MULTIDISCIPLINARY MINOR COURSES

MINOR DEGREE IN PLANNING

Semester	Subject Code	Subject Name	Total Credits
SEM-III	24UD1191MD306	Introduction to Engineering Geology	3
SEM-III	24UD1191MDL312	Engineering Geology Lab	3
SEM-III	24UD1191MD306A	Site Planning	3
SEM-V	25UD1191MD506	Engineering Economics and Project Management	3
SEM-V	25UD1191MD506A	Planning Legislation	3
SEM- VI	25UD1191MD606	Town and Urban Planning	3
SEM-VI	25UD1191MD606A	Disaster Mitigation and Management	3
SEM-VII	26UD1191MD706A	Appropriate Building Technologies	3
SEM-VII	26UD1191MD706B	Bamboo for Sustainable Development	3
SEM-VII	26UD1191MD706C	Ferrocement Technology	3
SEM-VIII	27UD1191MD801	(MOOC/SWAYAM/NPTEL)	2
MINIMUM CREDITS REQUIRED TO COMPLETE A MINOR DEGREE IN PLANNING ENGINEERING			**14**

SUBJECT CODE	MDM -I	CREDITS
24UD1191MD306	Introduction to Engineering Geology	3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives	
COBJ1	To recognize and classify rock and soil materials to identify suitable construction materials or as a stable foundation.
COBJ2	To offer the essential geological knowledge necessary for the construction of various kinds of civil engineering structures.
COBJ3	To focus on the core activities of engineering geologists like site characterization and geologic hazard identification and mitigation.
COBJ4	To arrange, and carry out site investigation methods to extract the necessary characteristics for a variety of technical applications.
COBJ5	To interpret field and laboratory data for safety and security of mega structures like tunnels and dams

Course Outcomes: Students will be able to	
CO1	Learn mineralogical and petrological features that are significant in characterizing its competency as
CO2	Learn how different geological conditions influence the design parameters of Civil Engineering
CO3	Understand the earth's structure and deformation history before applying rock mechanics theory.
CO4	Understand the site selection criteria for designing civil engineering projects that are both safe and
CO5	Learn about the influence of geological conditions on dams and tunnels, and also provide related

Course Contents

Module 1	**Introduction and Geomorphology**	**Hrs. 8**

Introduction and history of Engineering Geology and related branches, applications in Civil engineering.

Interior of Earth, Plate tectonics, Earthquakes, seismic zones in India.

Geomorphology: - basic principles and processes loke denudation and types of weathering.

Landform formation and types associated with river, wind, and sea, and their relevance to civil engineering.

Module 2	**Mineralogy and Petrology**	**Hrs. 8**

Mineralogy: - Study of physical properties of minerals and study of common rock-forming minerals & clay minerals. Petrology: Definition, rock cycle. Civil engineering significance. Igneous rocks: Origin, classification, textures, related structures, and their importance. Sedimentary rocks: Formation, classification, textures and structures, and their importance. Metamorphic rocks: Agents and types of metamorphism, textures, and structures and their importance.

Module 3	**Structural Geology and Groundwater**	**Hrs. 6**

Geological maps: - Geologic cross-section, Attitude of beds like outcrops, strike, and dip. Study of tectonic structures like folds and faults their origin, classification, diverse effects, and case studies. Joints and unconformities their origin, types, and diverse effects case studies. Groundwater: Sources of groundwater, water table, zones of groundwater, porosity, and permeability.

Module 4	Geological Investigations	Hrs. 6
Introduction, geological survey, steps in geological investigations. Exploratory drilling types and limitations, preservation of cores, core logging, core recovery, Rock Quality Designation (RQD). Engineering properties of rocks like density, unit weight, porosity, strength, and index properties. Geophysical investigation applications in Civil engineering methods like electrical resistivity method, gravity method.		
Module 5	**Geology of Dams, Reservoirs, and Tunnels**	**Hrs. 8**
Dams: - Influence of geological conditions on location, alignment, design, and type of a dam, geological considerations in site selection for dams, and site improvement techniques e.g. grouting. Tunnelling: - Types of tunnels, tunnelling in various conditions e.g. folded/faulted region, deccan trap or any other kind of rocks. Influence of geological conditions on tunnelling and remedial measures like tunnel lining. Bridges: - Types of bridges, dependence of types of bridges on geological conditions and remedial measures.		

Text Books:	
1	Singh Prabin, 2009, "Engineering and General Geology", S. K. Katariya and sons, Delhi.
2	Mukerjee P. K., 2013, "A Text Book of Geology", World Press Pvt. Ltd., Calcutta.
3	Gokhale K.V.G.K. and Rao D. M., 1982, "Experiments in Engineering Geology", TMN, New-Delhi.
4	Gupte R. B., "A Text Book of Engineering Geology", Pune Vidyarthi Griha Prakashan, Pune.
5	Subinoy Gangopadhyay, 2013, "Engineering Geology", Oxford University Press.
Reference Books:	
1	G. W. Tyrrell, 1926, "Principles of Petrology", B. I. Publication Pvt. Ltd., New Delhi .
2	Legget R. F., 1983"Geology Handbook in Civil Engineering", McGraw-Hill, New York.
3	Krynine D. P. & Judd W. R., 2005, "Principles of Engineering Geology & Geo- technics", CBS Publishers & distri. New Delhi.
4	Billings M. P., 1942, "Structural Geology", Prentice Hall of India Private Ltd., New Delhi.
5	A. Holmes, 1944, "Principles of Physical Geology", ELBS Chapman & Hall, London.

SUBJECT CODE	MDM -I	CREDITS
24UD1191MD306A	Site Planning	3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives	
COBJ1	Understand principles of site selection and site planning
COBJ2	Develop skills in site analysis
COBJ3	Learn earth form grading techniques
COBJ4	To understand the importance of site in architectural design
COBJ5	To analyse ecological and geomorphological characteristics of a site.

Course Outcomes: Students will be able to	
CO1	Learn various terms involved in site planning and their relevance in design of buildings of varying scales.
CO2	Understand various parameters that need to be considered in site analysis and its implications on site.
CO3	Perform grading design for sites, roads, and sports fields, including cut-and-fill calculations and earthwork volume estimation.
CO4	Evaluate the consequences of interventions in a site at micro and macro scales
CO5	Apply the principles of site planning learnt in real/ studio projects

Course Contents

Module 1	**Site Analysis**	**Hrs. 6**

Importance of site analysis - On site and off-site factors - Analysis of natural, cultural and aesthetic factors – topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available - sources of water supply and means of disposal system, visual aspects, visual analysis.

Module 2	**Preparation of site analysis diagram**	**Hrs. 6**

Study of contours: slope analysis - grading process – grading criteria - functional and aesthetic considerations. Environmental consideration, Site Analysis tools and Techniques.

Module 3	**Site Planning**	**Hrs. 6**

Definition of plot, site, land and region, units of measurements. Objective of Site Planning, Site Planning Process, Design and management of site, Site Planning and Site Layout Principles

Module 4	**Street and Parking design:**	**Hrs. 6**

Organization of vehicular and pedestrian circulation, types of roads, hierarchy of roads, networks, road widths and parking, regulations. Turning radii and street

Module 5	**Site Grading**	**Hrs.6**

Balancing Cut and Fill- measures to minimize impact of site grading- grade changes site stabilization techniques- slope stability- retaining walls- erosion and sediment control Storm water management- swales- detention and retention basins Gray water systems- sanitary sewers- on site sewage disposal systems-sewage treatment plants

Text Books:	
1	Randhawa M S : Flowering Trees. National Book Trust, New Delhi
2	Santapau H: Common Trees. India The Land And The People
3	Mukherjee Pippa : Nature Guides, Common Trees of India. Worldwide Fund For Nature, India.
4	Virginie & Elbert George A : Foliage Plants For Decorating Indoors. Timber Press,
5	Cloustan Brain : Landscape Design With Plants Ed. 2. Heinemann Newnes Oxford
Reference Books:	
1	Time Saver Standards for Landscape Architecture, Charles W Harris and Nicholas T Dine Mcgraw – Hill International Edition, Arch. Series
2	Bartrum Douglas: Rock Garden. John Gifford Ltd., London
3	Perkins Philip H: Concrete Floors Finishers
4	Text By David Stevens: Ultimate Water Garden Book
5	Littlewood Michael: Tree Detailing. London. Butterworth Architecture, 1988.

SUBJECT CODE	MDM -II	CREDITS
25UD1191MD506	Engineering Economics and Project Management	3

Teaching Work Load/week(Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	03	20	20	60	100

Course Objectives	
COBJ1	Introduce fundamentals of project management, types of projects, and organizational structures.
COBJ2	Develop skills in project planning, scheduling, and application of tools like CPM, PERT, and WBS.
COBJ3	Familiarize students with resource management, site layout, equipment productivity, and safety practices.
COBJ4	Enable understanding of project monitoring and control techniques including EVM and software applications.
COBJ5	Provide knowledge of engineering economics, financial principles, and project financing methods.

Course Outcomes: On completion of course, students will be able to	
CO1	Describe and explain key concepts of project management including roles, structures.
CO2	Develop and interpret project schedules using tools of construction management
CO3	Plan and manage materials, manpower, equipment, and site layout with attention to productivity and safety.
CO4	Analyze project progress using resource optimization, network analysis, and EVM techniques with basic software applications
CO5	Assess the economic viability of projects using time value of money, investment criteria, and feasibility reporting.

Course Contents

Module 1	**Fundamentals of Project Management**	**Hrs. 08**
Project and Project Management Basics, Management: Objectives, Functions, Principles, Project Types: Infrastructure, Industrial, R&D, Turnkey, Causes of Project Failure, Project Life Cycle and Cost Components, PMBOK: Domains and Knowledge Areas, Role of PMI and PMP Certification, Organizational Structures: Functional, Matrix, Projectized, Management by Objectives (MBO)		
Module 2	**Project Planning and Scheduling**	**Hrs. 08**
Planning: Strategic, Tactical, Operational, Work Breakdown Structure (WBS), Gantt/Bar Chart – Uses and Limitations, Network Techniques – Terms and Concepts, Critical Path Method (CPM – AOA), Floats and Critical Activities, Precedence Diagramming (AON), Types of Precedence Relationships, PERT – Time Estimation with Variability		
Module 3	**Project Resources and Site Management**	**Hrs. 08**
Material Management Objectives, Procurement Cycle: Indenting to Delivery, Excel and ERP for Material Tracking, Inventory Control: ABC Analysis, EOQ, Equipment Management: Productivity, Downtime, Fleet and Equipment Planning, Site Layout Planning Factors, Safety Norms – PPE, Legal Requirements		
Module 4	**Project Monitoring and Control**	**Hrs. 06**
Resource Allocation: Smoothing and Levelling, Network Crashing – Time-Cost Trade-off, Resource Optimization, Monitoring Progress and Milestones, Network Updating: Delays and Rescheduling, Earned Value Management (EVM), Software Introduction: MS Project / Primavera		
Module 5	**Engineering Economics and Financial Principles**	**Hrs. 08**

Role of Economics in Civil Projects, Economic Terms: Cost, Value, Price, Profit, Time Value of Money – PW, FW, Annuities, Interest Calculations: Simple and Compound, Demand & Supply – Concepts and Laws, Economic Laws: Demand, Substitution, Utility, Capital Types: Fixed, Working, Project Finance Sources: Debt vs Equity, Capital Instruments: Equity, Debentures, FDI

Text Books:	
1	Construction Project Management-Planning, Scheduling and Controlling by K. K. Chitkara, TMH.
2	Construction Management and Planning by B. Sengupta and H. Guha, Tata McGraw Hill .
3	The Essentials of Project Management by Dennis Lock, Gower Publishing Ltd. UK.
4	Total Engineering Quality Management – Sunil Sharma Macmillan India Ltd.
Reference Books:	
1	R. Panneerselvam – *Engineering Economics*
2	Total Quality Management - Dr. S.Rajaram and Dr. M. Sivakumar-- Biztantra

SUBJECT CODE	MDM -II	CREDITS
25UD1191MD506A	Planning Legislation	3

Teaching Work Load/week (Hrs.)			Examination Scheme (Marks)				
Theory	Tutorial	Laboratory	Theory	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives	
COBJ1	Introduce the concept, sources, and significance of law
COBJ2	Develop understanding of professional planning practice
COBJ3	Explain the evolution and framework of planning legislation in India
COBJ4	Familiarize students with legal mechanisms for land acquisition and assembly
COBJ5	Instill ethical values and professional responsibility

Course Outcomes: Students will be able to	
CO1	Explain sources of law and interpret legal terms relevant to planning, and assess the importance of statutory backing in urban and regional planning.
CO2	Apply professional practice principles related to contracts, tenders, project proposals, fees, and office management in planning assignments.
CO3	Analyze planning legislation and constitutional provisions, including the 73rd and 74th Amendments, and their implications for development control.
CO4	Evaluate land acquisition and land assembly frameworks using legal principles and case studies to understand planning disputes and resolutions.
CO5	Address ethical dilemmas in planning practice through reflective and deliberative approaches involving negotiation, stakeholder participation, and professional conduct.

Course Contents

Module 1	**Concept of Law**	**Hrs. 6**

Sources of law including custom, legislation and precedent; Meaning of the term of law, legislation, ordinance, bill, act, regulations and byelaws; Significance of law and its relationship to urban and regional planning; Benefits of statutory backing for planning at all levels.

Module 2	**Professional Engagement and Office Administration**	**Hrs. 6**

Tenders, Contracts, Formulation of Project Proposals., Professional fees for different types of planning practice, setting up of planning firms, official correspondence, office management practices. Concepts and contents of the Indian Constitution, article 21; Rights and their implications for planning; Fundamental provisions regarding property rights; Overview of legal tools connected with urban and regional planning and development; Model town planning laws.

Module 3	**Planning Law and its interface with other laws affecting development**	**Hrs. 6**

Evolution of town planning legislation, town planning laws, town planning as a state subject; 73rd and 74th amendment and its implications for planning law; Current amendments in planning and development laws; Related laws such as environment and infrastructure laws, heritage, housing, real estate, property law and their interaction with planning law.

Module 4	**Statutory Framework for Land Acquisition and Assembly**	**Hrs. 6**

Laws related to land assembly by public and private parties; Land acquisition legislations, eminent domain, police powers and concept of public purpose; Case studies highlighting nature of contentions, parties in dispute and decisions in specific planning disputes.

Module 5	**Ethical Planning Practice and Planning Engagement century**	**Hrs.6**

Human values and moral reasoning, Planning practice and ethical dilemmas, resolution of ethical dilemmas, code of professional conduct. Concept of reflective and deliberative practice, Study of decision making, role of different interest groups, deliberation and negotiation large planning project or policy modification requiring approvals.	
Text Books:	
1	Lakshimikanth, M. (2007) Indian Polity, Tata McGraw Hill, New Delhi
2	Bhattacharya, M. (2001) New Horizons of Public Administration, Jawahar Publishers and Distributors, Gurgaon
3	Needham, B. (2006) Planning, Law and Economics: An investigation in the rules we make for using land, Routledge, London.
4	McAuslan, P. (2019) Bringing the Law Back In: Essays in Land, Law and Development, Routledge, London
Reference Books:	
1	Urban Planning Theory and Practice by M. Rao
2	Planning Legislation and Professional Practice for AITP Students (Reader by B.K. Sengupta/ITPI)

SUBJECT CODE	MDM -III	CREDITS
25UD1191MD606	Town and Urban Planning	3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives	
COBJ1	Understand the necessity, scope, and historical evolution of town planning
COBJ2	Study contributions of eminent town planners and planning theories
COBJ3	Learn basic planning principles related to residential layouts
COBJ4	Understand elements of towns
COBJ5	Gain knowledge of planning legislation and planning approaches
Course Outcomes: Students will be able to	
CO1	Explain the evolution and principles of town planning
CO2	Describe the contributions of major town planners
CO3	Analyze residential layouts and neighborhood planning concepts
CO4	Apply knowledge of zoning, building bye-laws, urban roads, and landscape planning for effective town development.
CO5	Interpret town planning legislation (MRTP Act, Land Acquisition Act) and assess planning methodologies for urban and rural development.

Course Contents

Module 1	**Scope of Town Planning**	**Hrs. 6**

Necessity and scope of Town Planning, Brief history, Greek and Roman Towns, Planning in ancient India - Indus Valley Civilization, Vedic Period, Buddhist Period, Medieval Period, Mogul Period, British Period, Post-

Module 2	**Town Planning-History**	**Hrs. 6**

Town Planners in Modern Era such as Sir Patrick Geddes, Sir Ebenezer Howard, Clarence stein, Sir Patrick Abercrombie, Le Corbusier, Present Status of Town Planning in India, Efficiency Measures, Planners skills, Integrated Area Planning in India. Distribution and sizes of Settlements

Module 3	**Basic Planning**	**Hrs. 6**

Layout of Residential Units, Neighborhood Unit Planning, Radburn Plan, Grid Iron Pattern, Shoe String Development, Growth Pattern of Towns, Concentric Satellite, Ribbon Development, Scattered growth

Module 4	**Elements of Town**	**Hrs. 6**

Elements of Town, Various Zones, Development Control Rules and Building Bye Laws, Urban Roads: Objective, Classification, Road Networks, Data Collection Surveys, Analysis of data. Town aesthetics, Landscape Architecture, Suitability of Trees, Treatment of Traffic Islands, Open Spaces Walkways Public Sit-outs, Continuous Park System,

Module 5	**Town Planning Act**	**Hrs.6**

Town Planning works with reference to M.R.T.P. Act, Land Acquisition Act, Necessity and procedure of acquisition Village Planning, Multilevel Planning, Decentralization Concepts, Rural Developments, Planning Methodology, Growth Centre Approach, Area Development Approach, Integrated Rural Development Approach

Text Books:	
1	Hiraskar G.K. (2018) "Town and country Planning"DhanpatRai Publication, N. Delhi
2	Rangawala S.C. (2015) "Town Planning", Charotar Publications, Anand
3	Sundaram K.V. (1978) "Urban and Regional Planning in India", Vikash Publishing House Pvt. Ltd.
4	MRTP Act 1966 & 2002
5	Land Acquisition Act - 1894
Reference Books:	
1	Eisner S. and Gallion A. (1993) "The Urban Pattern", John Wiley & Sons, N. Delhi

SUBJECT CODE	MDM -IV	CREDITS
25UD1191MD606A	Disaster Mitigation and Management	3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives:

COBJ1	Understand the concept of disaster management.
COBJ2	Identify and classify different types of disasters.
COBJ3	Explain disaster mitigation strategies.
COBJ4	Study the legal and institutional framework.
COBJ5	Apply architectural and planning interventions.

Course Outcomes: Students will be able to

CO1	Define disaster management and explain its role in preparedness, response, and recovery of disasters.
CO2	Classify various types of disasters and analyze their causes, impacts, and consequences on society and infrastructure.
CO3	Evaluate disaster prevention, preparedness, and recovery strategies for effective risk reduction.
CO4	Interpret the provisions of the Disaster Management Act and understand institutional mechanisms for disaster response.
CO5	Apply architectural and planning measures such as fire safety rules, exits, and building regulations to mitigate disaster risks.

Course Contents

Module 1	**Disaster Management introduction**	**Hrs. 6**

The organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.

Module 2	**Types of Disasters**	**Hrs. 6**

Natural disasters: including floods, hurricanes, earthquakes and volcano eruptions that have immediate impacts on human health and secondary impacts causing further death and suffering from (for example) floods, landslides, fires, tsunamis.

Module 3	**Environmental emergencies**	**Hrs. 6**

including technological or industrial accidents, usually involving the production, use or transportation of hazardous material, and occur where these materials are produced, used or transported, and forest fires caused by humans.

Module 4	**Complex & Pandemic Emergencies**	**Hrs. 6**

Complex emergencies: involving a break-down of authority, looting and attacks on strategic installations, including conflict situations and war.

Pandemic emergencies: involving a sudden onset of contagious disease that affects health, disrupts services and businesses, brings economic and social costs

Module 5	**Remedies for disaster**	**Hrs.6**

Disaster prevention, Disaster preparedness, Disaster recovery. The Disaster Management Act. Architectural intervention to prevent and for remedial measures in case of any disaster like: Observance of Fire rules,

Text Books:

1	Disaster Management in India -Challenges & Strategies by R.K.Dave
2	Disaster Management by O.S. Dagur
3	Disaster Management E-Book by Harsh K. Gupta
Reference Books:	
1	Natural Hazards and Disaster by NCERT

SUBJECT CODE	MDM -V	CREDITS
26UD1191MD706A	Appropriate Building Technologies	3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives	
COBJ1	Introduce the concept of appropriate building techniques
COBJ2	Develop understanding of appropriate technologies
COBJ3	Study earth as a construction material.
COBJ4	Understand bamboo as a sustainable building material.
COBJ5	Familiarize students with the use of recycled and waste materials.

Course Outcomes: Students will be able to	
CO1	Explain various appropriate building techniques
CO2	Identify and apply appropriate technologies and prefabricated components
CO3	Analyze properties and applications of earth-based construction systems
CO4	Apply bamboo construction techniques
CO5	Evaluate the use of recycled and waste materials in construction

Course Contents

Module 1	**Types of Appropriate building techniques**	**Hrs. 6**

Introduction Types of Appropriate building techniques like, Earth, Flyash, Bamboo, Thatch, Ferro-cement, etc. Advantages of Appropriate building techniques over conventional methods. Alternative methods of construction related to different materials and their comparison. Upgradation, modification and revision of various methods of construction.

Module 2	**Appropriate technologies**	**Hrs. 6**

Appropriate technologies as evolved from contexts through the practice of Indian and International Architects. Systems and techniques developed in Research labs. Cost Reduction Techniques – Planning aspects. Prefabricated building components

Module 3	**Components of earth**	**Hrs. 6**

Earth: gravel, sand, silt and clay. Characteristics, advantages and disadvantages, needs and usage of various methods of construction like walling, flooring and roofing techniques. Composite materials made from earth like rammed earth, compressed stabilized earth blocks, stacked earth, sun dried clay bricks, and steam cured blocks, Wattle and Daub. Filler slab, Jack arch roof.

Module 4	**Bamboo**	**Hrs. 6**

Characteristics, advantages and disadvantages, needs and usage of various methods of construction like walling, flooring and roofing techniques. Preservation of bamboo, bamboo tiles, shingles, bamboo joints.

Module 5	**Recycled Waste Materials**	**Hrs.6**

Types of waste used in construction. Benefits of using recycled waste materials. Materials made out from waste paper, wood, plastic bottles, plastic bags, earthen materials, steel, aluminum, copper, bricks, gypsum, straw, and wool etc, Techniques of using these materials in building construction.

Text Books:	
1	Lewis Davidson Gotlieb, Environment and design in housing, The Mc.Millan Corp, New York
2	Housing and building in hot-humid and hot dry climate
3	Low-cost housing in developing countries/ Mathua
Reference Books:	
1	A.G MadhavaRao and D.S Ramachandra Murthy : Appropriate Technologies for Low cost housing.

SUBJECT CODE	MDM -V	CREDITS
26UD1191MD706B	Bamboo for Sustainable Development	3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives

COBJ1	Introduce the concept of appropriate building techniques
COBJ2	Develop understanding of appropriate technologies
COBJ3	Study earth as a construction material.
COBJ4	Understand bamboo as a sustainable building material.
COBJ5	Familiarize students with the use of recycled and waste materials.

Course Outcomes: Students will be able to

CO1	Understand Bamboo anatomy.
CO2	Understand Environmental issues.
CO3	Understand properties of bamboo
CO4	Understand applications of bamboo
CO5	Understand sustainable development

Course Contents

Module 1	**Understanding bamboo Anatomy**	**Hrs. 5**

Understanding Bamboo anatomy, Bamboo species in India & worldwide, Traditional use of bamboo in India & worldwide, Field visit to understand bamboo plant

Module 2	**Environmental impact**	**Hrs. 6**

Understanding environmental issues, Carbon Foot print of various building materials, Energy analysis, Response to Climate Change, environmental benefit of bamboo house

Module 3	**Properties & Preservation of Bamboo**	**Hrs. 6**

Various properties of bamboo, Physical, chemical & structural properties of various bamboo species, Bamboo preservation techniques, Field visit to understand preservation of bamboo

Module 4	**Application of bamboo as a industrial material**	**Hrs. 6**

Traditional uses of bamboo in historical context. Advantages of bamboo over timber, steel etc., use of bamboo in modern era, introduction to work of various organizations working in bamboo. Future of bamboo.

Module 5	**: Bamboo For sustainable development & schemes for bamboo**	**Hrs.6**

Sustainable development definition, criteria, Role of bamboo in sustainable development, economics in bamboo, government schemes for bamboo, case study (Mini Project)

Text Books:

1	David Farrelly, " The book of Bamboo '', Sep 2002, University of California press
2	Vinu Kale, " (Venu Bharati) '', CAPART publication , New Delhi
3	Jain A.K., "The Idea of Green Building" Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-256-4

Reference Books:

1	SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi (Part 6 – section 3)
2	IS 9096 (2006) Preservation of Bamboo

SUBJECT CODE	MDM -V	CREDITS
26UD1191MD706C	Ferrocement Technology	3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives

COBJ1	Understand the fundamentals of ferrocement, its composition, characteristics, types, and comparison with conventional concretes such as RCC, PSC, FRP, and polymer concrete.
COBJ2	Study raw materials, construction techniques, and workmanship requirements involved in the fabrication and construction of ferrocement structures.
COBJ3	Analyze mechanical behavior of ferrocement, including strength, shrinkage, creep, and performance under static and dynamic loading conditions.
COBJ4	Design ferrocement structural elements and systems using appropriate design methods, crack control concepts, and shape-based strength principles.
COBJ5	Evaluate cost, applications, and suitability of ferrocement in buildings, special structures, earthquake-resistant construction, and precast products.

Course Outcomes: Students will be able to

CO1	Define ferrocement and explain its basic concept, material composition, properties, and advantages over conventional construction materials.
CO2	Identify suitable raw materials, tools, skills, and construction methods required for forming durable ferrocement structures.
CO3	Analyze mechanical properties of ferrocement and assess its behavior under static, dynamic, shrinkage, and creep effects.
CO4	Design and analyze ferrocement structural elements such as plates, beams, walls, shells, and shaped forms using standard design approaches.
CO5	Apply ferrocement technology in cost-effective building construction, earthquake-resistant structures, hydraulic structures, soil-retaining systems, and precast components.

Course Contents

Module 1	**What is ferrocement?**	**Hrs. 5**

a) Definition. Basic concept like bond increase. Comparison with concretes like RCC, Prestressed, Asbestos cement, Fiber reinforced, Polymer concretes. Composition of ferrocement. Special types of Ferrocement. Ferrocement as substitute for conventional building materials. Typical characteristics and their applications.

b) Raw materials, skills, tools and plants. Ferrocement as material of construction. Forming a ferrocement structure. Properties and specifications of raw materials. Proportioning of cement mortar. Job requirements of required skills.

Module 2	**Mechanical properties and construction methods**	**Hrs. 6**

a) Mechanical properties and typical features affecting design. Properties under static and dynamic loading. Shrinkage and creep. Testing of ferrocement.

b) Methods of constructing ferrocement structures. Standardizing method of construction. Planning the work. Fabricating skeleton, tying meshes and mortaring. Curing. Maintenance. Protective surface treatments. Damage to ferrocement structures.

c) Strength through shape. Design of structure based on form and shape. Forms in nature. Various structural forms and their behavior. Typical strengths of different materials. Comparative study of various forms.

Module 3	Design of Ferrocement structures	Hrs. 6
a) Design of ferrocement structures. Design, analysis and optimization. Special design considerations for ferrocement. Typical features of ferrocement affecting design. Conventional design methods like working stress, load factor, applied to ferrocement. Design based on equivalent area method for compression, tension and flexural members. Specific surface method and crack control method b) Design of structures subjected to membrane stresses. Design of shaped structures in ferrocement like stiffened plates, arch faced walls, stiffened cavity walls and hollow floors and beams. Design of forms like 'T', 'U' 'T' '+' 'L'.		
Module 4	**Cost analysis and Ferrocement in Building construction**	**Hrs. 6**
a) Cost analysis: Factors governing cost analysis. Special considerations for ferrocement structures. Cost comparison with conventional construction. Specifications for ferrocement structures. Quantity analysis of material and labour for ferrocement items. Cost and value of ferrocement construction. b) Ferrocement in building construction. Ferrocement in foundations, walls, floors roofs. Ferrocement single wall construction. Design and construction of houses with cavity walls, hollow floors and hollow beams. Staircases and other building accessories. Earthquake resisting structures. Special characteristics of ferrocement to resist shock loading. Design and construction of quake proof structures.		
Module 5	**Special structures in Ferrocement**	**Hrs.6**
a) Hydraulic structures. Why ferrocement? Water retaining structures. Storage tanks of various types. Structures across streams. Ferrocement in layered form used for lining, water proofing and surface coating. b) Soil retaining structures. Types of retaining walls and their comparison with ferrocement arch faced wall. Design and method of fabrication and casting. Ferrocement counterfort retaining wall. Ferrocement containers for storing granular materials. c) Space structures and precast products: Ferrocement large size special purpose structures. Space structures like shells, pyramids, domes corrugated catenaries. d) Precast Ferrocement products: Why ferrocement for precasting? Methods of precasting. Ferrocement precast walling and flooring panels. Joints in precast ferrocement elements.		

Text Books:

1	"State-of-the-art report and guide for Design, Construction and Repairs of Ferrocement", ACI committee Report. No ACI549R- 88 and ACI 549.1R.88, Published by American Concrete Institute, Detroit, USA
2	"Ferrocement", Authors: B R Paul and R P Pama, Published by International Ferrocement Information Centre. A.I.T. Bangkok, Thailand.
3	Ferrocement and laminated cementitious composites, Author: A E Naaman, Publisher: Techno-press, Ann Arbor, Michigan, U S A.
4	Ferrocement- Materials and applications; Publication SP 61, A C I Detroit. U S A
5	"Ferrocrete Technology- A Construction Manual" Author: Dr B N Divekar. Published by the Author.
6	Chapter 1 titled 'Ferrocement' by S P Shah and P N Balaguru.in book 'Concrete Technology and Design Vol II' Editor; R N Swamy

Reference Books:

1	FS Code- for walls. Published by Ferrocement Society, India
2	Proceedings of FS 2011, FS 2013, FS 2015 by Published by Ferrocement Society, India
3	Proceedings of International Symposiums on 'Ferrocement and thin reinforced composites. -

SUBJECT CODE	Sustainable Building Planning	CREDITS
		3

Teaching Work Load/week (Hrs.)				Examination Scheme (Marks)			
Theory	Tutorial	Laboratory	Total	ISE	MSE	ESE	Total
3	0	0	3	20	20	60	100

Course Objectives	
COBJ1	To Understand the relationship between Natural environment and Built environment
COBJ2	To Study the effect of architectural development on natural resources
COBJ3	To study and understand passive methods of environmental control
COBJ4	To study and understand sustainable building design processes
COBJ5	To evaluate and apply sustainable building strategies over design

Course Outcomes: Students will be able to	
CO1	Understanding Natural environment and Built environment
CO2	Understanding effect of architectural development on natural resources
CO3	Understanding passive methods of environmental control
CO4	Understanding sustainable building design processes
CO5	Understanding sustainable building strategies over design

Course Contents

Module 1	**Environment**	**Hrs. 6**

Natural Environment, Ecology and ecosystems, Bio diversity and co-existence Relationship and co-existence of Built & Natural Environments Building Types & Lifestyles in different geographic zones and climatic zones.

Module 2	**Sustainable Development**	**Hrs. 6**

Concepts of sustainable development, Renewable resources, Conservation and generation of energy, Water cycle and its management. Concepts of Sustainable Building, Social, Economic and Environmental aspects, Different types of Indian and International Rating Systems.

Module 3	**Climatology and Building Sciences**	**Hrs. 6**

Micro climate and Macro climate, Energy flow in building Human comfort, Traditional methods for achieving comfort, Passive Methods of control Natural lighting, Solar Radiations and Architecture, Air flow patterns inside buildings and in building layouts, Natural ventilation

Module 4	**Energy Efficiency**	**Hrs. 6**

Energy Efficient Design (Achieving Efficiency through design), Energy Conservation Building Codes (ECBC) Codes 2007 Building Envelope, Understanding and calculation of energy consumption of a House, office building Learning Different Energy Simulation Techniques (Energy / Lighting), Advanced Energy Efficient Standards and Systems

Module 5	**Evaluation of sustainability**	**Hrs.6**

Post occupancy evaluation of case studies of student's thesis work ,Urban sustainability, Impacts of built environment on its surroundings.

Text Books:

1	Green Building Illustrated By Francis D.K.Ching

2	Sustainable Building Design Manuals (TERI): Volumes I-V
3	The Barefoot Architect: A Handbook for Green Building (Nader Khalili)
Reference Books:	
1	Sustainable Construction: Green Building Design and Delivery by Charles J. Kibert:
2	Handbook of Green Building Design and Construction by Sam Kubba