MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed University)
(Declared Under Distinct Category by Ministry of Education, Government of India)
NAAC Accredited with A++ Grade

BACHELOR OF ARCHITECTURE

SYLLABUS

(III Semesters)
Batch 2024 Onwards

DEPARTMENT OF ARCHITECTURE & PLANNING

Second Year Third Semester

1. **Building Construction – II (Code - 21242101) &(Code-21242107)**

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.
				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.	21242101	BSC	Building Construction II	20	20	30	30	-	-	100	2	-	-	2	ace to Fac	PP

UNIT 1: Modern Building Materials

Properties and architectural uses of plastics including thermoplastics, thermosetting plastics, reinforced and structural plastics, decorative laminates, plastic coatings, adhesives, sealants, modifiers, and plasticizers, along with fabrication methods and applications in walls, roofs, and partitions. Properties and uses of non-ferrous metals such as aluminum, zinc, lead, and copper used in modern construction.

UNIT 2: Doors, Windows, and Ventilators

Types of timber doors and their joints, including single and double-leaf, ledged braced and battened, framed ledged braced battened, panelled, flush, and composite doors. Timber windows and ventilators such as side-hung and top-hung casement windows, sliding and pivoted (horizontal and vertical), folding and bay windows, fixed lights in varied shapes and sizes, and combined door-window-ventilator systems.

UNIT 3: Staircases, Partitions, and Flooring Systems

Types of staircase- straight flight, dog-legged, quarter-turn, half-turn, bifurcated, spiral, and helical types, with construction details of wooden stairs. Timber partitions and flooring systems, discussing types, components, and construction techniques.

UNIT 4: Damp Proofing, Waterproofing, and Cavity Walls

Damp proofing and waterproofing materials such as emulsified asphalt, bentonite clay, butyl rubber, silicones, vinyls, epoxy resins, and metallic compounds, as well as membranes like rag felt, asbestos, glass felt, plastics, synthetic rubber (vinyl, butyl rubber, neoprene), PVC, sheet lead, and asphalt. Applications in basements, swimming pools, and terraces along with the advantages, positioning, and detailing of cavity wall construction.

UNIT 5: Emerging Technologies in Building Envelopes

Contemporary cladding systems including stone, timber, weatherboard, fiber cement, brick, vinyl, ACP, precast concrete panels, curtain walls, rain screens, and EIFS. It incorporates advancements like smart and self-cleaning materials, 3D-printed claddings, modular and dry systems, green facades, breathable walls, and solar-integrated building skins, adapting over time to reflect current technological and practical trends in construction.

<table>
<tr><td colspan="4"><u>COs & LOs for Building construction-II</u>

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.</td></tr>
<tr><td rowspan="5">CO1</td><td rowspan="5">Students will be able to understand the role of metal in structure technology .</td><td>LO1</td><td>Remember basic concepts metal, and its uses.</td></tr>
<tr><td>LO2</td><td>Learn the properties of different metals.</td></tr>
<tr><td>LO3</td><td>Understand its uses in the architecture industry.</td></tr>
<tr><td>LO4</td><td>Analyze the types of Reinforced plastics and Decorative laminates-plastic coatings, Adhesives, and its uses.</td></tr>
<tr><td>LO5</td><td>Evaluating its role for rooms, windows, roof lights, domes, gutters, and handrails..</td></tr>
<tr><td rowspan="5">CO2</td><td rowspan="5">Students will be able to demonstrate their understanding through application in design and detailing of doors, windows & ventilators.</td><td>LO1</td><td>Remember basic concepts regarding detailing of doors, windows & ventilators.</td></tr>
<tr><td>LO2</td><td>Learn its types according to uses.</td></tr>
<tr><td>LO3</td><td>Understand the detailing of doors, windows & ventilators.</td></tr>
<tr><td>LO4</td><td>Analyze the various types of doors, windows & ventilators, their extensive uses in building construction.</td></tr>
<tr><td>LO5</td><td>Draw all the elements of doors, windows & ventilators.</td></tr>
<tr><td>CO3</td><td>Students will be able to demonstrate their</td><td>LO1</td><td>Remember basic concepts regarding detailing of R.C.C staircases and masonry.</td></tr>
</table>

	understanding through application in design and detailing of staircase & lifts.	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

2. History of Western Architecture (Code -21242102)

Objectives –

The course aims to obtain knowledge about the development of architecture in the ancient Europe and the culture and context which produced it such as climate, religion, social practices & the politics, the evolution of architectural form & space with reference to Technology, Style and Character using sketches as the principal method of learning - about the prehistoric world, Ancient Egypt, West Asia, Greece ,Rome, Medieval times and Renaissance period.

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.
				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.	21242102	DC	History of Western Architecture	20	20	30	30	-	-	100	2	1	-	3	ace to Fac	MCQ

UNIT-1 GREEK ARCHITECTURE

Evolution of City states in Greece, the Hellenic & Hellenistic art & architecture, Evolution of the classical orders & the features of the Greek temple, the building of the Acropolis with one outstanding example of Doric (Parthenon), Ionic (Erechtheon) & Corinthian. Public architecture: Theatre of Epidaurus and Agora, Optical illusions in Greek architecture.

UNIT-2 ROMAN ARCHITECTURE

Formation of Roman republic & Empire & influence of geology, culture & lifestyle. Roman architectural character using concrete, marble, travertine etc & masonry types used for walls. Tuscan & Composite orders, Roman forums and basilicas – methods of Vault & Dome construction with examples of Pantheon, Thermae of Caracalla, Colosseum, & Basilica of Constantine.

UNIT-3 EARLY CHRISTIAN & BYZANTINE ARCHITECTURE

Spread of Christianity, the evolution of early Christian Church form from the Roman basilica (St. Clemente), Centralized plan concept (St. San Vitale, Ravenna). The creation of eastern & western Roman Empire, the development of domes & pendentive, Byzantine architectural character with study of St. Sophia (Hagia Sophia) at Istanbul.

UNIT-4 ROMANESQUE & GOTHIC ARCHITECTURE

Romanesque period: Monastic orders & development of Craft and merchant guilds, Influences & architectural character of Romanesque churches in Italy (Pisa complex), France (Abbey Aux Hommes) and England (Tower of London) - Development of vaulting. Development of Gothic architecture in France, evolution of Gothic Cathedral & structural system using vaulting & flying buttress, the example of Notre dame cathedral at Paris.

UNIT-5 RENAISSANCE ARCHITECTURE IN EUROPE

Idea of rebirth and revival of classical architecture & the development of art & science. Italian renaissance character. Early renaissance & urban renaissance style and High renaissance period. Works of various artists and architects during the period (Andrea Palladio, Sir Christopher Wren, Michelangelo, Leonardo

Industrial, agricultural and mineral wastes and their utilization as building materials: Fly ash, blast furnace slag, calcium carbonate, lime kiln rejects, by-product, gypsum, red mud, throw-away packages, rice husk, sawdust, wooden chips, choir waste, wood wool, tailings etc. their application in components of different types of buildings.

Note: Assignments should be in the form of small reports, movies, seminars and notes on above- mentioned topics. The works of CBRI, NBO, HUDCO, and other related institutions are referred to and discussed.

COs & LOs			
Overall Course Outcome: Students will be able to **develop** an appreciation of various architectural movements and its chronology across the globe and the resulting architectural productions that are unique in time and place.			
CO1	Students will be able to **apply** Greek architectural expressions in their own design.	LO1	**Learn the evolution** of Greek Dynasties & cities.
		LO2	**Understand** diverse artistic and architectural expressions in various periods of Greek Architecture.
		LO3	**Illustrate** visual and verbal vocabularies of Greek Architecture.
		LO4	**Analyze** Greek architectural forms and space through various examples.
		LO5	**Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms and styles of Greek Architecture.
CO2	Students will be able to **apply** elements of Roman architecture in their own design.	LO1	**Learn the evolution** of Roman Empire, its cities and Architecture.
		LO2	**Understand** diverse artistic and architectural character in various parts of Roman Architecture.
		LO3	**Illustrate** visual and verbal vocabularies of Roman Architecture.
		LO4	**Analyze** Roman architectural forms and space through various examples.
		LO5	**Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms and styles of Roman Architecture.
CO3	Students will be able to **apply** elements of Egyptian architecture in their own design.	LO1	**Learn** evolution of both Early Christian & Byzantine Architecture.
		LO2	**Understand** diverse artistic and architectural expressions in various periods of Early Christian & Byzantine Architecture.
		LO3	**Illustrate** visual and verbal vocabularies of Early Christian & Byzantine Architecture.
		LO4	**Analyze** Early Christian & Byzantine architectural forms and space through various examples.
		LO5	**Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms and styles of Early Christian & Byzantine Architecture.
CO4	Students will be able to **apply** elements and concepts of Romanesque & Gothic Architecture in their own design.	LO1	**Learn** evolution of both Romanesque & Gothic Architecture.
		LO2	**Understand** diverse artistic and architectural expressions in various periods of Romanesque & Gothic Architecture.
		LO3	**Illustrate** visual and verbal vocabularies of Romanesque & Gothic Architecture.
		LO4	**Analyze** Romanesque & Gothic architectural forms and space through various examples.
		LO5	**Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms and styles of Romanesque & Gothic Architecture.
CO5	Students will be able to **apply** elements of Renaissance Architectural Movement.in their own design.	LO1	**Learn the evolution** of the Renaissance Architectural Movement.
		LO2	**Understand** diverse artistic and architectural expressions in various periods of Renaissance Architectural Movement.
		LO3	**Illustrate** visual and verbal vocabularies of Renaissance Architectural Movement.
		LO4	**Analyze** Renaissance Architectural Movement, its form and space through various examples.
		LO5	**Reproduce** with help of sketches/visuals (softwares)/3D (models) of various architectural forms and styles of Renaissance Architectural Movement.

REFERENCE BOOKS:

1. Sir Banister Fletcher, A History of Architecture, CBS Publications (Indian Edition), 1999.
2. Spiro Kostof – A History of Architecture – Setting and Rituals, Oxford University Press, London, 1985.
3. Leland M Roth; Understanding Architecture: Its elements, history and meaning; Craftsman House; 1994.
4. Pier Luigi Nervi, General Editor – History of World Architecture – Series, Harry N. Abrams, Inc.Pub., New York, 1972.

3. Structure III (Code – 21242103)

Objectives – The course aims to obtain understanding of the basic principles of limit state design in reinforced concrete structural systems and the interpretation of detail structural drawings for the purpose of construction, the structural behavior of RCC buildings from an architect's perspective and hence does not delve into the process of detailed structural analysis design which is the forte of the structural engineer.

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.
				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.	21242103	ESC	Structure III	20	20	30	30	-	-	100	2	1	-	3	ace to Fac	PP

UNIT- 1 FOUNDATIONS IN BUILDINGS

Soil load bearing capacity – concept of RCC spread footing - Types of R.C.C. foundation – Individual, Combined, Strip footings – Raft foundation (Theory only) – Eccentric footings with projection on one side only- the situations in which the various footings are used – friction pile foundation used in clayey soil (section & understanding of the principle)- pile foundation used in sandy soil & the pile foundation used in multi-storied buildings (section & principle only).Interpretation of typical structural details in foundation drawings .Site visits necessary for understanding the above.

UNIT – 2 ROOF SLABS & STAIRCASE

Exposure to the basic design concepts of Limit state method of design – recommendations in the code book - Classification of slabs – Estimation of loads – Design of one way, two way, circular and continuous slabs using SP – 16(Theory only). Interpretation of reinforcement details in a typical structural drawing for one way, two way slab & continuous slab. Understanding the reinforcement details for a RCC waist slab in dog legged staircase and for a folded slab staircase using typical structural drawings.

UNIT-3 BEAMS & LINTELS

Exposure to the basic design concepts - Estimation of loads on beams – Transfer of load from slab to beam – Understanding the design of simply supported beams, cantilevered & continuous beams using code coefficients & detailing using SP-16 for the design (Theory only). Steel detailing of beams for earthquake proofing (section only) – the function of plinth beam belt & continuous lintel belt –ring beam for RCC dome roof, typical reinforcement detail for waffle (coffer) slab (section only).Site visits to understand typical details in RCC slabs & beams.

UNIT - 4 COLUMNS

Understanding the estimation of loads on columns – Load transfer from slab and beam to columns. Structural behavior of Long and short columns –Distinction between rectangular and circular columns – Difference between columns subjected to uniaxial and those subjected to bi-axial bending. Knowledge about the design of columns using column interaction diagrams (Theory only) – Use of SP-16 for reinforcement detailing. Interpretation of typical structural drawing for columns & footings.

UNIT- 5 FLAT SLABS

Understanding the situations in which flat slabs are used - advantages of flat slab construction. Components of flat slab – Configuration of columns – Design of flat slab by direct design method as per BIS codes (Theory only). Site visit to understand flat slab construction.

COs & LOs for Structure III			
Overall Course Outcome: Students will be able to design and interpret the structural systems for all reinforced concrete structures using the limit state design method for structural analysis.			
CO1	To interpret the structural design process and analyse design of RCC foundations for the purpose construction	LO1	**Learn** the principles of structural design process for RCC foundations
		LO2	**Classify** the types of foundations, soil capacity and loads in design of foundations
CO2	To analyse the structural design details and reinforcement of RCC slabs and staircase for the purpose of construction	LO1	**Learn** the principles of structural design method for Slabs and staircase
		LO2	**Identify** the types of RCC slabs and RCC staircases and their design considerations
CO3	To interpret the load calculation for structural design of beams and lintel in RCC structure and analyse their structural design details for the purpose of construction	LO1	**Learn** the principles of structural design method for Beams and lintel
		LO2	**Outline** the features of IS code provisions regarding limit state method for designing beams and lintel in RCC structures
		LO3	**Evaluate** the load considerations for design of beams and lintel in RCC structures
CO4	To interpret the structural design of columns in RCC structure and the design details using column interaction diagram	LO1	**Learn** the principles of structural design method for column in RCC structure
		LO2	**Outline** the features of IS code provisions regarding limit state method for designing columns in RCC structures
		LO3	**Evaluate** the load considerations, transfer of load and their structural behaviour for design of columns in RCC structure
CO5	To interpret the design of flat slab and their structural details	LO1	**Learn** the principles of structural design method for Flat slab
		LO2	**Outline** the features of IS code provisions regarding limit state method for designing beams and lintel in RCC structures
		LO3	**Evaluate** the need of flat slab in structures and their component and design consideration

REFERENCES:

Victor E.Sauoma, structural Engineering analysis & design University of Colorado, 2011
Simha NC and Roy SK Fundamentals of Reinforced Concrete, S.Chand & co Ltd, Delhi,2001

4. Building Physics I (Code – 21242104)

Objectives – The course aims to obtain knowledge of building sciences such as design methodology, resource optimization and innovative approaches to eco-design, the acclaimed sustainable buildings designed within the past decade, energy conservation through building design, designing an eco-building.

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.
				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								
4.	21242104	BSC	Building Physics I	20	20	30	30	-	-	100	2	1	-	3	ace to Fac	MCQ

UNIT 1: Climate, Thermal Comfort, and Solar Geometry

This unit introduces global and local climatic factors, elements of climate, classification and characteristics of tropical climates, as well as distinctions between site and urban climates. It explores the thermal balance of the human body and various thermal comfort indices including Effective Temperature and Corrected Effective Temperature (CET), along with the calculation of comfort zones and the determination of overheated and underheated periods. It also includes the apparent movement of the sun, use of sun path diagrams, solar and shadow angles, and solar shading masks. Exercises include plotting and transferring isopleths onto solar charts and designing sun-shading devices for different orientations based on overheated periods.

UNIT 2: Principles of Thermal Design and Heat Flow in Buildings

This unit covers key thermal quantities such as heat flow rate, thermal conductivity (k-value), resistivity, conductance through multilayered bodies, surface conductance, and transmittance (U-value) of various materials. Concepts of convection, radiation, sol-air temperature, and solar gain factor are introduced. It discusses heat loss and gain in buildings and the concept of periodic heat flow including time lag and decrement factor, with practical applications in selecting appropriate materials for walls and roofs. It also examines the effect of insulation and cavity construction on thermal performance.

UNIT 3: Ventilation and Daylighting in Building Design

Focusing on passive design strategies, this unit discusses ventilation principles including the stack effect, thermal forces, and wind velocity using wind rose

diagrams. It explains wind pressure and air movement through and around buildings, along with the factors affecting indoor airflow and wind shadows. The unit also covers the nature and behavior of light including transmission, reflection, and colored light using the Munsell system. Photometric quantities such as illumination and methods of daylight prediction using the daylight design graph are also included.

UNIT 4: Climate-Responsive Architecture and Design Application

This unit emphasizes climatic-responsive design approaches for different climatic zones including warm humid, hot dry, composite, and tropical upland climates. It includes the analysis of climatic data sets using climate graphs and Mahoney tables, with their recommended design specifications. Practical exercises involve designing small buildings tailored to various climatic conditions using the principles, data, and tools introduced in earlier units.

UNIT 5: Emerging Technologies in Climate-Responsive Design

This unit introduces advanced tools and technologies in environmental design, emphasizing digital methods and practical implementation. It covers the use of climate analysis software such as Climate Consultant to evaluate thermal performance, daylighting, and ventilation. It also explores the integration of smart materials, adaptive façades, automated shading systems, and building envelope technologies. Real-world case studies, live site readings, and hands-on digital modeling exercises are incorporated to bridge theoretical knowledge with practical application.

COs & LOs

Overall Course Outcome: The basic objective of this course is to make students learn about human thermal comfort along with required construction techniques and designing strategies to achieve it. It would deal with the study of climate and its relation with the built environment

CO1	**Understand** the elements of global and local climate, and evaluate their influence on thermal comfort and building design.	LO1	**Define** global climatic factors and elements
		LO2	**Classify** various climatic parameters on micro and macro level of site (tropical climates, site climates and urban climate)
		LO3	**Examine** thermal comfort indices for thermal balance in human body
		LO4	**Identify** overheated and under heated periods
CO2	**Analyze** solar geometry using sun path diagrams and design appropriate sun-shading devices based on orientation and climatic needs.	LO1	**Relate** sun path and its dynamics to site planning and building designing
		LO2	**Illustrate** winter & summer solar angles per day for designing proper shading devices
		LO3	**Experiment with** heliodon device used to simulate the sun and shadow patterns that occur at various locations and times across the surface of the earth
		LO4	**Analyze** various aspects of solar geometry in building orientation
CO3	**Explain** the mechanisms of heat transfer in buildings and interpret thermal properties of building materials and envelopes.	LO1	**Define** thermal quantities
		LO2	**Outline** U values of different building materials to identify their extent of thermal insulation
		LO3	**Make use** of dry bulb and wet bulb thermometers, rain gauge, etc.
		LO4	**Determine** appropriate materials for walls & roof according to periodic heat flow in building
CO4	**Influence** the integration natural elements as part of built environment	LO1	**Illustrate** stack effect for passive air movement throughout a building
		LO2	**Analyze** natural light transmission, day lighting penetration inside a building
		LO3	**Make use** of anemometers to identify wind direction and speed during site analysis
		LO4	**Test** stack effect and natural light transmission on any of the student's design problem
CO5	**Apply** contemporary digital tools and emerging technologies such as climate analysis software etc enhance the climatic performance and sustainability of architectural designs**.**	LO1	**Understand** the role of simulation software (e.g., Climate Consultant, Ladybug, Insight 360) in analyzing climate data and predicting building performance.
		LO2	**Identify** innovative climate-responsive materials such as phase change materials (PCMs), dynamic façades, and cool roofing technologies for thermal comfort and energy efficiency
		LO3	**Apply** digital tools and emerging technologies in developing responsive architectural solutions tailored to various climatic conditions.

REFERENCE BOOKS:

1. O.H. Koenigsberger, Manual of Tropical housing and building – Climatic Design, Orient Longman, Chennai, 1975.
2. M .Evans – Housing, Climate &Comfort , Architectural Press, London ,1980.
3. E.Schild &M. Finbow – Environmental Physics in construction & its application in Architectural Design Granadar , London, 1981.
4. B.Givoni - Man, Climate & Architecture, Applied Science, Essex 1982.
5. Donald Watson & Kenneth labs – Climatic Design – Mcgraw hill NewYork 1983.
6. A.Konya- Design Primer for Hot Climates, Architectural Press, London, 1980.

5. Building Services I (Water supply & Sanitation) (Code – 21242105)

Objectives – The course aims to obtain knowledge of water supply and waste water management, in residential units, small campus, and commercial buildings, plumbing layouts for various building typology, and best practices for Solid waste management.

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.
				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								
5.	21242105	BSC	Building Services I	20	20	30	30	-	-	100	2	-	-	2	ace to Fac	MCQ

UNIT-1 WATER SUPPLY

Sources of water supply – Water Quality - Water requirements for different types of buildings and for town, simple method of removal of impurities, pit. System of supply - continuous and intermittent supply, sump, overhead tanks, pumps, distribution pipes, cold water and hot water supply for single and multi-storied buildings. Pipes sizes, types – GI, CPVC, Copper, Cast Iron (CI) Pipes, Steel Pipes, Asbestos Cement (AC) Pipe, Concrete Pipes fittings, valves, and types of taps. Rainwater harvesting to include roof top harvesting, type of spouts, sizes of rainwater pipes and typical detail of a water harvesting. Surface water runoff

UNIT-2 DRAINAGE AND SEWAGE DISPOSAL

Recycling/Reuse of Wastewater, Systems of drainage – separate, combined and partially separate system, surface drainage, sizes and construction, system of plumbing - single stack, one pipe system, one pipe partially ventilating system and two pipe system.

House drainage – principles, traps-floor trap, multi-trap, gully trap, grease and oil trap,: Anti Siphonage pipe, Types of fixtures and materials, Arrangements of fixtures in a bathroom. Design of Septic tank, Treatment and disposal of septic tank effluents – Design of soak pit and dispersion trench, Biological filter, up flow anaerobic reactors

Sewage treatment technologies: Activated sludge process, Membrane bioreactors, packaged treatment plants, Root zone treatment system, Decentralized Wastewater Treatment Systems (DEWATS), Soil Bio technology

UNIT-3 SOLID WASTE DISPOSAL

Solid waste management: Generation of Solid waste, Collection & Transportation of solid waste to the secondary/ locality storage/community bins, Storage of solid waste at locality level, Transport of solid waste to dumping sites and treatment plants, Treatment and Dumping of Solid Waste, Methods of Disposal of solid waste Approaches to Solid Waste Management: Waste minimization / reduction at source, recycling, waste processing (with recovery of resources and energy), waste transformation (without recovery of resources) and disposal on land.

UNIT-4 EMERGING PROCESSING TECHNOLOGIES

Emerging processing technologies : Vermicomposting, Biogas from MSW, Pyrolysis (including plasma arc technology), refuse derived fuel, Bioreactor landfill - Biomethanation plant at koyambedu, wholesale vegetable market Chennai, Door-to-door collection, transportation and waste processing services by Exnora Green pammal.

UNIT-5: Modern Plumbing Layouts

Introduction to designing toilet blocks in residential and public buildings using modern materials and fittings. Focus on water-efficient fixtures, updated piping systems (like CPVC and PEX), and basic sustainable practices such as rainwater harvesting. Brief use of planning tools like AutoCAD for layout design.

Designing and preparing a complete water supply and drainage layout of an academic Architectural design project, with all required calculations.

<table>
<tr><th colspan="4"><u>COs & LOs</u>
Overall Course Outcome: The overall aim of the course is to introduce students to the various water supply and sanitation systems in building of various scales and also to make them understand plumbing layouts, knowledge of plumbing and sanitation fixtures and their sustainable applications in buildings</th></tr>
<tr><td rowspan="4">CO1</td><td rowspan="4">Students will be able to identify the significance of water supply in urban and rural areas, its methods and requirements.</td><td>LO1</td><td>Define the need of water supply and water requirements in different types of buildings.</td></tr>
<tr><td>LO2</td><td>Observe the methods of water supply in metropolitan areas, methods of rainwater harvesting in buildings.</td></tr>
<tr><td>LO3</td><td>Identify the types of apparatus required for water supply, sizes, availability, capacity and energy required to install water supply systems in a building.</td></tr>
<tr><td>LO4</td><td>Evaluate the sustainable methods in the process.</td></tr>
<tr><td rowspan="3">CO2</td><td rowspan="3">Students will be able to develop the understanding of drainage systems in buildings and its application</td><td>LO1</td><td>Define the types of sanitary wastes generated in various types of building and methods of disposal,</td></tr>
<tr><td>LO2</td><td>Observe the types of drainage systems, and methods of recycling various types of wastes (dry or wet)</td></tr>
<tr><td>LO3</td><td>Identify the types of apparatus required for drainage and sanitation fixtures, sizes, availability, capacity and energy required to install drainage systems in a building.</td></tr>
<tr><td rowspan="3">CO3</td><td rowspan="3">Students will be able to analyse the significance of solid waste management in cities and their sustainable methods</td><td>LO1</td><td>Define the types of solid wastes generated in various types of buildings</td></tr>
<tr><td>LO2</td><td>Observe the methods of waste segregation, their classification and methods of disposal.</td></tr>
<tr><td>LO3</td><td>Identify process of waste at city level, locality and approaches to waste management</td></tr>
<tr><td rowspan="3">CO4</td><td rowspan="3">Students will be able to evaluate the sustainable methods of processing solid waste and strategies for waste management at city level</td><td>LO1</td><td>Compare the existing trends in waste recycling and waste disposal in cities</td></tr>
<tr><td>LO2</td><td>Analyse the significance of vermin composting, biogas, recycling units etc. and their application</td></tr>
<tr><td>LO3</td><td>Evaluate the strategies for waste management at metropolitan level through case studies</td></tr>
<tr><td rowspan="3">CO5</td><td rowspan="3">Students will be able to compare and develop the plumbing layout of various types of building in context.</td><td>LO1</td><td>Evaluate the plumbing layout of any existing building</td></tr>
<tr><td>LO2</td><td>Evaluate the drainage layout of any existing building</td></tr>
<tr><td>LO3</td><td>Prepare the sanitation and plumbing layout for buildings of various scales</td></tr>
</table>

REFERENCES:

1. S. K. Garg , Water Supply Engineering: Environmental Engineering v. khanna publishers 2010
2. Charangith shah, Water supply and sanitary engineering, Galgotia publishers.
3. Kamala & DL Kanth Rao, Environmental Engineering, Tata McGraw – Hill publishing company Limited.
4. Technical teachers Training Institute (Madras), Environmental Engineering, Tata McGraw Hill publishing Company Limited.
5. M.David Egan, Concepts in Building Fire Safety.
6. V.K.Jain, Fire Safety in Building 43
7. National Building Code

6. Design Studio II (Code – 21242106)

Objectives – The course aims to obtain knowledge of Architecture as responding to site conditions, the designing process, spaces and relationship of architecture with personal traits, information and choices such as occupation, life style, religion etc.

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.
				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.	21242106	DLC	Design Studio II	-	-	-	-	70	30	100	-	-	4* (1.5)	6	xperiment l	SO

PROJECT 1(Prototype): TOWNHOUSE / VILLA

Study of contemporary practices & design for townhouses and villas in urban areas, to sensitize the students towards life style, individual preferences, space – activity relationship and exploration of how material, color, texture and light affect the quality of spaces is the main focus. It is also intended as an exercise in massing & configuration of façade elements such as the balancing of solids & voids, adoption of a system of proportioning and elements of contemporary detailing. This design exercise will also attempt to involve the student in the built form / open space relationship & explore the connectivity between indoor & outdoor spaces.

PROJECT 2(Prototype): NURSERY / PRIMARY / SECONDARY SCHOOL

Case studies on contemporary trends in school design to know how various architects have responded to the design program, site conditions, student age group etc. The project aims to enlighten the student on how the school design responds to various education philosophy and grooming methods. The analysis of important functional aspects such as space adequacy, circulation in the built form and play areas, locating the various spaces according to functional adjacency and careful design of toilet areas is intended. The objective is to also optimize the variables of the physical environment such as thermal comfort, daylighting and noise control in design.

PROJECT 3 & 4(Prototype): Time bound Problems of 6 hours to 48 hours.

COs & LOs			
Overall Course Outcome: The course aims to obtain knowledge of Architecture as responding to site conditions, the designing process, spaces and relationship of architecture with personal traits, information and choices such as occupation, life style, religion etc.			
CO1	Students will be able to design town houses and villas	LO1	**Identify** spaces responding to site condition and personal issues such as occupation, lifestyle, religion etc.
		LO2	**Map** gathered information of visited physical setting
		LO3	**Explore** the integration of indoor and outdoor areas.
		LO4	**Produce** sketches, models and photographs for analysis and design.
		LO5	**Analyze** the materials, construction techniques and structural systems used in the elements of built forms.
CO2	Students will be able to design buildings related to education philosophy.	LO1	**Develop** sensitivity towards existing habitat spaces with its building elements
		LO2	**Analyze** how school designs respond to various education philosophy and grooming methods with help of case studies.
		LO3	**Explore** the integration of classroom spaces with outdoor play areas in school buildings.
		LO4	**Produce** sketches, models and photographs for analysis and design.
		LO5	**Design** school buildings that respond to a particular educational philosophy.
CO3/CO4	Students will be able to maximize the potential of their designing skills within the period.	LO1	**Understand** the application of the architectural design process for medium scale projects of human habitat
		LO2	**Transform** the human behavioural needs into architectural program requirements
		LO3	**Analyze** 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 given period.

REFERENCES:

1. Time saver standards for building types, De Chiara and Callender, Mc Grawhill company.
2. Neufert Architect's data, Bousmaha Baiche& Nicholas Walliman, Blackwell science ltd.

8.Semester Proficiency (Code – 21242108)

Objectives – The course aims to assess the cumulative knowledge and skills acquired by students over the semester in various core subjects, ensuring they meet academic benchmarks.

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.
				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								
8.	21242108	**SP**	**Semester Proficiency**	-	-	-	-	50	-	50	-	-	2	**1**	ace to Fac	SO

This course evaluates the overall proficiency of students across architectural design, theory, and practical applications, promoting a holistic understanding and competence in architectural practices.

9.Micro Project-I# (Computer Graphics)(Code –21242109)

Objectives – The course aims to obtain knowledge of various softwares used for drafting, 3D model making, rendering and presentation, such as AutoCAD, Revit, 3Ds MAX, Photoshop, CorelDraw, etc. according to the availability of experts.

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.
				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								
9.	21242109	**PBL**	**Micro Project-I# (Computer Graphics)**	-	-	-	-	70	30	100	-	-	4	**2**	Experientia	SO

UNIT-1 COMPUTER AS A DRAFTING TOOL

- Productivity tools in CAD, organization of layers for working drawings, use of blocks and symbols hatch patterns.
- Dimensioning systems extracting of areas from drawings, concept of paper space plotting the drawings

UNIT-2 COMPUTER AS A DESIGN TOOL

- Repetition of forms mirroring, coping and array, etc. calculation of areas, volumes.
- Creating and using templates, blocks, and symbols and using them in architectural drawings. - Managements of large drawing files.
- Working in a network environment-Security systems-converting drawing files into Internet compatible files.

UNIT-3 MEASUREMENT DRAWING WITH THE HELP OF CAD

- Exercise will be a group activity; to measure and draw the floor plan along with the plot boundaries, four side elevations, four sections and block plan, site plan of a large building or a settlement with the help of CAD.
- In addition to this drawing shall be prepared based on examples of buildings by giving a sketch design. Drawings shall be detailed enough to explain the complete design.

UNIT-4 VISUAL COMMUNICATION

- Photoshop: Creating and saving images, basic image editing, Photoshop toolbox and tools, using layers, special effects.

UNIT-5 INTRODUCTION TO 3-D Software

- 3-D Max/Sketchup: Creating simple models of buildings, AI tools, basic editing, tools, effects, etc.

COs & LOs for Micro Project-I (Computer Graphics)			
Overall Course Outcome: Students will be able to draft plans, elevations, sections, views and other details and render them to make them look professional..			
CO1	Students will be able to **apply basic** commands in AutoCAD to draw objects.	LO1	**Learn** about computer-aided drawing.
		LO2	**Understand** the objects, blocks, symbols, hatch patterns in AutoCAD.
		LO3	**Apply** various tools in AutoCAD with reference to drawings.
		LO4	**Draw** objects using basic dimensioning, patterns, plotting, etc.
CO2	Students will be able to **draw** complex objects using complex commands in AutoCAD.	LO1	**Learn** various further complex commands in AutoCAD to design.
		LO2	**Understand** management of files, working in a network environment, etc.
		LO3	**Design & Draw** complex objects using commands learned.
CO3	Students will be able to **draw** measured drawings.	LO1	**Learn** the concept of measured drawing and details to be considered while doing measured drawing.
		LO2	**Understand** how AutoCAD can be used to measure drawings.
		LO3	**Apply** various commands of AutoCAD in measured drawings.
CO4	Students will be able to use Photoshop to **illustrate** building plans, elevations, etc. professionally.	LO1	**Learn** various tools in Photoshop & 3D software
		LO2	**Understand** use of commands in Photoshop & 3D software.
		LO3	**Apply** various commands to draw in Photoshop & 3D software.
CO5	Students will be able to use 3D softwares and AI tools to **illustrate** building plans, elevations, etc. professionally.	LO1	**Learn** various 3D softwares & AI tools
		LO2	**Understand** use of commands in 3D softwares & AI tools
		LO3	**Apply** various commands to draw in 3D softwares & AI tools

REFERENCES:

1. User manual & tutorials of Google Sketch Up software.
2. Auto CAD reference manual – Autodesk UNC, 1998
3. Sham Tickoo, Advanced Technique in AutoCAD Re.14 – 1977 6. Sham Tickoo, Understanding AutoCAD – 14 (windows) – 1977
4. Photoshop CS Bible – Deke McClelland..

10. Self-learning/Presentation (SWAYAM/NPTEL/MOOC) (Code – 21242110)

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.
				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								
10.	21242110	**SLP**	**Language Lab**					40	-	40	-	-	2	**1**	Interactive	SO

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11.Novel Engaging Course (Activity Based Learning) (Code – NEC00003)

Objectives – The course aims to offer students a chance to acquire interdisciplinary skills beyond the architectural curriculum, fostering creativity and adaptability. .

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.
				Theory Block				Practical Block								
				Continuous Evaluation			Major valuatio	Continuous Evaluation	Major Evaluatio		L	T	P			
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional								
11.	NEC00003	**NEC**	**Novel Engaging Course (Activity Based Learning)**	-	-	-	-	-	50	50	-	1	-	**1**	Interactive	SO

These courses allow students to opt for skill-based learning from various departments, encouraging holistic development through subjects like photography, graphic design, or entrepreneurship, enriching their architectural skill set.

12.Cyber Security/ Data Science (Code – 21242111)

Objectives –

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									
12.	21242111	MAC	Cyber Security / Data science	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	-

Course Content:

13. Mandatory Workshop on Internet of things IOT at Department Level (Duration: Two Days) Basic Design (Code – 21242112)

Objectives – The course aims to introduce the fundamentals of the Internet of Things (IoT) and its practical applications in smart systems

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 valuatio	Continuous Evaluation	Major Evaluatio		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ ssignmen t		Lab Work & Sessional									
13.	21242112	MAC	Workshop on Internet of things IOT at Department Level	20	20	30	30	-	-		2	-	-	GRADE	Blended	MCQ	1.5 Hrs