

**MRSPTU M.ARCH. (BUILDING ENGINEERING AND MANAGEMENT)
SYLLABUS 2018 BATCH ONWARDS**

SEMESTER 1 st		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MARC3-101	Building Engineering and Construction Technology	3	1	0	40	60	100	4
MARC3-102	Project Procurement, Planning and Control Techniques	3	1	0	40	60	100	4
MARC3-103	Energy Efficient Construction and Green Buildings	3	1	0	40	60	100	4
MARC3-104	Building Information and Energy Management Lab.	0	0	4	60	40 (Viva voce)	100	2
Departmental Elective – I (Select any one)		3	1	0	40	60	100	4
MARC3-156	Infrastructure Development and Management							
MARC3-157	Quality Management Techniques							
Departmental Elective – II (Select any one)		3	1	0	40	60	100	4
MARC3-158	High Rise Buildings and Large Span Structures							
MARC3-159	Building Maintenance & Management							
Total		15	5	4	260	340	600	22

*Educational Tours/Case Studies (of duration up to one week) relevant to various subjects may be undertaken during the semester.

SEMESTER 2 nd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MARC3-205	Research Methodology	3	1	0	40	60	100	4
MARC3-206	Building Costing and Financial Management	3	1	0	40	60	100	4
MARC3-207	Project Management - Software Lab.	0	0	4	60	40 (Viva voce)	100	2
Departmental Elective – III (Select any one)		3	1	0	40	60	100	4
MARC3-260	Site Safety							
MARC3-261	Material Management Techniques							
Departmental Elective – IV (Select any one)		3	1	0	40	60	100	4
MARC3-262	Advanced Building Services							
MARC3-263	Concrete Technology							
Open Elective – I (Select any one)		3	1	0	40	60	100	4
Total		15	5	4	260	340	600	22

*Educational Tours/Case Studies (of duration up to one week) relevant to various subjects may be undertaken during the semester.

**MRSPTU M.ARCH. (BUILDING ENGINEERING AND MANAGEMENT)
SYLLABUS 2018 BATCH ONWARDS**

SEMESTER 3 rd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MARC3-308	Seminar	0	0	8	100 (Viva voce)	0	100	4
MARC3-309	Project	0	0	14	60	40 (Viva voce)	100	10
Professional Skill		3	1	0	40	60	100	4
MARC3-310	Real Estate Management and Ethics							
Departmental Elective – V (Select any one)		4	0	0	40	60	100	4
MARC3-364	Environmental Compliances							
MARC3-365	Project Management for Disaster Resilience							
Open Elective – II (Select any one)		3	1	0	40	60	100	4
Total		10	2	22	280	220	500	26

SEMESTER 4 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MARC3-411	Thesis	0	0	0	40	60 (Viva voce)	100	20

*One research paper is to be written on the Thesis work carried out and presented to his/her supervisor and the Department Research Committee (DRC). The paper, if approved, shall be communicated for publication in the journal recommended by DRC.

*On completion of thesis, the candidate shall present his/her work and defend it before DRC. If approved, the thesis shall be accepted for external evaluation.

Overall

Semester	Marks	Credits
1 st	600	22
2 nd	600	22
3 rd	500	26
4 th	100	20
Total	1800	90

BUILDING ENGINEERING AND CONSTRUCTION TECHNOLOGY

Subject Code: MARC3-101

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students learn aspects of building engineering and technologies related to construction of buildings.

EXPECTED OUTCOMES

The student shall be able to select appropriate technologies for various construction projects.

Unit-I

1. Geotechnical investigations and interpretation of results.
2. Settlements of buildings and techniques for ground improvement.
3. Methods of deep excavation.
4. Foundations- Types, special foundation systems for multi-storeyed buildings.
5. Basements- Waterproofing techniques for basements.

Unit-II

1. Cement selection for civil works.
2. Concrete making materials.
3. Different types of cementitious materials, different types of cements and pozzolanas, Admixtures and Construction Chemicals: Benefits of admixtures, type of admixtures, plasticizers, super plasticizers-cement compatibility, waterproofing admixture, antibacterial and similar admixtures.

Unit-III

1. Factors affecting selection of equipment - technical and economic.
2. Analysis of production outputs and costs.
3. Characteristics and performances of equipment for Earth moving, Erection, Material transport, Pile driving, Dewatering, Concrete construction (including batching, mixing, transport, and placement) and Tunneling.

RECOMMENDED BOOKS

1. M.L. Gambhir, 'Concrete Technology', McGraw Hill Education.
2. Neville and Brooks, 'Concrete Technology', Prentice Hall.
3. M.S. Shetty, 'Concrete Technology', S. Chand.
4. Mahesh Verma, 'Construction Equipment and its Planning and Application'.
5. R.L. Peuripo, 'Construction Planning Equipment and Methods', Tata McGraw Hill.
6. Jagman Singh, 'Heavy Construction Planning Equipment and Methods', Oxford.

PROJECT PROCUREMENT, PLANNING AND CONTROL TECHNIQUES

Subject Code: MARC3-102

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

1. To make the student understand the project procurement process.
2. To disseminate knowledge of project planning and control techniques with reference to construction of a building.

EXPECTED OUTCOMES

The students shall be able to take effective decisions for project procurement and at the same time use planning and control techniques to manage various situations on projects.

Unit-I

1. Project procurement management - Procurement guidelines (World Bank ADB).
2. Preparation of contract documents (RFP, RFQ).
3. Pre-qualification of contractors.
4. Evaluation of Technical and financial bid proposals.
5. Negotiations, Award of contracts.
6. Arbitration.
7. Procurement for various supplies, equipment and machineries.

Unit-II

1. Project Planning – Need, constructional resources, construction team, stages in construction, construction schedule.
2. Work breakdown structure, Time estimates.
3. Planning and scheduling construction jobs by bar charts, Critical path Method (CPM) and PERT techniques.
4. Optimization of resources.

Unit-III

1. Time cost analysis.
2. Earned value management - Developing planned value, actual cost, earned value and variances, EVM application for project progress.
3. Resource and material management - Resource allocation, Resource histograms and Resource levelling, PACK method, Branch and Bound method.
4. Supervision, Inspection and quality control in construction.
5. Total quality management (TQM).

RECOMMENDED BOOKS

1. K.K. Chitkara, 'Construction Project Management: Planning Scheduling and Control', Tata McGraw Hill Publishing Company, New Delhi, 1998.
2. M. Popescu Calin, Chotchchal Charoenngam, 'Project Planning, Scheduling and Control in Construction: An Encyclopaedia of Terms and Applications', Wiley, New York, 1995.
3. Chris Hendrickson and Tung Au, 'Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders', Prentice Hall Pittsburgh, 2000.
4. Moder, C. Phillips and E. Davis, 'Project Management with CPM, PERT and Precedence Diagramming', 3rd Edn., Van Nostrand Reinhold Company, 1983.
5. E.M. Willis, 'Scheduling Construction Projects', John Wiley & Sons, 1986.

ENERGY EFFICIENT CONSTRUCTION AND GREEN BUILDINGS

Subject Code: MARC3-103

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To learn principles and design strategies for energy efficient and green buildings especially at schematic design stage. The emphasis would be learning through exemplars. To present a value system for selecting environmentally preferable products and an overview of green and sustainable building materials.

EXPECTED OUTCOMES

Student shall able to understand basic knowledge about energy efficient construction technologies and green building materials.

Unit-I

1. Energy sources- Renewable and Non-renewable.
2. Energy and Environment: World/Asia energy outlook.
3. Building types and energy consumption (including heating, cooling, ventilation, lighting and other loads).
4. Psychometrics and comfort.
5. Thermal behaviour of buildings.
6. Natural and Mechanical Ventilation.

Unit-II

1. Energy efficiency considerations.
2. Introduction to Building Physics.
3. Energy efficient measures- Study of energy efficiency principles of a building for different climatic zones.
4. Sustainable construction- Green buildings.
5. Sustainability assessment- Rating Systems.
6. Energy Conservation Building Codes.

Unit-III

1. Study of Embodied energy- Carbon footprint, carbon neutral buildings.
2. Building Automation, BIM and Performance assessment.
3. Analysis of Lighting- Day-lighting and Electric-lighting.
4. Energy Auditing.
5. Software tools for energy analysis of buildings.

RECOMMENDED BOOKS

1. MoEF, 'Environmental Clearances, Ministry of Environment and Forest', Government of India, New Delhi, <http://moef.nic.in/modules/project-clearances/environment-clearances/>, **2006**.
2. BIS, 'Handbook of Functional Requirements of Buildings (other than industrial building) SP 41(S & T)', Bureau of Indian Standards, New Delhi, 1987.
3. BIS, 'National Building Code of India SP: 7', Bureau of Indian Standards, New Delhi, 2005.
4. BEE, 'Energy Conservation Building Code', Bureau of Energy Efficiency, Ministry of Power, Government of India, 2007.
5. MNRE, 'Green Rating for Integrated Habitat Assessment', Ministry of New and Renewable Energy, Government of India, New Delhi. <http://www.grihaindia.org/index.php>, 2010.
6. IGBC, 'LEED – India, Green Building Rating System, (LEED-India NC)', version 1.0, Indian Green Building Council, Hyderabad. http://www.igbc.in/site/mmbase/attachments/48344/LEED.Abrid_Ver.pdf, 2007.
7. D.P. Lawrence, 'Environmental Impact Assessment: Practical Solutions to Recurrent Problems', John Wiley & Sons, New Delhi, 2003.
8. Kulbhushan Jain, 'Earth Architecture'.

BUILDING INFORMATION AND ENERGY MANAGEMENT LAB.

Subject Code: MARC3-104

**L T P C
0 0 4 2**

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students gain the fundamental knowledge of using energy modelling, simulation technology and equipment as an energy performance analysis tool.

EXPECTED OUTCOMES

The students shall be able to calculate the energy consumption of heating, cooling, lighting and other equipment to understand the thermal behavior of buildings by using energy modelling simulation programs and equipment.

PROJECTS

1. Building Information Management (BIM) systems.
2. Energy performance analysis- Thermal analysis, Thermal modelling (heating, cooling loads).
3. Ventilation models- Steady state, Dynamic heat flow.
4. Lighting analysis- Day lighting, Artificial lighting.
5. Evaluating models- Measurements with equipment, Comparisons, Verifications.

Note: The progress of lab work is to be presented by the student periodically in classroom environment which shall be evaluated by teacher in-charge continuously. The student is required to appear for a viva voce examination to be conducted by external examiners at the end of semester.

INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT

Subject Code: MARC3-156

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the basic concepts related to infrastructure development and its management for planning and effective delivery.

EXPECTED OUTCOMES

The student shall be able to develop expertise in effective management of infrastructure challenges.

Unit-I

1. Overview of infrastructure sector.
2. Introduction to infrastructure business.
3. Various types of infrastructure.
4. Infrastructure project feasibility - Appraisal and Diligence.
5. Life Cycle perspective of infrastructure.
6. Project implementation approach - SPVs and PPPs.

Unit – II

1. Introduction to Infrastructure project planning and management techniques.
2. Stages of Project formulation and their significance.
3. Strategic planning measures.
4. Project feasibility analysis.
5. Integrated reporting techniques- Milestone technique, time and cost underrun, Cost overrun techniques, Unit index technique.

Unit – III

1. Typical DPR structuring.
2. Case studies for application of social and financial cost benefits in rural and urban sector.
3. Infrastructure development under JNNURM, NCR and growth centres.

RECOMMENDED BOOKS

1. N. Mani, 'Infrastructure Development and Financing in India'.
2. Nilanjan Ray, Dillip Kumar Das, Somnath Chaudhuri and Arindam Ghosh, 'Strategic Infrastructure Development for Economic Growth and Social Change'.
3. Michel Crouhy, Dan Galai, Robert Mark, 'The Essentials of Risk Management'.
4. Thomas S. Coleman, 'Practical Guide to Risk Management'.
5. Stephen Asbury and Edmund Jacobs, 'Dynamic Risk Assessment: The Practical Guide to Making Risk-Based Decisions with the 3-Level Risk Management Model'.

QUALITY MANAGEMENT TECHNIQUES

Subject Code: MARC3-157

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the concept of quality management system and apply various techniques in the management of a construction project.

EXPECTED OUTCOMES

The student shall be able to apply the techniques of quality management in the various construction activities.

Unit-I

1. Quality concepts, Evolution of modern concepts of quality management process approach, Quality Assurance and control.
2. Total quality management (TQM) and Total quality circle, Practical aspects of quality control of building projects, TQM system evaluation (NBQ Awards criteria).

Unit-II

1. Concept of quality in building design, construction and project management.
2. Deming's principles.
3. Concepts – Juran, Ishikawa, Crosby, Taguchi.

Unit-III

1. Product quality approach versus Systems quality approach.
2. Quality tools – SWOT analysis, Ishikawa diagram, Pareto analysis, Delphie technique, Statistical quality control, Just in time technique.
3. ISO 9000 quality system standards for major building items and ISO 14000 series for environmental management systems.

RECOMMENDED BOOKS

1. Geoff Vorley and Fred Tickle, 'Quality Management (Principles and Techniques)'.
2. Poornima M. Charantimath, 'Total Quality Management'.
3. Joseph Berk, 'Total Quality Management: Implementing Continuous Improvement'.
4. P. Saravanavel & S. Balakumar, 'Total Quality Management'.
5. D.R. Kiran, 'Total Quality Management'.

HIGH RISE BUILDINGS AND LARGE SPAN STRUCTURES

Subject Code: MARC3-158

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the construction technology social and ecological aspects of high rise and large span structures.

EXPECTED OUTCOMES

Student shall able to understand basic knowledge about energy efficient construction technologies and green building material.

Unit-I

1. Conceptual Understanding of various large span structures, like Geodesic domes, hyperbolic paraboloids, and free form shapes etc. used for Airports, Stadia, Industrial buildings, public spaces etc.
2. Construction details understanding, Service systems, Structural Systems, Sequence of erection of large span structures.
3. Identification of specialized equipment required for erection of large span structures.

Unit-II

1. Conceptual Understanding of High rise buildings: Different types of forces on high rise structures, Types of High Rise structures – Exterior structures such as Braced Frames, tube structures, tube in tube structure, Diagrid structures, trussed tubes, bundled tubes, space truss etc.
2. Interior structures such as Rigid frame structures, braced frame cores, shear wall cores etc. Machines & equipment for high rise construction.
3. Understanding construction details, Service systems, Sequence of erection of such structures.

Unit-III

1. Architectural design considerations for long span and high rise buildings, space planning and design standards.
2. An approach to sustainable and green high rise buildings including the concepts of Zero Energy Habitat.
3. Norms for high rise and large span structures as per NBC/bye laws.

RECOMMENDED BOOKS

1. Salvadori and Heller, 'Structure in Architecture'.
2. William Morgan, 'Elements of Structure: An Introduction to the Principles of Building and Structural Engineering'.
3. Francis D.K. Ching, Barry S. Onoye, Douglas Zuberbuhler, 'Building Structures Illustrated', John Wiley & Sons.
4. Michael Barnes and Michael Dickson, 'Widespan Roof Structures'.
5. Johann Eisele and Ellen Kloft, 'High Rise Manual', Birkhauser Boston.
6. Mehmet Halis Günel, 'Tall Buildings: Structural Systems and Aerodynamic Form'.
7. A.K. Mittal, 'Electrical and Mechanical Services in High Rise Building: Design and Estimation Manual'.
8. K. Ishii, 'Structural Design of Retractable Roof Structures (Advances in Architecture)'.

BUILDING MAINTENANCE AND MANAGEMENT

Subject Code: MARC3-159

L T P C

Contact Hrs.: 45

3 1 0 4

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students develop an understanding of various techniques of maintenance in existing buildings.

EXPECTED OUTCOMES

The students shall be able to make effective decision making for maintenance options for components of built environment.

Unit-I

1. Building maintenance- Introduction, need, scope and importance.
2. Economic and social significance of building maintenance.
3. Causes of distress, defects and decay in buildings from Foundation to Parapet levels including services.
4. Classification of maintenance works.

Unit-II

1. Defects in buildings from Foundation to Parapet level including services.
2. Diagnostic techniques.
3. Repair methods and Materials for maintenance.
4. Specifications for maintenance jobs.

Unit-III

1. Maintenance management – Definition, work force and communication needs.
2. Maintenance budget and estimates.
3. Maintenance manuals and their importance.
4. Maintenance in High-rise and Large span structures.

RECOMMENDED BOOKS

1. A.C. Panchdhari, 'Maintenance of Buildings', New Age International (P) Limited, Publishers, New Delhi, 2003.
2. CPWD, 'Maintenance Manual of CPWD', Director General (Works) CPWD, Nirman Bhawan.
3. P.S. Gahlot and Sanjay Sharma, 'Building Repair and Maintenance Management'.
4. G. Szechy and D. SC, 'Foundation Failures', Concrete Publications Ltd., 14 Dartmouth Street, London.
5. Allan Hancock, 'Common Defects in Buildings', College H.J. Eidridge Her Majesty's Stationery Office, London.
6. W.H. Ransom, 'Building Failures: Diagnosis and Avoidance', New Age Publications (P) Ltd.
7. 'Housing Defects Reference Manual', The Building Research Establishment E. & F.N. SPON.

RESEARCH METHODOLOGY

Subject Code: MARC3-205

L T P C

Contact Hrs.: 45

3 1 0 4

PREREQUISITES

Nil

COURSE OBJECTIVES

To develop capabilities in students to conduct academic research.

EXPECTED OUTCOMES

The students shall be able to conduct academic Research and articulate the findings of research for dissertation research papers seminars and thesis report.

Unit-I

1. Research – Definition, objective and process.
2. Research Design - Definition and types – Historical, Descriptive, Exploratory and Experimental.

3. Research problem – Need, Identification of Research Area, Problem formulation and Literature review.
4. Hypothesis - Formulation and feasibility.
5. Research methodology - Quantitative and qualitative research.

Unit-II

1. Sources of data - Primary and Secondary.
2. Data collection methods – Planning sample surveys.
3. Sampling techniques - Sample size and population.
4. Field application and simulation models.
5. Ranking and scoring.

Unit-III

1. Data analysis and results.
2. Introduction to analysis of survey data techniques - Statistical methods (Central tendency, Dispersion, Correlation, Linear and partial regression, Skewness, Time series).
3. Validity and reliability analysis.
4. Derivation of conclusions and Formulation of research recommendations.

RECOMMENDED BOOKS

1. R.I. Levin and D.S. Rubin, ‘Statistics for Management’, 7th Edn., Pearson Education, New Delhi.
2. N.K. Malhotra, ‘Marketing Research–An Applied Orientation’, 4th Edn., Pearson Education, New Delhi.
3. Donald Cooper, ‘Business Research Methods’, Tata McGraw Hill, New Delhi.
4. Sadhu Singh, ‘Research Methodology in Social Sciences’, Himalaya Publishers.
5. Darren George & Paul Mallery, ‘SPSS for Windows Step by Step’, Pearson Education, New Delhi.
6. C.R. Kothari, ‘Research Methodology Methods & Techniques’, 2nd Edn., New Age International Publishers.

BUILDING COSTING AND FINANCIAL MANAGEMENT

Subject Code: MARC3-206

L T P C

Contact Hrs.: 45

3 1 0 4

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the fundamentals of financial management and methods of cost estimation in buildings.

EXPECTED OUTCOMES

The student shall be able to prepare estimates and carry out financial feasibility of projects for evaluation of investment decisions.

Unit-I

1. Estimation types- Parametric and elemental method.
2. Preliminary and detailed cost estimation.
3. Analysis of Rates- analysis of material, labour equipment, and contingencies.
4. Schedule of rates.
5. Preparation of bill of quantities.
6. Construction specifications, formulation of specifications for special items.

Unit-II

1. Estimation of building services- plumbing, water supply, electrification, sanitary fittings, HVAC.

2. Value Engineering.
3. Valuation for building projects.
4. Methods for valuation including income capitalisation method and market analysis.
5. Life cycle cost analysis.

Unit-III

1. Finance Management- Time value of money, depreciation, inflation and capital budgeting techniques.
2. Management of working capital.
3. Cash flow- forecasting and management techniques.
4. Payment of works.
5. Analysis of financial ratio, NPV, ROR and RIR, discounted cash flow, cost benefit analysis, break even analysis, financial statement analysis balance sheet income and project loss statement profit after taxation.
6. Financial planning- Preparation of financial feasibility report, project investment decisions and financial risk analysis.

RECOMMENDED BOOKS

1. B.N. Dutta, 'Estimating and Costing'.
2. G.S. Birdie, 'Estimating and Costing'.
3. Chakaraborty, 'Estimating and Costing'.
4. F.W. Mueller, 'Integrated Cost and Schedule Control for Construction Projects'.
5. Gobourne, 'Cost Control in the Construction Industry'.
6. Chris Hendrickson and Tung Au, 'Project Management for Construction'.
7. Datta, 'Material Management Procedures, Text and Cases', Prentice Hall.
8. P. Gopalakrishnan and M. Sundaresan, 'Material Management - An Integrated Approach', Prentice Hall.

PROJECT MANAGEMENT- SOFTWARE LAB.

Subject Code: MARC3-207

L T P C

0 0 4 2

PREREQUISITES

Nil

COURSE OBJECTIVES

To augment the knowledge of students through study of live construction projects by using project management software.

COURSE OBJECTIVES

The students shall be able to take effective decision making for project scheduling with the help of project management software.

PROJECTS

1. Cost benefit analysis of project.
2. Value Engineering of project.
3. Preparation of project schedules with PERT/CPM.
4. Preparation of project schedules with PRIMAVERA.
5. Preparation of resource sheets.
6. Plotting variance graphs of project.

Note: The progress of lab work is to be presented by the student periodically in classroom environment which shall be evaluated by teacher in-charge continuously. The student is required to appear for a viva voce examination to be conducted by external examiners at the end of semester.

SITE SAFETY

Subject Code: MARC3-260

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the various aspects related to safety requirements at building sites.

COURSE OBJECTIVES

The students shall be able to determine and analyse the implications of safety at site.

Unit-I

1. Safety during project construction- Training to project staff and operation staff.
2. Stages of project construction.
3. Safety during receiving, unloading, shifting and storage.
4. Safety facilities at sites.
5. Legal framework for site safety during construction.

Unit-II

1. Interface between civil and erection works.
2. Safety guidelines.
3. Hazardous atmosphere and material.
4. Emergency rescue equipment.
5. Shoring for trenches.
6. Safety in cutting, brazing and gas welding.
7. Scaffolding – Types, design, causes of hazards, International labor organization (ILO) recommendations.

Unit-III

1. Safety in concrete - Concrete forms, reinforcement and placement.
2. Electrical safety in constructions.
3. Safety in use of power tools, hand tools, pneumatic tools and precautions.
4. Site evacuation plan.
5. Safety in material handling.

RECOMMENDED BOOKS

1. Phil Hughes and Ed Ferrett, 'Introduction to Health and Safety in Construction'.
2. Neil Gunningham and Richard Johnstone, 'Regulating Workplace Safety'.
3. Richard Hislop, 'Construction Site Safety: A Guide for Managing Contractors'.
4. Charles D. Reese, 'Accident/incident prevention techniques'.

MATERIAL MANAGEMENT TECHNIQUES

Subject Code: MARC3-261

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To impart knowledge related to procurement, monitoring and control processes of materials of a building project.

EXPECTED OUTCOMES

The student shall be able to make decision making with regard to management of materials in a construction project.

Unit-I

1. Material management – Definition, scope, objective and functions.
2. Concept of Integrated Material Management.
3. Relationship of material management with other organizational functions.
4. Supply chain management.
5. Material planning – Need, factors affecting material planning, techniques, classification and codification.
6. Material budgeting – Need and techniques.

Unit-II

1. Inventory control – Need and types of inventory.
2. Functions of inventory control.
3. Inventory costs.
4. Inventory control tools – ABC, VED, XYZ and FSN.
5. Economic order quantity and replenishment of stocks.

Unit-III

1. Purchasing principles, procedures and system.
2. Make or buy decisions.
3. Factors affecting purchase decisions.
4. Documentation and procedure for import.
5. Functions and importance of store keeping – store accounting and verification.
6. Management of surplus, scrap and obsolete items.

RECOMMENDED BOOKS

1. Glen Arnold, 'Introduction to Materials Management'.
2. A. K. Datta, 'Materials Management: Procedures, Text and Cases'.
3. Martin Christopher, 'Logistics and Supply Chain Management', Pearson Education Asia, 2002.
4. Peter Meindl, 'Supply Chain Management–Strategy, Planning and Operations', Pearson Education, Asia.

ADVANCED BUILDING SERVICES

Subject Code: MARC3-262

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To provide exposure to students about various aspects of mechanical, electrical, plumbing, vertical transportation and fire safety services for effective coordination during pre-construction and construction phases of a project.

EXPECTED OUTCOMES

The student shall be able to understand the schematics of infrastructural services in a project.

Unit-I

1. Water and waste management- Water supply (sources, pumping, reservoirs, water treatment, pipe materials).
2. Quality and quantity standards for water.
3. R.O. system for potable water.
4. Sewage and sewage treatment plants.
5. Storm water system, rain water harvesting.
6. Multi-stage pumping, net zero water approach.
7. Fittings and fixtures.

Unit-II

1. HVAC systems – types and components, heating and cooling load determination, District cooling, Planning and design of duct systems.
2. Electrical services – Components, sub-stations, power distribution systems (underground and overhead), metering, renewable energy sources.

Unit-III

1. Vertical transportation systems – Elevators, travellers, escalators.
2. Fire fighting systems – Causes of fire, fire resistant materials, escape layouts for high-rise buildings, methods of firefighting and fire protection.

RECOMMENDED BOOKS

1. Klaus Daniels, 'Advanced Building Systems: A Technical Guide for Architects and Engineers'.
2. R. Birdi, 'Water Supply and Sanitation'.
3. R. Barry, 'Building Services', John Wiley and Sons Ltd., 1998.
4. G.S. Bindra, J.S. Bindra, 'Water Supply and Sanitation'.
5. Shah S. Charanjit, 'Water Supply and Sanitation', Galgotia Publishing, New Delhi, 2008.
6. 'National Building Code', 2005.

CONCRETE TECHNOLOGY

Subject Code: MARC3-263

**L T P C
3 1 0 4**

Contact Hrs.: 45

PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the concepts, discourses and practices of smart cities across globe and in Indian context.

EXPECTED OUTCOMES

The students shall be able to comprehend the road map for planning smart cities and benchmarking their performance.

Unit- I

1. Introduction of Concrete materials, Admixtures, Fly Ash, Polymers, Early Age Properties, Strength, Permeability & Durability. Principles of Concrete mix design, Concrete Mix Design procedure by: IS/ACI/British Standards.
2. Concrete technology – Materials, Admixtures, Properties, Durability, Mix design, Special concretes, Alternate aggregates, Ready mix concrete.

Unit – II

1. Production, transportation and placement of concrete.
2. Special concrete operations – Shot-crete, grouting, guniting, underwater concreting, hot and cold weather concreting, Architectural finishes and aesthetic concrete, Alternative aggregates.
3. Formwork systems- (including slip-form), temporary works and enabling works.
4. Scaffolding systems.

Unit – III

1. Quality control investigations - Laboratory and In-situ tests.
2. Precast, Pre-stressed concrete.
3. Quality Control laboratory facilities and processes, experimental investigations; In-situ tests on concrete (including Non – Destructive Testing), Field laboratory tests

RECOMMENDED BOOKS

1. IS/ACI/British Standards, 'Principles of Concrete Mix Design, Concrete Mix Design Procedure'.
2. Mahesh Verma, 'Construction Equipment and its Planning and Application'.
3. R.L. Peuripo, 'Construction Planning Equipment and Methods', Tata McGraw Hill.
4. Jagman Singh, 'Heavy Construction Planning Equipment and Methods', Oxford and IBH.

SEMINAR

Subject Code: MARC3-308

**L T P C
0 0 8 4**

COURSE PREREQUISITES

Nil

COURSE OBJECTIVES

To provide an opportunity to students for carrying out academic research in the areas of their interest.

EXPECTED OUTCOME

The student shall be able to prepare state of art seminar report by assimilation of concepts on a chosen area of building engineering and management through literature study and data collection.

PROJECTS

1. A comprehensive state of art report is to be prepared on the chosen topic with the identification of areas requiring further research. Students are required to develop a research methodology and hypothesis for this purpose and test their outcome proposals through various methods - including questionnaire surveys and case studies. Students must create an innovative insight on the specific issues.
2. It is encouraged that students identify topics for the seminar work which can be further developed into another research Project in the same semester.
3. Alternatively, this seminar report can be independent research topic.

Note: The progress of seminar work is to be presented and discussed by the student periodically in classroom environment which shall be monitored continuously. The students shall be provided guidance from the faculty. The student is required to defend his/her seminar report at a viva voce examination by internal examiners.

PROJECT

Subject Code: MARC3-309

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COURSE PREREQUISITES

Nil

COURSE OBJECTIVES

To provide an opportunity to students for carrying out academic research in the areas chosen for seminar report or different.

EXPECTED OUTCOME

The student shall be able to prepare state of art Project report by assimilation of concepts on a chosen area of building engineering and management through literature study and data collection with more specific findings.

PROJECTS

1. A comprehensive state of art report is to be prepared on the chosen topic with the identification of areas requiring further research. Students are required to develop a research

methodology and hypothesis for this purpose and test their outcome proposals through various methods - including questionnaire surveys and case studies. Students must create an innovative insight on the specific issues.

2. It is encouraged that students identify topics for the seminar work which can be further developed into another research Project in the same semester.
3. Alternatively, this project report can be independent research topic.

Note: The progress of project work is to be presented and discussed by the student periodically in classroom environment which shall be monitored continuously. The students shall be provided guidance from the faculty. The student is required to defend his/her Project report at a Viva voce examination by external examiner.

REAL ESTATE MANAGEMENT AND ETHICS

Subject Code: MARC3-310

**L T P C
3 1 0 4**

Contact Hrs.: 45

COURSE PREREQUISITES

Nil

COURSE OBJECTIVES

To make students familiar with aspects related to management of Real Estate projects.

EXPECTED OUTCOMES

The student shall be able to comprehend the interests of various stakeholders and understand the professional responsibilities.

Unit-I

1. Real Estate – Scope, classification and characteristics.
2. Role, scope and functions of real estate participants and stakeholders.
3. Factors affecting real estate market, Role of government.
4. Statutory provisions, laws, rules, regulations, land use controls, registration and licensing.

Unit-II

5. Real Estate financing, REIT.
6. Appraisal and valuation of Real Estate development projects.
7. Urban Economics – Land as a factor of production, land rent, land use issues, location decisions.

Unit-III

8. Facilities and asset management, role and responsibilities of property managers.
9. Transaction management, transfer of titles and records.
10. Codes of ethics for real estate participants.
11. Environmental issues related to real estate transactions, closing the real estate transactions.

RECOMMENDED BOOKS

1. Roulac, Stephen, 'Ethics in Real Estate', E. (Ed.).
2. Deborah H. Long, 'Ethics for the Real Estate Professional'.
3. M. Joseph Sirgy, 'Real Estate Marketing: Strategy, Personal Selling, Negotiation, Management and Ethics'.
4. Deborah H. Long, 'Doing the Right Thing: A Real Estate Practitioner's Guide to Ethical Decision Making'.

ENVIRONMENTAL COMPLIANCES

Subject Code: MARC3-364

**L T P C
3 1 0 4**

Contact Hrs.: 45

COURSE PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the environmental compliances and management systems for buildings and infrastructure projects.

EXPECTED OUTCOMES

The student shall be able to understand policies, standards, procedures and formats related to environmental compliances and clearances.

Unit-I

1. International Agreements, Agendas and Protocols – Earth summit at Rio 1992 and subsequent development UNFCCC, Agenda 21, Copenhagen Accord, Montreal protocol, Kyoto protocol.
2. Case studies in India under CDM, COPs/ United nations climate change conferences.

Unit-II

1. Statutory Acts, Regulations and Notifications, Environment (Protection) Act 1986 as amended to date, NOCs and authorities which grant NOCs.
2. The Water (Prevention and control of pollution) Act, 1974 as amended to date, The Noise (Regulation and control) Rules, 2000 as amended to date, standards for discharge of environmental pollutants, hazardous wastes (Management, Handling and Transboundary movement) rules, 2008 as amended to date, The Municipal Solid Wastes (management and handling) rules, 2000 as amended to date, the Biomedical waste (management and handling) rules 1998 as amended to date, E-waste (management and handling) rules, 2012.
3. Wetland Rule 2010, Coastal Regulation Zone (CRZ) rules 2011 as amended to date.

Unit-III

1. Environmental Impact Assessment – Methods, procedures, legal framework of EIA, EIA notification 2006 as amended to date.
2. Steps of environmental clearance (EC), formats – Form 1, 1A, understanding TOR, Baseline data generation – parameters and methods for climate, micro meteorology, air, water, noise, soil, drainage, flora, fauna, socio- economics, demography and industries.
3. National Green Tribunal Act.

RECOMMENDED BOOKS

1. Peavy, Rowe, 'Techobanoglous, Environmental Engineering', Tata McGraw Hill.
2. Mackenzie L. Davis, 'Environmental Engineering', Tata McGraw Hill.
3. Baljeet S. Kapoor, 'Environmental Engineering-An overview', Khanna Publishers.
4. Gilbert H. Masters, 'Environmental Engineering and Science', Prentice Hall of India Pvt. Ltd.
5. G.N. Panday and G.C. Carney, 'Environmental Engineering', Tata McGraw Hill.
6. P.D. Sharma, 'Ecology and Environment', Rastogi Publications.
7. P.A. Ray and Lcances, 'Environmental Impact Assessment', Hand National Environmental Protection Council, Manile.

PROJECT MANAGEMENT FOR DISASTER RESILIENCE

Subject Code: MARC3-365

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3 1 0 4

Contact Hrs.: 45

COURSE PREREQUISITES

Nil

COURSE OBJECTIVES

To make students understand the typologies of disasters, their management and design solutions ranging from architectural to planning levels.

EXPECTED OUTCOMES

The student shall be able to understand procedures, policies and guidelines related to disaster resilience and management.

Unit-I

1. Introduction to Disaster Management- Introduction: Natural Disasters, Manmade Disaster, Disaster Determinants; Risk Assessment and Vulnerability Analysis; Risk Reduction, Risk analysis techniques, Participatory risk assessment, Vulnerability analysis and Risk assessment; Vulnerability; Strategic development for Vulnerability reduction.
2. Risk Assessment and Vulnerability Analysis- Introduction, Risk Assessment & Reduction, Vulnerability, Strategic development for Vulnerability reduction.
3. Disaster Preparedness- Introduction, Disaster Preparedness Plan, Disaster Preparation, Emerging Technologies in Disaster Management.
4. Disaster Response- Introduction, Coordination in Disaster Response, Quick Disaster Response, Relief Measures.
5. Recovery, Reconstruction and Rehabilitation- Rehabilitation, Reconstruction and Development; Recovery, Rehabilitation, Reconstruction.

Unit-II

1. Disaster Management Policy and Administration- Introduction, Disaster Management Policy, Disaster Management Administration, Disaster management and techno legal regime.
2. Managing Human behavior- Individual Dimensions of Organizational Behaviour, Group Dimensions of Organizational Behaviour, Training and Development.
3. Industrial Safety Management- Introduction, Training for Safety, Accident Investigation and Reporting, Safety Performance Monitoring and Audit.
4. Finance and Insurance in Disaster Management- Introduction to Banking & Finance, Central Bank / Reserve Bank, Introduction to Insurance, Life Insurance & General Insurance, Insurance Policies for Disaster Management.

Unit-III

1. Research Methodology in Disaster Management- Introduction, Methods of Research, Development of Research Proposal, Methods of Data Collection and Analysis.
2. Environment Studies- Introduction, Natural Resources, Ecosystems, Social Issues and the Environment.
3. GIS in Disaster Management- Introduction, Data base management systems in GSI, Geographical Information System, GIS software.
4. Information and Communication Technology for Disaster Management- Computer Systems, Information Communication Technology, Information Processing, Advanced Information Communication Technology, Disaster Management Information Sources

RECOMMENDED BOOKS

1. S.L. Goel, 'Disaster Administration and Management-Text & Case Studies', Deep and Deep Publications.
2. G.K. Ghosh, 'Disaster Management', A.P.H. Publishing Corporation.

3. S.K. Singh, S.C. Kundu and Shobha Singh, 'A Disaster Management', 119 William Publications, New Delhi.
4. Vinod K. Sharma, 'Disaster Management'.
5. S.L. Goel, 'Encyclopedia of Disaster Management', Deep and Deep Publications, New Delhi, 2006.

THESIS

Subject Code: MARC3-411

L T P C

0 0 0 20

COURSE PREREQUISITES

Nil

COURSE OBJECTIVES

To provide an opportunity to the students to prepare original study of a special project of own choice.

EXPECTED OUTCOMES

The student shall be able to prepare state of art thesis report on the basis of original research on the topic of own choice.

1. The topic of thesis may be conceptual or practical but related to building engineering and management. The student must adopt a methodology for effective and useful research.
2. Each student shall prepare a thesis under the guidance of a supervisor with regular reviews by the faculty of department. The thesis will be presented in the specified format duly supported by sufficient references, sketches, graphs, statistical data, and details of surveys / experimental / analytical procedures adopted for research.
3. The student is required to defend his/her thesis at a viva voce examination by external examiners.

SCHEDULE OF SUBMISSION STAGES/EXAMINATION

Stages of Work		Time Allocated
1.	Synopsis	
	i. Formulation of Research Problem	1 week
	ii. Finalisation of Research Design	2 weeks
2.	Pre-Submission	
	i. Literature Review	2 weeks
	ii. Data Collection	3 weeks
	iii. Analysis of Data	2 weeks
	iv. Validity and reliability analysis	2 weeks
	v. Derivation of conclusions	2 weeks
	vi. Formulation of research recommendations	2 weeks
	vii. Draft of Final Report	3 weeks
3.	Final Hard-Bound Thesis Submission (incorporating improvements suggested in Pre-submission draft report)	1 week

NOTE:

1. Students will be required to submit one original coloured and two photocopies copies of the final Thesis report along with a soft copy, on a standard format prescribed in the thesis programme issued by the Thesis Coordinator. The original copy of the report will be returned to the student after the declaration of the result. The photocopies along with the soft copy of the report will be retained for reference in the college library.

2. One research paper is to be written on the Thesis work carried out and presented to his/her supervisor and the Department Research Committee (DRC). The paper, if approved, shall be communicated for publication in the journal recommended by DRC.
3. On completion of thesis, the candidate shall present his/her work and defend it before DRC. If approved, the thesis shall be accepted for external evaluation.

Format for the Thesis Report:

1. Size of report – A4, Portrait format
2. Color of Page - White
3. Font Details - Typed in Times New Roman, Headings – 14, Body Text – 12, Line spacing 1.5; Margin 4 cm on left and 2.5 cm on the other sides.
4. The thesis shall be hard bound with cover page in black background and golden text color. The name of the candidate, degree (specifying the specialization), year of submission, logo of the University including college name shall be printed in golden on the black cover.

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