

**Course Structure & Syllabus of
M.Tech-Construction Engineering & Management
Applicable for Batch: 2018-2020**

**DIT UNIVERSITY
Dehradun**



**Detailed Course Structure & Syllabus
of
M.Tech-Construction Engineering &
Management**

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020 Course Structure

Year: 1st

Semester: I

Course Category	Course Code	Course Title	L/S*	T	P	Credit
DC	AR 612	Principles of Management	3	0	0	3
DC	AR 613	Project Planning & Scheduling	4	0	0	4
DC	AR 614	Research Methodology	2	0	0	2
DC	AR 615	Construction Equipment & Management	3	0	0	3
DC	AR 616	Environmental Management & Impact Assessment	3	0	0	3
DC	AR 617	Computer Application-I	2	0	2	3
DE		Departmental Elective-I	3	0	0	3
		Total	20	0	2	21

Departmental Elective-1

AR-641- INVENTORY MANAGEMENT
AR-642- Introduction to Economics of Infrastructure Development

Year: 1st

Semester: II

Course Category	Course Code	Course Title	L/S*	T	P	Credit
DC	AR 618	Project Formulation & Appraisal	3	0	0	3
DC	AR 619	New Building Materials & Technology	3	0	0	3
DC	AR 621	Resource Management in Construction	2	0	0	2
DC	AR 622	Construction Contracts & Administration	3	0	0	3
DC	AR 623	Computer Application-II	2	0	4	4
DE		Departmental Elective-II	3	0	0	3
ST	AR 624	Summer Training				3
		Total	16	0	4	21

Departmental Elective-2

AR-644- Building Energy Efficiency Codes
AR-645- Strategic Management in Construction

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020 Course Structure

Year: 2nd

Semester: III

Course Category	Course Code	Course Title	L/S*	T	P	Credit
DC	AR 701	Construction Finance Management	4	0	0	4
DC	AR 702	Risk Management in Construction Business & Projects	3	0	0	3
DC	AR 703	BOT, Turnkey Projects & FIDIC	3	0	0	3
DC	AR 704	Project Quality & Safety	3	0	0	3
DC	AR 705	Construction Projects Case Study	5	0	0	5
DE		Departmental Elective-3	3	0	0	3
DE		Departmental Elective-4	3	0	0	3
		Total	24	0	0	24

Departmental Elective-3

AR-741- Construction & Project Account
AR-742- Laws Governing Infrastructure Projects

Departmental Elective-4

AR-744- Construction Marketing Management
AR-745- Site Management

Year: 2nd

Semester: IV

Course Category	Course Code	Course Title	L/S*	T	P	Credit
THESIS	AR 706	Thesis Project	0	0	24	12
DC	AR 707	Real Estate Management	2	0	0	2
DE		Departmental Elective-5	3	0	0	3
		Total	5	0	6	17

Departmental Elective-4

AR-747- BIM for Construction Management
AR-748- Infrastructure Development Through PPP Mode

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Summary of the Credit

Year	Semester	Credit
1	1	21
	2	21
2	3	24
	4	17
Total		83

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-612	Subject Title	Principles of Management						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	I

Course Objective:

The course is intended to introduce the management principles to the students. The course will also introduce the various components of organization

Unit 1 : Introduction to Management and Construction Management

- What is Management? It's Need ,Importance & Purpose, Evolution of Managements thoughts Different Schools/ approaches to Management: Behavioral, Quantitative, Systems, Contingency Approach
- Nature of Construction Industry, Role of Architects and Engineer, Special Characteristics of Construction activity, their Influence on Construction Managements, Development of Construction Management, Scope of Construction Management Project Management, and Contracts Managements functions of Construction Managements.

Unit 2 : Project Manager

- Managing projects vis-à- via Managing Routine activities, Qualities of Project Manager, Selection of Project Manager, Training for a Project Manager.

Unit 3 : Management Planning

- What is planning? Importance of Planning, Types of Planning, levels of Planning, Strategies, Policies, Procedure, Rules etc. in the context of Planning.

Unit 4 : Organizing

- Organizing as a Management process, Principles of Organization, Different Structures of organizations such as line, Line & Staff, Functional, Matrix or project Organization: Characteristics, Features, their Merits and Limitation, Ownerships of Organization: Sole Proprietorship, Partnership, Private Ltd., Public Ltd. Introduction to Organizational climate, Decision Making, Group Decision Making, Staffing: What is Staffing? Steps involved in Staffing, Recruitment, Staffing, Performance Appraisal Development.

Unit 5 : Leading

- Leadership Characteristics, Entrepreneur, Leader And Manager Distinguished, Motivation, Managing Conflicts, Leadership Traits And Styles, Different Approaches To Leadership.
- Communication Process-Types Of Communication, Communication Model, Feedback, Effective Communication, Listening skills
- Controlling as a Management function, Direct and Indirect Control, Elements of Control, Prerequisites for Effective Control.

LEARNING OUTCOME:

- The students will be able to understand the various management theories and its evolution.
- The students will be able to understand the various aspects of an organization
- The students will understand the characteristics of a manager

Text Books:

1. Principles of Management, P.C Tripathi& P.N Reddy
2. Principles of Management, J.K Mitra

Reference Books:

- Management, Stoner J A & Freeman R E
- Management: Principles & Practice, S K Mandal

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-613	Subject Title	Project Planning & Scheduling						
LTP	4 0 0	Credit	4	Subject Category	DC	Year	1 st	Semester	I

OBJECTIVE: The course is intended to disseminate about the application of Construction Management and to familiarize with the information technology based tools, applications during the Project Life Cycle.

Unit 1 : CONSTRUCTION PLANNING

- Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.

Unit 2 : SCHEDULING PROCEDURES AND TECHNIQUES

- Construction Schedules – Critical Path Method – Scheduling Calculations – Float – Presenting Project Schedules – Scheduling for Activity-on-Arrow and with Leads, Lags, and Windows – Scheduling with Resource Constraints and Precedence – Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations – Calculations for Monte Carlo Schedule Simulation – Crashing and Time/Cost Tradeoffs – Improving the Scheduling Process.

Unit 3 : COST CONTROL, MONITORING AND ACCOUNTING

- The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows – Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.

Unit 5 : ORGANIZATION AND USE OF PROJECT INFORMATION

- Types of Project Information – Accuracy and Use of Information – Computerized Organization and Use of Information – Organizing Information in Databases – Relational Model of Databases – Other Conceptual Models of Databases – Centralized Database Management Systems – Databases and Applications Programs – Information Transfer and Flow.

LEARNING OUTCOME: The students should be able to:

- The students will be able to understand the practices of project management during the project life cycle.
- The students will be able to work on project management software and prepare the project schedule

Text Books:

- Construction Project Management: Planning, Scheduling and Controlling, K.K Chitkara

Reference Books:

1. Project Planning & Scheduling, Gregory T.H
2. A Handbook for Construction Project Planning & Scheduling, V.K Paul

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-614	Subject Title	Research Methodology						
LTP	2 0 0	Credit	2	Subject Category	DC	Year	1 st	Semester	I

OBJECTIVE: The course is intended to create a capability for the students to conduct academic research.

Unit 1 : Introduction to Research and Developing a Research Proposal

- Meaning of research, types of research, process of research, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, formulation of research hypotheses. Search for causation.
- Format of research proposal, Individual research proposal, Institutional research proposal, Significance, objectives, methodology,

Unit 2 : Literature survey

- Definition of literature and literature survey, need of literature survey, sources of literature, elements and objectives of literature survey, styles of literature survey, and strategies of literature survey.

Unit 3 : Data collection, Measuring, Sampling and Scaling

- Classification of data, benefits and drawbacks of data, evaluation of data, qualitative methods of data collection, sampling ,sample size, measurement and scaling, types of measurements, criteria of good measurements, classification of scales.

Unit 4 : Data Analysis

- Introduction to data analysis techniques

Unit 5 : Report writing, Presentation of research

- Need of effective documentation, importance of report writing, types of reports, report structure, report formulation, Plagiarism.
- Research briefing, presentation styles, impact of presentation, elements of effective presentation, Writing of research paper, presenting and publishing paper,

LEARNING OUTCOME:The students should be able to:

- The students will be able to formulate a research problem
- The students will be able to collect and analyse a data
- The students will be able to document and present their findings

Text Books:

1. Research Methodology: Methods and Techniques, C.R Kothari
2. Lecture Notes on Research Methodology, V.P. Saxena

Reference Books:

Case Study Research: Design and Methods, Robert Yin

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-615	Subject Title	Construction Equipment & Management						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	I

OBJECTIVE: The course is intended to acquaint the students about construction equipment for various construction activities and equipment management.

Unit 1 : Equipment For Earthwork

- **Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders, Earth Movers**

Unit 2 : Equipment For Production Of Aggregate And Concreting

- **Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing**
- **Equipment - Hauling, Pouring and Pumping Equipment – Transporters**

Unit 3 : Other Construction Equipment

- **Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting - Equipment for Compaction - Erection Equipment - Types of pumps used in Construction – Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment, Forklifts and related equipment - Portable Material Bins – Conveyors - Hauling Equipment.**

Unit 4 : Construction Equipment Management

- **Identification – Planning - Equipment Management in Projects - Maintenance**

Management – Replacement – Unit Operating Cost - Cost Control of Equipment -

Depreciation Analysis – Safety Management

LEARNING OUTCOME: The students should be able to:

- The student will be able to select right type of equipment for construction activities
- The students will be able to understand the management of equipment

Text Books:

- **Construction Equipment & Management, S.C Sharma**

Reference Books:

1. **Managing Construction Equipment, S.W. Nunnally**
2. **Construction Equipment Guide, David A Day**

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-616	Subject Title	Environmental Management & Impact Assessment						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	I

OBJECTIVE: The course is intended to acquaint the students with the impact of construction activities on environment

Unit 1 : ENVIRONMENTALIMPACTASSESSMENT

- Introduction,Definitions&Concepts,Rationale&HistoricalDevelopmentofEIA Management

Unit 2 : COMPONENTS OF EIA

- InitialEnvironmentExamination,EnvironmentImpactStatement,EnvironmentalAppraisal, Environmental Impact Factors

Unit 3 : EIA PROCESS

- Measurementofenvironmentalimpact,organization,scopeofpertinentenvironment factors
- Six generic steps, descriptive check lists, simple interaction matrix, stepped matrix, uniqueness ratio, habitat evaluation system
- Publicinvolvementtechniques,comprehensiveenvironmentalimpactstudy

Unit 4 : INDIAN SCENARIO

- EIA regulations in India, Case study of a large project

Unit 5 : ENVIRONMENTAL MANAGEMENT SYSTEMS & STANDARDISATION & CARBONTRADING

- Principles,problems,strategies,Reviewofpolitical,ecological&remedialactions
- Future Strategies, multidisciplinary environmental strategies
- IntroductiontoISOandISO14000,EMASregulations,system based approach
- Energy footprint , food foot printing and carbon foot printing, carbon credits, CDM

LEARNING OUTCOME: The students should be able to:

CO1: Analyse the adverse effects of construction on surrounding ecological system and society.

CO2: Assess the impact of the project.

CO3: To develop a strategy to manage the impacts of the project.

Text Books:

1. Environmental Impact Assessment by – R.R. Barthwal
2. Environmental Impact Assessment by – P.R. Trivedi

Reference Books:

1. Environmental Impact: Assessment and Analysis by – Emma Layer
2. Introduction To Environmental Impact Assessment by – John Glasson

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-617	Subject Title	Computer Application-I						
LTP	2 0 2	Credit	4	Subject Category	DC	Year	1 st	Semester	I

OBJECTIVE: The intent of this course is to develop the skills of using basic computer software being used in construction industry.

Unit 1 : Basic Software

MS Office – Word, Excel, Powerpoint

Unit 2 : Auto-Cad

Application and usage of Autocad – 2D

LEARNING OUTCOME: The students should be able to:

CO1: Students will be able to aware about the general software being used in practice.

CO2: Students will be able to apply the knowledge of software in managing the construction projects.

Text Books:

Computer Applications in Construction (Mcgraw Hill Series In Construction Engineering And Project Management) by – Boyd C. Paulson

Reference Books:

Autocad 2016 beginning and intermediate by - Mercury Learning

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-641	Subject Title	Departmental Elective – 1 (Inventory Management)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	I

OBJECTIVE: This course provides students with an understanding of the principles, processes and methods for the effective management of inventory in relation to other activities in the supply chain.

Unit 1 : Stocks

- Stocks within an Organisation
- Stocks and Inventories

Unit 2 : Introduction to Inventory

- Importance & Scope of Inventory Control
- Types of Inventory
- Costs Associated with Inventory

Unit 3 : Inventory Control

- Inventory Control
- Selective Inventory Control
- Economic Order Quantity
- Safety Stocks

Unit 4 : Inventory Management Systems-I

- Models for Known Demand
- Models for Uncertain Demand
- Sources of Information
- Work in Process Inventories
- Finished Goods Inventories
- General Management of Inventory
- Spare Parts Inventories
- Use of Computers in Inventory Management

Unit 5 : Planning of Stocks

- Forecasting Demand
- Planning and Stocks
- Material Requirements Planning
- Just-In-Time

LEARNING OUTCOME: The students should be able to:

CO1: The students will be able to understand the Inventory management information system.

CO2: The students will be able to understand Stock control

CO3: The students will be able to forecast the demand and planning operations.

Text Books:

Waters, D. (2003): Inventory Control and Management 2nd Edition John Wiley & Sons ISBN-13: 9780470858769-AA

Reference Books:

Waters, D. (2003): Inventory Control and Management 2nd Edition John Wiley & Sons ISBN-13: 9780470858769

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-642	Subject Title	Departmental Elective – 1 (Introduction to Economics of Infrastructure Development)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	I

OBJECTIVE: This course is designed to introduce the role of infrastructure in economic growth. The broad view of physical as well as social infrastructure will be dealt in depth which will be helpful for the students.

Unit 1 :

- **Economics and Infrastructure**
- **Finance for Infrastructure**

Unit 2 :

- **Infrastructure and Economic Growth**
- **Challenges for Infrastructure Development**

Unit 3 :

- **Economic Model for Infrastructure Development**
- **Infrastructure in an Open Economy**

Unit 4 :

- **Infrastructure Development in India**
- **A Comparison of Infrastructure in India with world.**

LEARNING OUTCOME: The students should be able to:

CO1: Understand the economics involved on a bigger perspective

CO2: Understand the infrastructure development outside India

Text Books:

Infrastructure and Economics Development Hardcover – 2009 by Seema Sharma.

Reference Books:

Strategic Infrastructure Development for Economic Growth and Social Change (Advances in Business Strategy and Competitive Advantage) Hardcover – Import, 31 Jan 2015 - by Nilanjan Ray (Editor), Dillip Kumar Das (Editor), Somnath Chaudhuri (Editor), Arindam Ghosh (Editor)

**Course Structure & Syllabus of
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SEMESTER II

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-618	Subject Title	Project Formulation & Appraisal						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	II

Course Objective:

The intent of the course to acquaint the students with the different phases of project development with specific emphasis on the initiation phases of any construction project.

Unit 1 : PROJECT FORMULATION

- Project, Concepts, Capital investments, Generation and Screening of Project Ideas, Project identification, Preliminary Analysis, Market, Technical, Financial, Economic and Ecological, Pre-Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report, Different Project Clearances required

Unit 2 : PROJECT ESTIMATION

- Importance of Estimation, Method of Cost Estimating, Parameter Cost Estimating, Cost Capacity Factor, Detailed Cost Estimation, Provision of Escalation, Inflation Provision and Operation of Contingency Provisions

Unit 3 : PROJECT COSTING

- Project Cash Flows, Time Value of Money, Cost of Capital

Unit 4 : PROJECT APPRAISAL

- NPV, BCR, IRR, ARR, Urgency, Pay Back Period, Assessment of Various Methods, Indian Practice of Investment Appraisal, International Practice of Appraisal, Analysis of Risk, Different Methods, Selection of a Project and Risk Analysis in Practice

LEARNING OUTCOME:

CO1: Understand the project formulation process.

CO2: Compile the data required for conceptual stage.

CO3: Conduct various surveys for preparation of feasibility report.

CO4: Produce feasibility reports of various project options.

Text Books:

1. **Construction Project Management** – by Col. K.K. Chitkara
2. **Projects** – by Prasanna & Chandra

Construction Management: Theory and Practice - by Kumar NeerajJha,

Reference Books:

- PMBOOK - A Guide To The Project Management Body Of Knowledge.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-619	Subject Title	New Building Materials & Technology						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	II

OBJECTIVE: The intent of this course to give the knowledge of latest trends in building construction in terms of new building materials and technology used worldwide to meet the demand of current era.

Unit 1 : SPECIAL CONCRETES, METALS COMPOSITES TYPES OF PLASTICS

- Concretes, Behaviour of concretes – Properties and Advantages of High Strength and High Performance Concrete – Properties and Applications of Fibre Reinforced Concrete, Self compacting concrete, Alternate Materials to concrete on high performance & high Strength concrete.
- Types of Steels – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminium and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings.
- Properties & Manufacturing process – Advantages of Reinforced polymers – Types of FRP – FRP on different structural elements – Applications of FRP.

Unit 2 : PREFAB CONSTRUCTION

- Pre- fabrication: Introduction to pre- fabrication technology, column and beam system /panel system / box system, advantages of pre- fabrication. Pre- fabrication techniques and various building components – foundation, walls, floors, roofs, doors, windows.
- Ferro cement products: sanitary and service core unit, trusses and rafters, water tanks. Design: Design considerations for prefab construction.

Unit 3 : MODERN FORMWORK TECHNIQUES

- Modern Formwork techniques in steel - Lift slab construction and slip form formwork, Tunnel formwork and formwork of special profiles.

Unit 4 : SPECIAL STRUCTURE

- Definition –single, double and multilayered grids- two way and three way space grids connectors, Grid domesvarious forms-Geodesic domes.
- Shell, Folded Plates and Tensile Structures – Shell types, Classification as per BIS- Relative merits and applicability, Folded plate types- comparison with shell- applicability, suspended cable structures- types of cable network systems- shapes of cable suspended systems, examples of tensile membrane structures- types of pneumatic structures.

Unit 5 : MODULAR COORDINATION

- Aims, basis, planning, dimensioning,
- Assembly of components, tolerances, modules, reference system, grids, positioning of functional
- elements – slabs, walls, staircases; Standardization in buildings' design and their components

LEARNING OUTCOME:The students should be able to:

CO1: Understand the characteristic, usages and applications of the new building materials.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

CO2: understand the utilization of the modern construction techniques in construction.

Text Books:

Ching, F.D.K., "Building Construction Illustrated", Wiley

Reference Books:

1. Deplazes, A. (Editor), "Constructing Architecture: Materials, Processes, Structures: A Handbook", Birkhäuser
2. Prefabrications by Gary Robins
3. Concrete Folded Plate Roofs by Wilby

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-621	Subject Title	Resource Management in Construction						
LTP	2 0 0	Credit	2	Subject Category	DC	Year	1 st	Semester	II

OBJECTIVE: The course is intended to create a capability for the students to conduct academic research.

Unit 1 : RESOURCE PLANNING

- Resource Planning, Procurement, Identification, Personnel, Planning for material, labour, time schedule and cost control, types of resources, manpower, equipment, material, money, time

Unit 2 : LABOUR MANAGEMENT

- Systems approach, characteristics of resources, utilization, and measurement of actual resources required, tools for measurement of resources, labour, classes of labour, cost of labour, labour schedule, optimum use labour.

Unit 3 : MATERIALS AND EQUIPMENT

- Material: time of purchase, quantity of material, sources, transportation, delivery and distribution.
- Equipment: planning and selecting by optimistic choice with respect to cost, time, source and handling.

Unit 4 : TIME MANAGEMENT

- Personnel time, management and planning, managing time on the project, forecasting the future, critical path measuring the changes and their effects – cash flow and cost control.

Unit 5 : RESOURCE ALLOCATION AND LEVELLING

- Time-cost trade off, computer application – resource leveling, resource list, resource allocation, resource loading, cumulative cost – value management.

LEARNING OUTCOME: The students should be able to:

CO1: The students will be able to understand the management of resources at site.

CO2: The students will be able to optimize the allocation of resources for various activities at site.

Text Books:

1. Construction Management & Planning, B. Sengupta & H. Guha
2. Construction Project Management, Harbhajan Singh

Reference Books:

1. PMBOOK - A Guide To The Project Management Body Of Knowledge.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-622	Subject Title	Construction Contracts & Administration						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	II

OBJECTIVE: The course is intended to provide an understanding of the contracting and bidding process for construction project.

Unit 1 : CONSTRUCTION CONTRACTS

- Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.

Unit 2 : TENDERS

- Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines.

Unit 3 : ARBITRATION

- Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs.

Unit 4 : LEGAL REQUIREMENTS

- Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations.

Unit 5 : LABOUR REGULATIONS

- Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Child Labour Act - Other Labour Laws.

LEARNING OUTCOME: The students should be able to:

CO1: The students will understand the process of construction contracting

CO2: The students will be able to prepare request for proposal

CO3: The students will be able to prepare contract document

Text Books:

1. Construction Management & Planning, B. Sengupta & H. Guha
2. Construction Project Management, Harbhajan Singh

Reference Books:

1. Construction Contracts, Jimmie Hinze
2. PMBOOK - A Guide To The Project Management Body Of Knowledge.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-623	Subject Title	Computer Application-II						
LTP	2 0 4	Credit	4	Subject Category	DC	Year	1 st	Semester	II

OBJECTIVE: The intent of this course is to develop the skills of using advanced computer software useful in construction management processes.

Unit 1 : Advance Software used in construction project management

MS Project/ Primavera/ ProCore/ CoConstruct etc.

(Application and usage of any one of them)

LEARNING OUTCOME: The students should be able to:

CO1: Students will be able to aware about the latest computer applications being used.

CO2: Students will be able to apply the knowledge of software in managing the construction projects

Text Books:

Computer Applications in Construction (Mcgraw Hill Series In Construction Engineering And Project Management) by – Boyd C. Paulson

Reference Books:

Planning and Control Using Oracle Primavera P6 by – Paul E. Harris

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-624	Subject Title	Summer Training						
LTP	-	Credit	3	Subject Category	ST	Year	1 st	Semester	II

OBJECTIVE: The intent of the course is to give knowledge of different activities associated in general projects of construction.

Unit 1 :

- Min. 8 weeks of training period under a PMC or Construction company.
- Emphasis should be given on working environment on site, running construction activities and working process of PMC or Construction Company.

Compilation of a report from data collected through live site visits, notes, pictures, videos, interviews of the construction team etc taken during training period.

LEARNING OUTCOME: The students should be able to:

CO1: Students will be able identify the type of activities.

CO2: Students will be able to analyse the sequencing of different activities.

Text Books:

Reference Books:

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-644	Subject Title	Departmental Elective – 2 (Building Energy Efficiency Codes)						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	II

OBJECTIVE: This course provides students with an understanding energy requirements of the building. The course mainly focuses on the optimum use of energy through the guidelines given in ECBC (Energy Conservation Building Code) of India.

The purpose is to equip students with skills and techniques to calculate the energy consumption of heating, cooling, lighting, and other equipment by hand to understand the energy & thermal behaviour of buildings, then compare and analyse these calculations with others calculated using energy modelling and simulation programs.

Unit 1 :

- Introduction to energy efficient buildings; Building physics; Latent, specific heat gains in the building; Psychometric analysis; Weather analysis;

Unit 2 :

- Energy use in buildings; Energy Supply in Buildings: Heating, Ventilating, and Air-Conditioning (HVAC) Systems; Heating and cooling loads;

Unit 3 :

- Day lighting and artificial lighting analysis;

Unit 4 :

- Energy Performance Analysis: Energy Codes, Guidelines, and Standards;

Unit 5 : Planning of Stocks

- Constructing energy simulation models: Thermal modelling, Models for ventilation, Steady state and dynamic heat flow analysis; evaluating models: Measurements, Comparisons and verifications.

LEARNING OUTCOME: The students should be able to:

- CO1: apply simulation programs of buildings to perform energy calculations, evaluate the relationship between energy use, indoor comfort and users,
- CO2: evaluate and justify energy-saving measures in existing building stock,
- CO3: discuss energy efficiency measures on grounds of engineering and economic feasibility,
- CO4: discuss the environmental aspects of renovation and the building's energy supply from a system perspective.

Text Books:

1. Green Structures: Energy Efficiency in Buildings (English, Paperback, GHOSH).

Energy Simulation in Building Design Paperback – Import, 17 Sep 2001 - by Joseph Clarke

Reference Books:

Energy Conservation Building Code

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-645	Subject Title	Departmental Elective – 2 (Strategic Management in Construction)						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	II

OBJECTIVE: This course aims to equip students with better profound knowledge in strategic management in the field of construction. Also skills in analysing competitor will be discussed, in order to develop students with the ability to benchmark their own organization's performance with another.

Unit 1 :

- Introduction to Strategic Management
- Understanding External Environment
- Understanding Internal Environment

Unit 2 :

- Establishing Strategic Focus
- Corporate Strategy
- Business Level Strategy

Unit 3 :

- Competitive Strategies
- Implementing Strategies – I: Management
- Implementing Strategies – II: Organizational Issues

Unit 4 :

- BSC-Oriented Strategic Management Process
- Strategic Analysis
- Strategic Choice
- Strategic Feedback/Performance
- Data collection and Group Discussion

Unit 5 :

- Case studies of local contractors and developers and leading MNC
- Elaborate the factor of Technology e.g. Precast in PESTEL model

LEARNING OUTCOME: The students should be able to:

CO1: apply the strategic management process in the field of construction management;

CO2: formulate effective strategic management policies;

CO3: analyse different strategic management policies on a broader spectrum and develop their own organization policy for benchmarking;

CO4: combine the application of technology management tools in undertaking strategic analysis.

Text Books:

Strategic Excellence in the Architecture, Engineering, and Construction Industries (English, Hardcover, Gerhard Plenert)

Reference Books:

Strategic Management in Construction (English, Paperback, David Langford Steven Male D A Langford Male Langford).

**Course Structure & Syllabus of
M.Tech-Construction Engineering & Management
Applicable for Batch: 2018-2020**

SEMESTER III

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-701	Subject Title	Construction Finance Management						
LTP	4 0 0	Credit	4	Subject Category	DC	Year	1 st	Semester	III

Course Objective:

The objective of the course is to familiarise the fundamentals of financial management concepts and their applications in the various phases of the project cycle of construction projects. The course aims to provide a basic knowledge to carry out the financial feasibility of projects, evaluation of project investment decisions.

Unit 1 : BASIC PRINCIPLES

- Time Value of Money – Cash Flow diagram – Nominal and effective interest- continuous interest. Single Payment Compound Amount Factor (P/F,F/P) – Uniform series of Payments (F/A,A/F,F/P,A/P)– Problem time zero (PTZ)- equation time zero (ETZ). Constant increment to periodic payments – Arithmetic Gradient (G), Geometric Gradient (C).

Unit 2 : COMPARING ALTERNATIVES PROPOSALS

- Comparing alternatives- Present Worth Analysis, Annual Worth Analysis, Future Worth Analysis, Rate of Return Analysis (ROR) and Incremental Rate of Return (IROR) Analysis, Benefit/Cost Analysis, Break Even Analysis.

Unit 3 : EVALUATING ALTERNATIVE INVESTMENTS

- Real Estate - Investment Property, Equipment Replace Analysis, Depreciation – Tax before and after depreciation – Value Added Tax (VAT) – Inflation.

Unit 4 : FUNDS MANAGEMENT

- Project Finance – Sources of finance - Long-term and short -term finance, Working Capital Management, Inventory valuation, Mortgage Financing - International financial management- foreign currency management.

Unit 5 : FUNDAMENTALS OF MANAGEMENT ACCOUNTING

- Management accounting, Financial accounting principles- basic concepts, Financial statements – accounting ratios - funds flow statement – cash flow statement.

LEARNING OUTCOME:

CO1: Students will be able to understand the financial implications of infrastructure projects.

CO2: Students will be able to determine the financial feasibility of projects.

CO3: Students will be able to advice on the investments to be made on the projects.

Text Books:

- **Construction Project Management** – by Col. K.K. Chitkara
- **Projects** – by Prasanna & Chandra
- **Construction Management: Theory and Practice** - by Kumar NeerajJha,

Reference Books:

- **A Guide to the Project Management Body of Knowledge: PMBOK Guide**
- **Financial Management in Construction Contracting by** - Andrew Ross, Peter Williams

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-702	Subject Title	Risk Management in Construction Business & Projects						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	III

OBJECTIVE: This course aims to provide basic understanding of risks associated with the construction projects. Starting with the explanations of the fundamentals of risk and risk managements, the course helps in developing the understanding and analytical approach of handling the risks. The objectives includes:-

- To acquaint the students with the risks associated with the construction projects.

To help students understand the various tools and techniques of risk managements

Unit 1 : Risk in Infrastructure Projects

- Identification of Risks, Specific categories of risk, concept of risk management, Leader's, Developer's and Government's perspective of risk.

Unit 2 : Risk management & its process

- Risk management process, Risk management responsibility, Stages of risk management, Risk response, Risk identification, Brainstorming, Qualitative assessment, Mitigation, Risk analysis.

Unit 3 : Tools and techniques of risk management

- Introduction, Risk register, Risk estimate, MERA, Decision tree, Sensitivity analysis, Influence diagrams, Probability analysis, and Computer software.

Unit 4 : Risk management – Technical procedure

- Introduction, Phases of construction, Post construction risks, Risk matrix, Exhibits

Unit 5 : Project Insurance

- Insurance policy structure, types of insurance, guidance on insurance for construction projects, current condition of contracts, General services provided by the project insurance companies.

LEARNING OUTCOME: The students should be able to:

CO1: Apply the knowledge, skills, and techniques of the discipline.

CO2: Understand the nature, scale and impact of various risks.

CO3: Apply an analytical and logical sequence in thinking risk managements.

Text Books:

1. Kumar NeerajJha, Construction Management: Theory and Practice

Reference Books:

1. PMBOOK - A Guide To The Project Management Body Of Knowledge.

Project Risk Management: Processes, Techniques and Insights - by Chris Chapman and Stephen. Ward.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-703	Subject Title	BOT, Turnkey Projects & FIDIC						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	III

OBJECTIVE: The objective of this course to acquaint the students with different modes of project delivery & international approaches of project contracting.

Unit 1 : PPP Mode of infrastructure development

- Introduction, Types of agreements, advantages, disadvantages.

Unit 2 : BOT projects

- Introduction (Characteristic, Acceptance criteria, advantages & disadvantages)
- Procurement process, concession period, contractual structure, various agreements under BOT, benefits to government.
- Types of Risk associated
- Other types of BOT project procurement structure – BOOT, BOO, DBO, LOO

Unit 3 : Turnkey Projects

- Introduction – Turnkey model, Characteristic, Advantages and Disadvantages, EPC turnkey projects.
- Phases, Procurement process, Turnkey contracts and agreements.
- Role of client, contractor and suppliers.

Unit 4 : FIDIC

- Introduction, objectives, membership, Statues & Byelaws, Policies, Awards
- FIDIC contracts – The red book, The yellow book, the silver book/ orange book.

LEARNING OUTCOME:The students should be able to:

CO1: The students will be able to understand the role of private sectors in development of public infrastructure projects.

CO2: Students will be able to analyse the importance and complexity of contracts.

Text Books:

- **Construction Project Management** – by Col. K.K. Chitkara
- **Projects** – by Prasanna & Chandra

Reference Books:

- **A Guide to the Project Management Body of Knowledge: PMBOK Guide**
- **The FIDIC form of contract** – by Nael G. Bunni
- **FIDIC Contracts: Law and Practice** – by Ellis Baker, Ben Mellors, Scott Chalmers, Anthony Lavers

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-704	Subject Title	Project Quality & Safety						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	1 st	Semester	III

OBJECTIVE:The intent of the course is to give an insight into the concepts of project Quality and safety. The emphasis is to relate quality and safety principles to design development, project management and construction activities.

Unit 1 : INTRODUCTION TO QUALITY

- Understanding the concept of quality, Benchmarking and key performance indicators. Understanding the best practices on construction sites.

Unit 2 : QUALITY MANAGEMENT

- Understanding quality assurance and quality control. Learning international best practices and certifications in the field of quality. Preparation of manuals and checklists.

Unit 3 : SAFETY MANAGEMENT

- Understanding the concept and importance of safety. Cost of safety. Assessment of risks and hazards. Planning for safety.

Unit 4 : ENSURING SAFETY AT CONSTRUCTION SITES

- Safety Planning, monitoring and formulation of safety instructions for a construction site. Site specific safety guidelines.

LEARNING OUTCOME:The students should be able to:

CO1: Students will be able to evaluate the modern concepts of quality systems and quality control

CO2: Students will be able to take general precautions for avoiding accidents on construction site.

Text Books:

- **Construction Project Management** – by Col. K.K. Chitkara
- **Projects** – by Prasanna & Chandra

Reference Books:

- **A Guide to the Project Management Body of Knowledge:** PMBOK Guide.
- **Construction Quality Management** – by Siu-lam Tang, Syed M. Ahmed, Raymond T. Aoieong, S.W. Poon.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-705	Subject Title	Construction Projects Case Study						
LTP	5 0 0	Credit	5	Subject Category	DC	Year	1 st	Semester	III

OBJECTIVE: The intent of the course is to give knowledge of the latest trends in construction industry in terms of materials, equipment, techniques and technology.

Unit 1 :

- A case study of a live construction project throughout the semester and submitting the weekly report.
- Emphasis should be given on site management, construction activities, project scheduling and resource management.
- Weekly submission can be in form of series of seminars/ presentations by the students.
- The final submission at the end of the semester will be in form of report which will be the summation of weekly submissions.
- Live construction site visits on weekly basis and compilation of data through notes, pictures, videos, interviews of the construction team etc taken during all the site visits.

LEARNING OUTCOME: The students should be able to:

CO1: Students will be able to grasp the knowledge through running projects for better understanding.

CO2: Students will be able identify different types of activities and events.

CO3: Students will be able form a logical sequencing of different activities and events.

Text Books:

Reference Books:

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-741	Subject Title	Departmental Elective – 3 (Construction & Project Account)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	III

OBJECTIVE: This course provides students with an understanding of basics of accounting of construction projects.

Unit 1 :

Introduction: Introduction to Management accounting, concept of control, status, role and scope of the management accounting, relationship between management accounting and top-level management, Break-Even Analysis

Unit 2 :

Accounting Mechanism: Accounting Mechanism & accounting practices in India. Preparation of financial statements, Accounting policies with special reference to revenue recognition, matching expenses and revenue & depreciation accounting.

Unit 3 :

Accounting types: Inflation accounting, creative accounting, social accounting and social audit. **Financial statement and their analysis:** Understanding of financial statement and their analysis, like Balance Sheet, Profit & Loss Account, ratio analysis, fund flow analysis, statement of changes in financial position.

Unit 4 :

Statutory requirements: Statutory requirements for accounting and auditing. **Corporate reporting:** Corporate reporting practices in India.

LEARNING OUTCOME: The students should be able to:

CO1: Understand various aspects of management accounting in construction business and

CO2: Provide knowledge about the coordination of management accounting information for corporate financial decision making.

Text Books:

- Accounting for management; By Bhattacharya, S.K. and John Dearden, Publisher – Vikar, New Delhi.
- Management Accounting & Financial Analysis, By Khan & Jain, Publisher – Tata McGraw Hill.

Reference Books:

- Blank, L. T. and Tarquin, A. J., "Engineering Economy", Fourth Edition, WCB/McGraw-Hill, 1998.
- Bose, D. C., "Fundamentals of Financial management", 2nd ed., PHI, New Delhi, 2010.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-742	Subject Title	Departmental Elective – 3 (Laws Governing Infrastructure Projects)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	III

OBJECTIVE: The intent of this course is to acquaint the students with the various legal and regulatory framework governing the infrastructure projects in India.

Unit 1 : Legal and Policy Aspects

Constitutional aspects

Constitutional law-allocation of jurisdiction over different infrastructure sectors between the Centre and State - law making powers Administrative Law

Policy Formulation

Role of Centre and State in policy formulation – Central funding of infrastructure projects – central oversight and interference.

Private Participation

Investment requirements – non ideological factors leading to commercialisation and privatisation of infrastructure- from socialism to market driven economy- legal framework for private sector participation – modes of Public Private Partnership (PPP)- dispute settlement clauses in concession agreements.

Unit 2 : General legal context of infrastructure business

Environmental Aspects

General Framework on environmental regulation and guidelines- Coastal Zone Regulation- Forest (Conservation)

Act -Environmental Impact Assessment Role of judiciary

Land Acquisition

Land Acquisition – Rehabilitation and resettlement

Unit 3 :

Introduction: Law and the Common man, Consumer protection Act, Legal Systems in India.

Indian Contract Act, 1872: Provisions of Contract Act, Important clauses of the Act.

Unit 4 :

Arbitration & Reconciliation Act, 1996.

Labor Acts related to construction activity: Payment of wages Act, Contract Labour Act, Minimum Wages Act, Employees' State Insurance Act, and Workmen 's Compensation Act.

LEARNING OUTCOME: The students should be able to:

After successful completion of this course, student shall be able to: Acquaint with relevant Acts & Laws related to construction projects in India.

Text Books:

- Law Relating To Infrastructure Projects Paperback – 2003 by Piyush Joshi.

Reference Books:

- Administrative Law , Lucknow: Eastern Book Company by I.P Massey
- The Constitutional Law of India, New Delhi: Lexis Nexis Butterworths by D DBasu

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-744	Subject Title	Departmental Elective – 4 (Construction Marketing Management)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	III

OBJECTIVE: This course provides students with an understanding of marketing strategies related to construction projects.

Unit 1 : Marketing environment:

Impact of internal and external environment, socio-economic, demographic, political, technological and legal environment, nature and impact of competition, marketing strategy

Unit 2 : Basics of marketing:

Features of marketing of consumer goods, industrial products and services, product and marketing, marketing organization structures, societal role of marketing

Unit 3 : Marketing projects:

Characteristics of construction projects, sources of information, pre-qualification documents, bid preparation – estimating, provision for overheads and profit, bidding models, bidding strategy, pre-bid meetings, negotiation, legal aspects, impact of joint ventures, collaborations and alliances, impact of globalization and privatization, strategies for project export.

Unit 4 : Marketing real estate:

Characteristics of real estate, demand and supply relationship, segmentation, product mix, pricing strategies, advertising strategies, legal aspects

Unit 5 : Marketing products for construction:

Characteristics of construction materials and equipment, strategies for marketing of materials and equipment for construction, demand surveys, advertising strategies, communication, exhibitions and product demonstrations, pricing strategies, financing arrangements

LEARNING OUTCOME: The students should be able to:

CO1: Understand the importance and basics of marketing.

CO2: Understand the characteristics of construction projects and real estate.

CO3: Understand the strategies for marketing of materials & equipment.

Text Books:

Marketing and the laws - by M.A. Sujan and Haish Sujan

Reference Books:

Market Management and Project Business Development 1st Edition - by Hedley Smyth

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-745	Subject Title	Departmental Elective – 4 (Site Management)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	III

OBJECTIVE: The intent of this course is to provide students with an understanding of managerial skills required to handle the construction site.

Unit 1 :

- Terminology, methodology of design of the construction site operations and site facilities.
- Logistic and technology schemes.

Unit 2 :

- Planning and documentation of the site facilities.
- Production facilities of the construction site.

Unit 3 :

- Operation facilities of the construction site.
- Social and sanitary facilities of the construction site.

Unit 4 :

- Fire safety and protection of the construction site facilities.
- Health safety and protection of the employees.

Unit 5 :

- Provisions on the protection of the environment in plan of the construction site.
- Pre-construction planning in Building Information Modelling (BIM)
Planning and construction according to BREEAM, LEED, etc.

LEARNING OUTCOME: The students should be able to:

CO1: Understand the principles of the design of a site operations.

CO2: Utilize the methodology of facility planning focused on individual operations.

CO3: Aware of provisions on fire safety, protection of environment, health & safety protection

Text Books:

Security and Site Design by - Leonard Hopper and Martha Droge

Reference Books:

The A to Z of Practical Building Construction and Its Management Hardcover– 2017 by Sandeep Mantri.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-706	Subject Title	Thesis Project						
LTP	0 0 24	Credit	12	Subject Category	THESIS	Year	1 st	Semester	IV

OBJECTIVE: The objective of the thesis is to provide an opportunity to the students to prepare independent and original study of a special project of his own choice.

Unit 1 :

The subject for special study may be conceptual or practical but pertaining to Building Engineering and Management. This should however, offer scope to adopt a fresh approach in formulating a concept or developing a methodology effective and useful. Each student will prepare the Thesis under the guidance of a principal advisor with regular reviews by the faculty of the department. The Thesis will be presented in the accepted form of a thesis report duly supported by copious References, sketches, graphs, statistical data, details of survey if any, detailed account of experimental / analytical procedures adopted. Each student is required to defend his Thesis at a Viva Voce Examination by jury.

The suggested thesis topic may be as following:

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Building Engineering 2. Construction technology 3. Structural systems 4. Energy efficient building materials & techniques 5. Construction project management 6. Time management 7. Cost management 8. Quality management 9. Safety management 10. Contract Administration | <ol style="list-style-type: none"> 11. Design management 12. Construction financial management 13. Human resource management 14. Quantitative techniques 15. Energy management 16. Building services 17. Building management systems 18. Infrastructure services 19. Management information systems 20. Project planning and feasibility 21. Disaster management |
|---|---|

LEARNING OUTCOME: The students should be able to:

CO1: Students will be able to work individually on a project

CO2: Students will be able to evaluate his/ her potential and limitations to carry out a project independently.

Text Books:

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Reference Books:

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Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-707	Subject Title	Real Estate Management						
LTP	2 0 0	Credit	2	Subject Category	DC	Year	1 st	Semester	IV

OBJECTIVE: Intent of the course is to impart detailed knowledge of all aspects related to management of Real Estate projects to train the students as Real Estate Project Managers. Students are expected to comprehend interests of various stakeholders and build understanding to discharge appropriate functions.

Unit 1 : REAL ESTATE SCOPE

- Classification of real estate activities and peculiarities; Role, scope, working characteristics and principal functions of real estate participants and stakeholders;
- Factors affecting real estate market; Role of Government in real estate market; Statutory provisions, laws, rules and regulations application, land use controls in property development, registration and licensing requirements; Appraisal of Real Estate development projects; Real Estate financing; REIT

Unit 2 : URBAN ECONOMICS

- Land as a factor of production, land rent, land use problems, location decisions
- Introduction to building economics; The Economic context: Materials, Labour, Capital; Economic aspects of design decisions; The Initial Cost of Building Projects; Construction Cost; Financing Construction Projects.; The Future Performance of Buildings: Cost-In-Use; Life Cycle Cost; Benefits and Value of Buildings; Measures of Economic Performance; Techniques of Economic performance analysis for building projects;

Unit 3 : FUNCTIONS OF REAL ESTATE DEVELOPMENT

- Functions of Real Estate development; Project formulation; Feasibility studies; Developing Costing and financing; Planning, scheduling and monitoring of real estate projects; Marketing/advertising; Risk management; Documentation in real estate processes;
- Transaction management; Transfer of titles and title records; Real Estate appraisal and valuation;

Unit 4 : REAL ESTATE CONSULTANT AND THEIR ACTIVITIES

- Types of agreements between the consultants and principal; Knowledge base for assessment and forecasting the Real Estate market; Real Estate investment, sources and related issues; Code of ethics for Real Estate participants; Environmental issues related to Real Estate transactions; Closing the Real Estate transactions.

LEARNING OUTCOME: The students should be able to:

CO1: Students will be able to understand the characteristic of real estate market.

CO2: Students will be able to understand the process of demand and supply of the market through various concepts of real estate management.

Text Books:

- Stapleton's Real Estate management Practice by - Anthony Banfield
- Principles of Real Estate Managements by - Anthony Downs

Reference Books:

- Corporate Real Estate Asset Management by – Barry Haynes, Nick Nunnington

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-747	Subject Title	Departmental Elective – 5 (BIM for Construction Management)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	III

OBJECTIVE: This course provides students with an understanding of the software used in construction project management for scheduling called BIM (Building Information Modelling)

Unit 1 : Design Phase application

- Schematic Design
- Detail Design
- Training
- Energy Analysis
- Marketing

Unit 2 : Construction Phase application

- Site Planning & Logistics
- Schedule/Work Sequence Simulation
- Quantity Take Off
- Clash Detection
- Marketing
- Shop Drawing
- Project Control
- Construction Project Modeling
- Training

Unit 3 : Operation & Maintenance Phase Application

- Asset Management
- Renovation Prioritization

LEARNING OUTCOME: The students should be able to:

CO1: Understand the application of the BIM at various phases of construction project.

CO2: Utilize the acquired knowledge and skills for the scheduling of a new project.

CO3: Apply the acquired skills to analyze and modify the scheduling of any current project.

Text Books:

McGraw Hill Construction SmartMarket Report “The Business Value of BIM: Getting Building Information Modeling to the Bottom Line” (2009).

Reference Books:

Eastman, C., Teicholz, P., Sacks, R., & Liston, K. (2008). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers, and contractors. Hoboken, N.J: Wiley.

Course Structure & Syllabus of M.Tech-Construction Engineering & Management Applicable for Batch: 2018-2020

Subject Code	AR-748	Subject Title	Departmental Elective – 5 (Infrastructure Development Through PPP Mode)						
LTP	3 0 0	Credit	3	Subject Category	DE	Year	1 st	Semester	III

OBJECTIVE: The intent of the course is to introduce students to basic concepts related to infrastructure development with an aim for developing expertise in effective management of infrastructure challenges across the country. The focus is on imparting knowledge and skills required for planning, management, and effective delivery of large-scale infrastructure projects through PPP.

Unit 1 :

Overview of infrastructure sector; Introduction to infrastructure business; Study of various types of infrastructure; Evolution and growth of infrastructure; Models on infrastructure development; Government's initiatives in infrastructure; Initiatives in 5-year plans;

Unit 2 :

Infrastructure Policy & Regulation; Land procurement; Project clearances; Appraisal of techno-legal and regulatory aspects of infrastructure;
Infrastructure Project Feasibility - Appraisal and Due Diligence; Life Cycle perspective of infrastructure; Social benefits of infrastructure development; Integrated impact assessment; Infrastructure project finance;

Unit 3 :

Infrastructure procurement and Project Implementation approach - SPVs & PPPs; Bidding systems; concession agreements, selection procedures of concessionaires; issues in financial closure, stakeholder management

Unit 4 :

Infrastructure Project Finance Management; Financial Models; Infrastructure Project planning and management; Strategic planning; Risk analysis techniques; Typical DPR Structures; Study case examples on different infrastructure types.

Unit 5 :

Environmental Impact Assessment; Case studies of infrastructure projects.

LEARNING OUTCOME: The students should be able to:

CO1: The students will be able to understand the Inventory management information system.

CO2: The students will be able to understand Stock control

CO3: The students will be able to forecast the demand and planning operations.

Text Books:

- Infrastructure Development & the Role of Public-Private-Partnership (PPP) Hardcover – Import, 3 Aug 2017 - by Professor G Satyanarayana.

Reference Books:

Public Private Partnerships: A Global Review (Cib) Hardcover – Import, 15 Sep 2015 - by Akintola Akintoye (Editor), Matthias Beck (Editor), Mohan Kumaraswamy (Editor)