

MULTIDISCIPLINARY MINOR COURSES

MINOR DEGREE IN CIVIL ENGINEERING

Semester	Subject Code	Subject Name	Total Credits
SEM-III	24UD1191MD306	Introduction to Engineering Geology	3
SEM-III	24UD1191MD306A	Building Construction	3
SEM-V	25UD1191MD506	Engineering Economics and Project Management	3
SEM-VI	25UD1191MD606	Town and Urban Planning	3
SEM-VII	25UD1191MD706	Geomatics Engineering	3
SEM-VII	25UD1191MD706A	Infrastructure Engineering	3
SEM-VII	26UD1191MD706B	Bamboo for Sustainable Development	3
SEM-VIII	25UD1191MD801	MOOC/SWAYAM/NPTEL	2
MINIMUM CREDITS REQUIRED TO COMPLETE A MINOR DEGREE IN CIVIL 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 like 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
<p>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.</p> <p>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.</p> <p>Bridges: - Types of bridges, dependence of types of bridges on geological conditions and remedial measures.</p>		

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
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24UD1191MD306A		<h1>Building Construction</h1>				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	
COBJ 1	Learn masonry construction with reference to different building material - stone, brick etc.
COBJ 2	Learn construction details of all components of RCC frame structures.
COBJ 3	Learn means of communication – door, window, staircase, ramp.
COBJ 4	Learn types and construction details of roof in timber & steel.
COBJ 5	Learn Low-cost construction & pre cast construction techniques.

Course Outcomes: Students will be able to	
CO1	Understand & Draw construction details of load bearing structures.
CO2	Understand & Draw construction details of RCC frame structures.
CO3	Understand & Draw construction details of different types of means of communication.
CO4	Understand & Draw construction details of different types of Roofs.
CO5	Understand & Draw construction details of low-cost construction & pre cast construction.

Course Contents

Module 1	Masonry Construction	Hrs. 8
<p>Stone masonry: Setting of stone, joints, Random rubble, un-coursed rubble, coursed rubble & ashlar, General principles observed in stone Masonry.</p> <p>Brick masonry: General principles observed in Brick masonry, Bonds – English bond, Flemish Bond</p> <p>Composite Masonry: types, Partition walls in brick, concrete block, timber, glass & aluminum, autoclaved blocks, fly ash bricks.</p> <p>Spanning members in Masonry construction – a) Arch – Types, method of construction b) Lintels – steel, timber, stone, RCC.</p> <p>Foundation – Dewatering, Excavation for Foundation, soil bearing capacity, Timbering and Strutting, Foundation detail.</p>		
Module 2	Reinforced Cement Concrete	Hrs. 8
<p>Concrete & Reinforcement: Ingredients of concrete, mix design, Properties, tests, curing, Mixing, Reinforcement specification etc.</p> <p>Footing Types: Column Footing, Isolated and Combined Column Footing, Raft Foundation, Types of Pile foundation – bearing, friction, sheet, anchor, batter, fender, compaction.</p> <p>Column, Slab & Beam: Construction detail, Reinforcement, Slab (one way & two way), Type of beams – simply supported, continuous, cantilever.</p> <p>Formwork: Definition, Requirements, Materials used, Types and Removal of Formwork.</p>		
Module 3	Means of Communication	Hrs. 6
<p>Horizontal Communication: Doors –Components of Doors, Classification, Battened & ledged, Battened, ledged & braced, batten, ledged, braced & framed, framed & paneled, glazed, flush, revolving, sliding, collapsible, rolling.</p> <p>Windows: Component of windows, Types of Windows: fixed, pivoted, double hung, sliding, casement, glazed, louvered, metal, dormer, sky light, ventilators, bay window.</p> <p>Vertical Communication – a) Stair Case, Types – straight, dog legged, open newel, geometrical, Bifurcated, circular b) Construction detail -staircase in Timber, stone, RCC, steel, etc c) Designing staircase with given area &</p>		

height.

Vertical Communication - Lift, Elevator and Escalators, Guidelines of ramp for physically handicapped person, minimum size requirement, construction detail.

Module 4	Roofs & Floors	Hrs. 6
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Roofs – a) Types - Pitched, Flat, lean-to roof, coupled roof, Couple close roof, Collar roof, Scissor roof, Domes, Shells b) components of pitched roof – wall plate, rafter, purlin, batten etc. .

Trusses – a) Timber – king post truss, queen post truss b) steel trusses (types, joints).

Floors – Timber floor, Timber floors supported on rolled steel joist, Flag stone floors resting on steel joists, Jack arch floors, Ribbed floors, pre cast concrete floor.

Roof covering – Thatch covering, Shingles, Manglore Tiles, Aesbestos cement sheets, galvanized corrugated iron sheet, slates.

Module 5	Pre-fabricated structures, Building Skin, Low-cost construction	Hrs. 6
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Pre-fabricated structure - Principles- advantages and disadvantages, types of prefabricate, standardization, basic, nominal and actual dimensions, tolerances, joints production, transportation and erection

Building Skin – Curtain walls with transoms, mullions and infilling panels of various materials, Suspended Glazing, Composite panel cladding.

Low-cost construction techniques – Rat trap bond, compressed stabilized earth blocks, Bamboo construction, hollow blocks, pre cast wall & roof panels.

Text Books:

1	Ghose, D. N. Construction Materials Tata McGraw Hill, New Delhi, 2014 ISBN: 9780074516478
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2	Rangwala, S. C. Engineering Materials Charator publisher, Ahemdabad, 2015.
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3	S. P. Arora and Bindra, Building Construction, Dhanpat Rai Publication, Delhi Edition 2013.
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4	S. C. Rangawala, Building Construction Charotar Publication, Dist-Anand.
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5	Sushil Kumar, Building Construction, Standard Publication, Edition 2010.
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6	Francis D. K. Ching, Building Construction
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Reference Books:

1	Dr. B.C. Punmia, Building construction Laxmi publications, 10th edition 2016.
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2	A Text Book of Building Construction – S.P. Arora, S.P. Bindra (Dhanpat Rai Publications)
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3	A to Z of Practical Building Construction and Its Management- Sandeep Mantri (Satya Prakashan, New Delhi)
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4	Construction Technology (Volume 1 to 4) – R. Chudley (ELBS)
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5	Engineering Materials – R.K. Rajput (S. Chand) • Handbook of Building Construction
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SUBJECT		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 -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" Dhanpat Rai 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	MRTTP 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
25UD1191MD706	Geomatic Engineering						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 introduce the fundamentals and principles of remote sensing.
COBJ2	To understand image interpretation and digital image processing techniques.
COBJ3	To learn the concepts and implementation of spatial databases and spatial analysis.
COBJ4	To comprehend the components, functions, and applications of GIS.
COBJ5	To explore the implementation steps and real-life applications of GIS in civil engineering and related domains.

Course Outcomes: On completion of course, students will be able to	
CO1	Explain the principles and components of remote sensing systems and satellite platforms.
CO2	Perform visual and digital interpretation of remotely sensed data for terrain analysis.
CO3	Apply spatial database concepts and analysis techniques for data management and decision-making.
CO4	Understand the fundamentals and operational principles of GIS, including data models and projections.
CO5	Analyze and implement GIS applications in civil engineering, planning, hazard assessment, and business.

Course Contents

Module 1	Concepts of Remote Sensing	Hrs. 08
<p>Basics of remote sensing, elements involved, electromagnetic spectrum</p> <p>Terminology & units, energy resources, energy interactions with Earth surface & atmosphere</p> <p>Atmospheric effects, Remote sensing platforms and sensors, satellite orbits, sensor resolutions, types of sensors, IRS, and Landsat satellites series.</p>		
Module 2	Remote Sensing Data Interpretation & Digital Image Processing	Hrs. 08
<p>Visual interpretation techniques, elements, converging evidence, Spectral signature, Spectral properties of soil, water, vegetation, Digital image and properties, Concepts of digital image processing, image enhancement, Pattern recognition, classification techniques, and accuracy estimation.</p>		
Module 3	Spatial DBMS & Analysis	Hrs. 08
<p>Spatial DBMS: data storage, DBMS structure models, Entity Relationship model, normalization.</p> <p>Spatial Analysis: topology, vector & raster data analysis, network analysis, Data interpolation techniques, data input: keyboard, digitization, scanning, remotely sensed data.</p>		
Module 4	Introduction to GIS	Hrs. 08
<p>History and components of GIS, applications and integration of remote sensing,</p> <p>Nature of geographic data, types of maps and scales, Map projections, coordinate systems, geo-referencing, map transformation, Thematic mapping for various applications.</p>		

Module 5	Implementing a GIS and Applications	Hrs. 08
<p>Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems, decision making using GIS. Applications of GIS: GIS-based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi-criteria problems, GIS for business applications.</p>		

Text Books:	
1	Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2 nd Edition, 2011.
2	Introduction to Geographic Information Systems by Kang-Tsung Chang, McGraw-Hill Education (Indian Edition), 7 th Edition, 2015.
3	Fundamentals of Geographic Information Systems by Michael N. Demers, 4 th Edition, Wiley Publishers, 2012.
4	Textbook of Remote Sensing and Geographical Information Systems by M. Anji Reddy.
Reference Books:	
1	Remote Sensing and Image Interpretation by Thomas M. Lillesand and Ralph W. Kiefer, Wiley Publishers, 7 th Edition, 2015.
2	Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley India Publication, 3 rd Edition, 2010.
3	Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, R. Sathi Kumar, N. Madhu, Pearson Education, 1 st Edition, 2007.

SUBJECT CODE		MDM -IV				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	
		Sustainable Building 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	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

SUBJECT CODE		MDM -V						CREDITS	
		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 Madhava Rao and D.S Ramachandra Murthy: Appropriate Technologies for Low cost housing.