
| | | LO4 | **Analyze** the market survey of different types of damp roofing & waterproofing material available in the market. |
| | | LO5 | **Evaluating** through case studies and drawings of selected building types. |
| CO5 | Students will be able to **analyze different** cladding systems and finishes for the building. | LO1 | **Learn** basic types of cladding material. |
| | | LO2 | **Understand** its uses on a project. |
| | | LO3 | **Apply** it on a given live project. |
| | | LO4 | **Analyze** the market survey of different types of cladding material available in the market. |
| | | LO5 | **Evaluating** through case studies and drawings of selected building types. |

**REFERENCES:**


1 . W.B. Mckay – Building construction Vol. 1 (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition)

2. R.Chudley & R.Greeno – Building Construction Handbook, ninth edition
3. S.C. Rangwala – Engineering materials (Fortieth edition) – Charotar Publishing pvt.ltd
4. P.C Varghese, “Building Materials”, Prentice Hall of India Pvt. Ltd., New Delhi, 2005
5. Use of Bamboo and Reeds in building Construction – UNO Publications
6.


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

1- Slightly, 2- moderately, 3- Substantially

## 2. Building Services-II (Electrical & Mechanical) (Code – 21242202)

**Objectives –**

The course aims to obtain knowledge of various services in a building such as electrical, illumination, etc., an understanding of layouts of electrical, plumbing, AC ducts, lighting, etc., Air conditioning system and its working.

| S. No. | Course Code | Category Code | Course Name | Maximum Marks Allotted | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Learning | Mode of Exam. | Duration of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Block | | | | Practical Block | | | | | | | | | |
| | | | | Continuous Evaluation | | | Major Evaluation | Continuous Evaluation | Major Evaluation | | L | T | P | | | | |
| | | | | Minor Evaluation I | Minor Evaluation II | Quiz/ Assignment | | Lab Work & Sessional | | | | | | | | | |
| 2 | 21242202 | BSC | Building Services II | 25 | 25 | 20 | 30 | - | - | 100 | 2 | 1 | - | 3 | Face to Face | MCQ | 2 Hr |

**UNIT-1 ELECTRICAL SERVICES**

Electrical systems – Basic of electricity – single/Three phase supply , Electrical installations in buildings – Types of wires, Wiring systems and their choice, planning electrical wiring for building – Main and distribution boards, HT transformers, electrical panel rooms, cable trenches, controls, Circuits, fuses, main switch box, meter box, circuit breakers. Uninterrupted power supply, inverters, protective devices in electrical installation – Earthing for safety – Types of earthing – ISI Specifications, Lighting protection Electrical installations in various building types, Residential bungalow, apartments, commercial recreational buildings and factory buildings etc. Market survey of Electrical materials and electrical appliances.

**UNIT-2 ILLUMINATION AND LIGHTING DESIGN**

Principles of Illumination: Basics of Lighting Technology and Terminology, Classification of lighting–Artificial light sources. Systems of lighting such as direct, indirect, diffused etc.,

Design of modern lighting: Lighting for stores, offices, schools, hospitals and house lighting.Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

Seeing light: learn about vision and perception, color, and - understanding shade and shadow Light fixture :Controlling light, luminaire optics and distributions - introduction to light fixture materialsand construction, and components Light in Architecture and the Psychology of Light,

Lighting Design Concepts, Lighting in terms of energy efficiency, ergonomic aspects and aesthetic aspects. Light a surface: Horizontal and vertical - present various approaches and techniques - finding lightfixtures. For a Task - present various approaches and techniques, simple lighting effects.

Calculating Light: learn light metrics and calculation methods - review energy and the environment Lighting calculations Lighting Design :Residential lighting, Office and Corporate Lighting, Hospitality Lighting Design, Health Care/Institutional Lighting Design, Lighting for Stores, Lighting Common Spaces

**UNIT-3 AIR CONDITIONING**

Components of an air-conditioning system & their function-Refrigeration cycle, different systems of AC, window, split, small standalone unit, and air cooled direct expansion system used for auditorium spaces, chill water systems with air handling units, estimating the cooling load of different spaces in a building with simple calculation, duct lay out for both types of systems. Intelligent building systems in air conditioning, Sick building syndrome, effect of pollutants, improving air quality in air-conditioned buildings.

**UNIT-4 PUMPS AND MACHINERIES**

Pumps: Different types of Pumps, working, applications. Water pumps, sewage pumps, Centrifugal, Reciprocating pump, turbine (diagrams & functioning only)

Compressors: Different types of Compressors and their applications.

Lifts And Escalators : Elevators (Lifts) and escalators–Brief history-types of Elevators like traction,Hydraulic etc., Double-decker, sky lobby, lift lobby, lift interiors etc., Definition and components Elevatoring a building: environmental considerations i.e., location in building, serving floors, grouping, size, shape of passenger car, door arrangement etc., Service requirements: Quality of service, quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and its typical layout Escalators – Definition, Application. Location and arrangement in buildings. Space requirement, Conveyor belts-movement of passengers and goods

**UNIT-5 ELECTRICAL AND AC DUCT LAYOUT OF SIMPLE BUILDINGS**

Fixtures and accessories used in electrical installation –Preparing an electrical layout for part of design project, with simple load calculations. Design consideration for AC plant location and size. Ac ducting layout for an office building, shopping complex etc.

**COs & LOs for BUILDING SERVICES-II**

Overall Course Outcome: The overall aim of the course is to introduce students to the various electrical and mechanical systems in building of various scales and also to make them understand electric layouts, fixtures and their sustainable applications in buildings.

| | | | |
|---|---|---|---|
| CO1 | To understand the basics of electric supply in buildings, guidelines for electric installations and safety measures | LO1 | **Understand** the principles of electricity, installation and safety in electricity supply |
| | | LO2 | **Observe** the methods of electricity supply in metropolitan areas, methods of wiring and earthing etc |
| | | LO3 | **Analyse** the guidelines for electric installations in various buildings |
| | | LO4 | **Survey** on electric materials and appliances. |
| CO2 | To learn the application of lighting design principles in design and evaluate lighting requirements using light metrics | LO1 | **Understand** the principles of lighting design, classification and systems of lighting in buildings. |
| | | LO2 | **Observe** the lighting design requirements for various buildings based on function, occupants and usage. |
| | | LO3 | **Analyse** the psychology of lighting design and concepts based on efficiency, ergonomics and aesthetics |
| | | LO4 | **Survey** on electric materials and appliances. |
| | | LO5 | **Evaluate** lighting requirement based on light metrics and calculations |
| CO3 | To evaluate the HVAC systems in buildings, their principles and methods of air conditioning | LO1 | **Define** the principles of air conditioning in buildings, types and methods of air conditioning. |
| | | LO2 | **Analyse** air conditioning requirements in different types of enclosed spaces, load calculation and |
| | | LO3 | **Identify** various systems of air conditioning in buildings and their sustainable application |
| | | LO4 | **Evaluate** the effects of air conditioning such as sick building syndrome and pollutants. |
| CO4 | To understand the functioning of various mechanical systems and their installation in buildings | LO1 | **Understand** the working of various mechanical systems in building, its classification, design considerations |
| | | LO2 | **Analyse** the environmental considerations and service requirements in installation of mechanical devices. |
| | | LO3 | **Evaluate** the space requirements, location and arrangement of mechanical devices in buildings |
| CO5 | To prepare electric layouts and HVAC layouts for large buildings | LO1 | **Evaluate** the air conditioning layout of any existing building |
| | | LO2 | **Evaluate** the electrical layout of any existing building |
| | | LO3 | **Prepare** the electric layout for buildings of various scales |
| | | LO4 | **Prepare** the air conditioning layout for large buildings |
| | | LO5 | **Calculate** the power load and cooling load for various buildings |

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

1- Slightly, 2- moderately, 3- Substantially

**REFERENCES:**

1. Heating, Cooling, Lighting: Sustainable Design Methods for Architects Oct 13, 2014 by NorbertLechner DEWALT Plumbing Code Reference: Based on the 2015 International Plumbing and Residential Codes (DEWALT Series)

2. Electrical Wiring Residential Jan 1, 2011by Ray C. Mullin and Phil Simmons

3. Architectural Lighting: Designing with Light and Space (Architecture Briefs),May 4, 2011 by Hervé Descottes and Cecilia Ramos.

4. HVAC Design Sourcebook Oct 26, 2011, by W. Larsen Angel

## 3. Structures-IV (Code – 21242203)

**Objectives –**

The course aims to obtain knowledge about the structural behavior of various types of steel structural systems those are commonly employed in the building construction industry presently, methods those are used to design a steel structural system for a specific condition & loading. Interpretation of structural detail drawings in the site is also intended.

| S. No. | Course Code | Category Code | Course Name | Maximum Marks Allotted | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Learning | Mode of Exam. | Duration of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Block | | | | Practical Block | | | | | | | | | |
| | | | | Continuous Evaluation | | | Major Evaluation | Continuous Evaluation | Major Evaluation | | L | T | P | | | | |
| | | | | Minor Evaluation I | Minor Evaluation II | Quiz/ Assignment | | Lab Work & Sessional | | | | | | | | | |
| 3 | 21242203 | ESC | Structure IV | 25 | 25 | 20 | 30 | - | - | 100 | 2 | 1 | - | 3 | Face to Face | MCQ | 2 Hr |

**UNIT- 1 PROPERTIES OF STEEL SECTIONS & TYPES OF CONNECTIONS**

Introduction Properties of Indian standard rolled steel section – Use of IS 800 and steel tables – Permissible and stresses in tension, compression and shear. Connections: Welded and bolted connections – Types of failure – Design of welded and bolted connections for members subjected to axial forces. Site visit to a steel fabrication unit.

**UNIT-2 TENSION AND COMPRESSION MEMBERS**

Steel structures – Identification of tension and compression members in trusses & girders– Understanding the process of design of single angle and double angle sections in tension– understanding the method to design compression members – signify chance of Slenderness ratio– Design of simple and compound sections (Theory only) – Design of lacings and battens.

**UNIT -3 STEEL BEAMS**

Identification of principal & secondary beams in a structural system - Allowable stresses in Principal beams, General specifications for steel beams, Understanding the design process for simply supported & cantilevered beams – Comprehending the design of laterally supported beams.(Simple problems).

**UNIT-4 STEEL TRUSSES & GIRDERS**

Study of the various types of roof trusses & where a particular truss can be used – Selection of trusses according to the span – Estimation of gravity loads and wind loads on roof – Use of BIS and book SP-38 in analyzing and design of trusses – gusseted plate connections (Theory Only).

**UNIT-5 INTRODUCTION TO LONG SPAN STEEL STRUCTURAL SYSTEMS**

Space frame structural system in tubular steel – various types of connectors – single / double & triple grid space frames and the span for which they can be employed – various types of space frame configurations. Tensile structural systems using steel cables – Examples of space frame & tensile structural systems.

| **COs & LOs for Structure - III**<br>Overall Course Outcome: Students will be able to understand the structural behaviour of steel in construction of buildings and their methods of designing. | | | |
|---|---|---|---|
| CO1 | Student will be able to **understand** the behaviour of steel in construction, its forms and use in different structures | LO1 | **Learn** the common properties of structural steel |
| | | LO2 | **Identify** the types of stresses in steel construction |
| | | LO3 | **Outline** the features of IS code provisions regarding use of steel in construction |
| | | LO4 | **Evaluate** the details for welded connections in steel construction and types of failures in design of steel structure |
| | | LO5 | **Asses** the working of structural details through site visit |
| CO2 | Student will be able to **understand** the methods of designing angle sections, single and compound sections, compression members, lacings and battens | LO1 | **Identify** the types of tension and compression members in steel trusses and girders |
| | | LO2 | **Analyse** the methods of designing angle sections in tension members, compression members and design of lacing and battens |
| | | LO3 | **Outline** the features of IS code provisions for designing with steel members |
| | | LO4 | **Interpret** the working details of tension and compression members in steel construction |
| | | LO5 | **Asses** the working of design through site visit |
| CO3 | Student will be able to **comprehend** the design of principle and secondary beams in steel construction | LO1 | **Learn** the principle and secondary beams in structural systems |
| | | LO2 | **Outline** the general specifications for steel beams |
| | | LO3 | **Evaluate** the load considerations for design of beams and lintel in RCC structures |
| | | LO4 | **Interpret** the design process for cantilever and simply supported beams in steel construction and design of laterally supported beams through solving simple problems |
| | | LO5 | **Asses** the working of structural details through site visit |
| CO4 | Student will be able to **comprehend** the types, selection, estimation of load and designing of steel trusses and girders for construction | LO1 | **Understand** the use of steel girders and its types |
| | | LO2 | **Analyse** selection of trusses on the basis of span of roof |
| | | LO3 | **Outline** the features of IS code provisions for design of trusses |
| | | LO4 | **Evaluate** the various loads and typical structural details for design of steel trusses and girders along with load considerations |
| | | LO5 | **Asses** the working of structural details through site visit |
| CO5 | Student will be able to **learn** about the use of steel in construction of various long span structures | LO1 | **Classify** the types of long span structural systems in steel |
| | | LO2 | **Identify** the connectors in space frame structures and types of space frame configurations |
| | | LO3 | **Evaluate** the applications of space frame structures and tensile structures through examples |
| | | LO4 | **Interpret** the typical structural details for tubular steel and steel cables |
| | | LO5 | **Asses** the working of structural details through site visit |

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

1- Slightly, 2- moderately, 3- Substantially

**REFERENCES:**


1. Ramachandra .S Design of steel structures Vol. I, Standard publication, New Delhi, 1992
2. Vazirani V.N, and Ratwani M.M, Steel structures, Khan
3. Handbook of Typified Designs for Structures with steel roof trusses, SP 38 (S&T) – 1987, BIS, New Delhi, 1987
4. Code of practice for Earthquake Resistant Design and Construction of Buildings IS4326-1976, BIS, New Delhi.

## 4. History of Modern and Contemporary Architecture (Code- 21242204)

**Objectives –**
The course aims to obtain knowledge of Design philosophies of colonial, post independent and contemporary architecture in Indian context, modern design philosophies in the evolution of innovative architectural forms and designs, the effect of industrial revolution on architecture.

| S. No. | Course Code | Category Code | Course Name | Maximum Marks Allotted | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Learning | Mode of Exam. | Duration of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Block | | | | Practical Block | | | | | | | | | |
| | | | | Continuous Evaluation | | | Major Evaluation | Continuous Evaluation | Major Evaluation | | L | T | P | | | | |
| | | | | Minor Evaluation I | Minor Evaluation II | Quiz/ Assignment | | Lab Work & Sessional | | | | | | | | | |
| 4 | 21242204 | DC | History of Modern and Contemporary Architecture | 25 | 25 | 20 | 30 | - | - | 100 | 2 | 1 | - | 3 | Face to Face | MCQ | 2 Hr |

**UNIT-1 INDUSTRIAL REVOLUTION**
Impact of the Industrial Revolution on Architectural practices. Transformation from iron to steel and the demand for a new Architecture.

**UNIT -2 MODERNISM**
Context of Origin; Characteristics; Key Movements – Arts and Crafts, Constructivism, Bauhaus, Expressionism, International Style, Minimalism, Brutalism. Works of notable conforming Architects: Frank Lloyd Wright, Ludwig Mies van der Rohe, Le Corbusier, Walter Gropius, Oscar Niemeyer and Alvar Aalto.

**UNIT-3 DECONSTRUCTIVISM**
Origin and influences breaking away from Modernism and Postmodernism, Deconstructivist philosophy. Influence on Architectural practice; Works of notable conforming Architects: Frank Gehry, Daniel Libeskind, Rem Koolhaas, Peter Eisenman, etc.

**UNIT-4 NEO-MODERNISM AND OTHER POST-MODERN REACTIONS**
Origin and Characteristics, Other associated movements: Metamodernism, Re-modernism, Neo-futurism, Neo- Historicism. Works of Richard Meier, I.M. Pei, Tadao Ando, Zaha Hadid, and Santiago Calatrava, etc.

**UNIT-5 COLONIAL, POST COLONIAL CONTEMPORARY INDIAN ARCHITECTURE**
Architecture in colonial India and post independence, Indo-Saracenic Architecture, Modernism and Works of notable contemporary Architects.

| **COs & LOs for HOA – IV** | | | |
|---|---|---|---|
| Overall Course Outcome: Students will be able to **develop** an appreciation of various architectural movements, revolutions & styles across the globe, its chronology, typology and the resulting architectural forms that are unique in time and place. | | | |
| CO1 | Students will be able to **apply** Industrial revolution architectural expressions in their own design | LO1 | **Learn the evolution** of the Industrial revolution and its relation with architecture. |
| | | LO2 | **Understand** diverse artistic and architectural expressions in various periods of Industrial revolution. |
| | | LO3 | **Illustrate** visual and verbal vocabularies of Industrial revolution. |
| | | LO4 | **Analyze** Industrial revolution forms and space through various examples. |

| | | | |
|---|---|---|---|
| | | LO5 | **Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms and styles of Industrial revolution. |
| CO2 | Students will be able to **apply** elements of modernism style in Architecture in their own design. | LO1 | **Learn** evolution of modernism style in Architecture. |
| | | LO2 | **Understand** diverse artistic and architectural character in modernism style in Architecture. |
| | | LO3 | **Illustrate** visual and verbal vocabularies of modernism style in Architecture. |
| | | LO4 | **Analyze** modernism style in architecture through forms and space and various examples. |
| | | LO5 | **Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms of modernism style in Architecture. |
| CO3 | Students will be able to **apply** elements of Deconstructivist style in Architecture in their own design. | LO1 | **Learn** evolution of Deconstructivist style in Architecture. |
| | | LO2 | **Understand** diverse artistic and architectural character in De-constructivism style in Architecture. |
| | | LO3 | **Illustrate** visual and verbal vocabularies of De-constructivism style in Architecture. |
| | | LO4 | **Analyze** De-constructivism style in Architecture through forms and space and various examples. |
| | | LO5 | **Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms of De-constructivism style in Architecture. |
| CO4 | Students will be able to **apply** elements and concepts of Neo-modernism & Postmodernism reactions in Architecture in their own design. | LO1 | **Learn** evolution of Neo-modernism & Postmodernism reactions in Architecture. |
| | | LO2 | **Understand** diverse artistic and architectural character in Neo-modernism & Postmodernism reactions in Architecture. |
| | | LO3 | **Illustrate** visual and verbal vocabularies of Neo-modernism & Postmodernism reactions in Architecture. |
| | | LO4 | **Analyze** Neo-modernism & Postmodernism reactions in architecture through forms and space and various examples. |
| | | LO5 | **Reproduce** with help of sketches/visuals (softwares)/3D (models) of various forms of Neo-modernism & Postmodernism reactions in Architecture. |
| CO5 | Students will be able to **apply** elements of Colonial, Post-Colonial & Contemporary style in Indian Architecture in their own design. | LO1 | **Learn** evolution of Colonial, Post-Colonial & Contemporary style in Indian Architecture. |
| | | LO2 | **Understand** diverse artistic and architectural character in Colonial, Post-Colonial & Contemporary style in Indian Architecture. |
| | | LO3 | **Illustrate** visual and verbal vocabularies of Colonial, Post-Colonial & Contemporary style in Indian Architecture. |
| | | LO4 | **Analyze** Colonial, Post-Colonial & Contemporary style in Indian Architecture through forms and space and various examples. |
| | | LO5 | **Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural Colonial, Post-Colonial & Contemporary style in Indian Architecture. |

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

1- Slightly, 2- moderately, 3- Substantially

**REFERENCES:**


1. Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, London.
2. Sigfriedgiedion, .Space time and Architecture: The Grwoth of a New Tradition, Harvard University Press.
3. Tzonis Alexander, Santiago calatrova , International Publications, January 2005, New York.
4. Steele James, Hassan fathy - The complete works , London : Thames and Hudson.

## 5. Building Physics II (Code- 21242205)

| S. No. | Course Code | Category Code | Course Name | Maximum Marks Allotted | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Learning | Mode of Exam. | Duration of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Block | | | | Practical Block | | | L | T | P | | | | |
| | | | | Continuous Evaluation | | | Major Evaluation | Continuous Evaluation | Major Evaluation | | | | | | | | |
| | | | | Minor Evaluation I | Minor Evaluation II | Quiz/ Assignment | | Lab Work & Sessional | | | | | | | | | |
| 5. | 21242205 | BSC | Building Physics II | 25 | 25 | 20 | 30 | - | - | 100 | 2 | 1 | - | 3 | Face to Face | PP | 2 Hr |

Unit 1: FUNDAMENTALS OF SUSTAINABILITY & IMPACT OF BUILD ENVIRONMENT - Concepts of sustainability- definitions, key principles, and relevance in architecture, Historical evolution- timeline from traditional practices to modern sustainable development, Sustainability in architecture- relationship between sustainable development and architectural design, Global perspectives- Brundtland Report, Rio Summit, SDGs (Sustainable Development Goals), Triple Bottom Line Approach- Environmental, economic, and social sustainability in the built environment, Environmental impact of buildings- carbon footprint, ecological footprint, urban sprawl, habitat loss, Sustainable development frameworks- Agenda 21, UN sustainable development goals, Paris agreement, Climate change and urbanization- role of architecture in reducing emissions and environmental degradation.

Unit 2: SUSTAINABLE BUILDINGS, CODES & GREEN BUILDING CERTIFICATION- Defining sustainable and green buildings- features, principles, and assessment criteria, Key parameters- energy efficiency, water conservation, material sustainability, Terminologies- carbon footprint, embodied energy, LCA (Life Cycle Assessment), operational energy, National and International codes- ECSBC (India), NBC (National Building Code), IGBC, Green building rating systems- LEED, GRIHA, BREEAM, comparison of criteria, Regulatory compliance in sustainable design- Local and global policy frameworks, Performance Analysis of Certified Buildings- energy savings, carbon footprint reduction.

Unit 3: SUSTAINABLE SITE DEVELOPMENT and URBAN ECOLOGY- Site selection criteria- topography, solar orientation, access to natural resources, Urban Heat Island Effect (UHI) Mitigation- green roofs, cool roofs, reflective surfaces, vegetation, Public Transport and Walkability- Transit-Oriented Development (TOD), non-motorized transport, Stormwater management and sustainable landscaping- bioswales, retention ponds, rain gardens, Sustainable rating parameters- SRI (Solar Reflectance Index), development footprint reduction strategies, universal accessibility.

Unit 4: SUSTAINABLE MATERIALS - Material selection criteria- durability, recyclability, embodied energy, life cycle cost analysis, Green materials and construction techniques- bamboo, CSEB, hempcrete, mycelium, 3D-printed materials, Insulation and thermal performance- U-value, R- value, SHGC (Solar Heat Gain Coefficient), Material certifications- BIS-certified sustainable materials.

Unit 5: BUIDLING SIMULATION AND PERFORMANCE EVALUATION-Introduction to building energy simulation tools: Autodesk Ecotect/ Equest, Climate Consultant, OpenStudio, EnergyPlus (conceptual understanding, Reading simulation outputs: heat gain/loss, daylight, ventilation patterns, Case studies of climate-responsive buildings using simulation tools ,Assignment: Creating a basic climate-responsive design report using digital tools

| **COs & LOs for** Building Physics II**(Code –21252205)** | | | |
|---|---|---|---|
| **Overall Course Outcome**: The course aims to obtain knowledge to understand, analyse, and apply principles of sustainability in architecture through climate-responsive design, green building standards, sustainable site development, material selection, and building performance simulation to create environmentally responsible and energy-efficient built environments. | | | |
| **CO1** | Students will be able to understand and analyse the fundamental concepts of sustainability and evaluate the impact of the built environment through global frameworks and environmental performance parameters. | **LO1** | **Explain** the Settlement pattern in village and socio-cultural, geographic and economic aspects that shape the built environment. |
| | | **LO2** | **Understand** the historical evolution of sustainability—from traditional practices to contemporary global sustainability movements. |
| | | **LO3** | **Analyse** the environmental, social, and economic impacts of the built environment, including carbon footprint, ecological footprint, and habitat loss. |
| | | **LO4** | **Interpret** global sustainability frameworks such as the Brundtland Report, Rio Summit, SDGs, Agenda 21, and the Paris Agreement in relation to architectural practice. |
| | | **LO5** | **Evaluate** the role of architectural design in mitigating climate change, reducing emissions, and promoting sustainable urban development. |
| **CO2** | Students will be able to understand and evaluate sustainable building principles, codes, and certification systems, and analyse their role in enhancing environmental performance through compliance and rating frameworks. | **LO1** | **Explain** the features, principles, and assessment criteria that define sustainable and green buildings. |
| | | **LO2** | **Describe** key sustainability parameters such as energy efficiency, water conservation, material sustainability, carbon footprint, embodied energy, and life cycle assessment. |
| | | **LO3** | **Analyse** national and international sustainability codes including ECBC, NBC, IGBC, and compare global green building rating systems such as LEED, GRIHA, and BREEAM. |
| | | **LO4** | **Interpret** regulatory compliance requirements and policy frameworks that govern sustainable building design at local, national, and global levels. |
| | | **LO5** | **Evaluate** the performance of certified green buildings in terms of energy savings, operational efficiency, and carbon footprint reduction. |
| **CO3** | Students will be able to understand and evaluate sustainable site development principles and urban ecological strategies to enhance environmental performance, resilience, and accessibility in the built environment. | **LO1** | **Explain** site selection criteria including topography, solar orientation, and access to natural resources for sustainable development. |
| | | **LO2** | **Describe** urban heat island mitigation strategies such as green roofs, cool roofs, reflective surfaces, and landscape-based solutions. |
| | | **LO3** | **Analyse** sustainable mobility concepts including public transport integration, walkability, and Transit-Oriented Development (TOD). |
| | | **LO4** | **Interpret** stormwater management and sustainable landscaping techniques such as bioswales, rain gardens, retention ponds, and permeable surfaces. |
| | | **LO5** | **Evaluate** sustainable rating parameters including Solar Reflectance Index (SRI), development footprint reduction strategies, and universal accessibility in site planning. |
| **CO4** | Students will be able to Understand and evaluate sustainable material selection, performance characteristics, and construction techniques to promote environmentally responsible and energy-efficient building practices. | **LO1** | **Explain** material selection criteria such as durability, recyclability, embodied energy, and life cycle cost analysis. |
| | | **LO2** | **Describe** green and alternative construction materials including bamboo, CSEB, hempcrete, mycelium. |
| | | **LO3** | **Analyse** insulation properties and thermal performance parameters such as U-value, R-value, and Solar Heat Gain Coefficient (SHGC). |
| | | **LO4** | **Interpret** sustainable construction techniques and the environmental advantages of low-impact building materials. |
| | | **LO5** | **Evaluate** material certifications, including BIS-certified sustainable materials, and their role in ensuring quality and sustainability in construction. |
| **CO5** | Students will be able to understand and apply building simulation tools to analyse energy performance, daylight, ventilation, and thermal behaviour, enabling evaluation of climate-responsive design strategies. | **LO1** | **Explain** the purpose and scope of building energy simulation tools such as Ecotect, Equest, Climate Consultant, OpenStudio, and EnergyPlus. |
| | | **LO2** | **Describe** the fundamental simulation parameters including heat gain, heat loss, daylight distribution, and ventilation patterns. |
| | | **LO3** | **Analyse** simulation outputs to assess building performance in relation to climate-responsive design strategies. |
| | | **LO4** | **Interpret** case studies of climate-responsive buildings that utilize digital simulation tools for performance optimisation. |
| | | **LO5** | **Develop** a basic climate-responsive design report using digital simulation tools, integrating energy, daylight, and ventilation analysis. |

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

1- Slightly, 2- moderately, 3- Substantially

**REFERENCES:**


1. Carlos Hernandez and Rashmi Mayur, Pedagogy of the Earth : Education for a sustainable future1999.
2. Norman J Vig and Michaeal E Kraft, Environmental Policy: New Directions for the Twenty – FirstCentury , CQ Press, 2012.
3. Gordon Wilson, Pam Furniss and Richard Kimbowa, Environment, Development, and Sustainability: perspectives and cases from around the world, Oxford University Press, USA;1 edition, 2009.
4. Madhav Gadgil, Ramachandra Guha, This Fissured Land, Second Edition, An Ecological History of India, Oxford University Press; 2 edition, 2012 Integrated Sustainable Design of Buildings, Paul Appleby, Routledge, 2010.


## 6. Design Studio III (Code- 21242206)

**Objectives –**

The course aims to obtain knowledge of Architecture as responding to Social issues such as community, Culture, religion, politics etc, designing for special groups such as the villagers, elderly, and the handicapped.

| S. No. | Course Code | Category Code | Course Name | Maximum Marks Allotted | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Learning | Mode of Exam. | Duration of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Block | | | | Practical Block | | | | | | | | | |
| | | | | Continuous Evaluation | | | Major Evaluation | Continuous Evaluation | Major Evaluation | | L | T | P | | | | |
| | | | | Minor Evaluation I | Minor Evaluation II | Quiz/ Assignment | | Lab Work & Sessional | | | | | | | | | |
| 6 | 21242206 | DLC | Design Studio III | - | - | - | - | 70 | 30 | 100 | - | - | 6* | 9 | Experimental | SO | - |

**PROJECT 1(Prototype): VILLAGE SURVEY & RURAL HOUSING**

Study of the physical, socio economic and cultural aspects of a selected village by conducting various surveys to understand the settlement pattern, housing stock and amenities that are existing or required – To understand the linkages between Occupation, Social structure and Religious beliefs and its physical manifestation in the form of the settlement – Identification of a suitable Design intervention that would improve the quality of life – Ex. Design of housing prototypes for a particular community / occupation using rural building materials & cost effective technology. Design exercise may include the design of any facility required such as Primary health center / Community hall / Farm training center, etc.

**PROJECT 2(Prototype): DESIGN OF COMMUNITY FACILITIES**

**Community facilities** –Design of Community hall, Nursing home, Youth hostel, Old age home etc., encourage the student to explore concepts of an agglomeration of simple spaces with particular emphasis on the special needs of elderly,

handicapped etc. It also focuses on the bioclimatic approach to the design of the building envelope i.e. articulation of openings, choice of materials for roof & walls of different orientations etc. Concepts integrating the use of passive, active & hybrid solar technologies with the design proposals are encouraged.

**PROJECT 3 (Prototype): Time bound Problems of 6 hours to 48 hours.**

| **COs & LOs for Architectural Design – III (Code –21242206)**<br>**Overall Course Outcome**: The course aims to obtain knowledge of Architecture as responding to Social issues such as community, culture, religion, politics etc, designing for special groups such as the villagers, elderly, and the handicapped. | | | |
|---|---|---|---|
| **CO1** | Students will be able to analyze data collected with relevance to the project by identification of a suitable design intervention that would improve the quality of life. | **LO1** | **Explain** the Settlement pattern in village and socio-cultural, geographic and economic aspects that shape the built environment. |
| | | **LO2** | **Analyse** design of any rural settlement that evolved organically over a period. |
| | | **LO3** | **Analyse** housing typology, locally available materials, artisanship and integration of landscape with the built environment. |
| | | **LO4** | **Explore** concepts of agglomeration of simple spaces with particular emphasis on the special needs of elderly, handicapped, etc. |
| | | **LO5** | **Develop** presentation of concepts through 2D and 3D presentation including sketches and models. |
| **CO2** | Students will be able to **explore** concepts and agglomeration of simple spaces with particular emphasis on the special needs of elderly, handicapped, etc. | **LO1** | **Demonstrate** the learning of the previous study. |
| | | **LO2** | **Collect** data from standards, case studies and site visits for the current project. |
| | | **LO3** | **Analyse** data collected with relevance to the current project |
| | | **LO4** | **Integrate** learning from other allied subjects to the design proposal |
| | | **LO5** | **Complete** the architectural project with all given requirements for the given project. |
| **CO3/CO4** | Students will be able to **maximize** the potential of designing within the period. | **LO1** | **Understand** the application of the architectural design process for adequate scale projects of human habitat |
| | | **LO2** | **Transform** the human behavioural needs into architectural program requirements |
| | | **LO3** | **Analyse** the information on context and the human-space relationship |
| | | **LO4** | **Compose** the architectural spaces in a design project in a given period. |
| | | **LO5** | **Communicate** architectural drawings with the help of various mediums in a given period. |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 1 | | 1 | | | | | | |
| CO2 | 3 | 3 | 1 | 3 | | 1 | 1 | | 3 | | | |
| CO3, 4 | 3 | 3 | 1 | 3 | | 1 | 1 | | 3 | | | |

1- Slightly, 2- moderately, 3- Substantially

**REFERENCES:**


1. Time saver standards for building types, DeChiara and Callender, Mc Grawhill Company.
2. Neufert Architect's data, Bousmaha Baiche& Nicholas Walliman, Blackwell science ltd.
3. National Building Code – ISI.
4. Time saver standards for landscape architecture – Charles W Harris – McGraw Hill.
5. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press.


**Note:** Design exercises that explore Architecture as responding to Social issues such as community, culture, religion, politics etc. Students familiarize themselves with designing for special groups such as the villagers, elderly, and the handicapped.

STRUCTURE SYLLABUS TO BE ADDED