

North Maharashtra University, Jalgaon

M.E. (Construction Technology & Management)

Examination Scheme and Structure with effect from Year 2010-11

First Year Term – I

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Management & Project Planning In Construction	3	--	3	100	--	--	--
2	New Construction Material & Technique	3	--	3	100	--	--	--
3	Construction Cost & Quality Management.	3	--	3	100	--	--	--
4	Construction Safety	3	--	3	100	--	--	--
5	Elective-I	3	--	3	100	--	--	--
6	Laboratory Practice-I	--	6	--	--	100	--	50
7	Seminar-I	--	4	--	--	100	--	--
Total		15	10		500	200		50
Grand Total		25		750				

Elective-I

- 1) Advance Construction Technology - I.
- 2) Infrastructure Development.
- 3) Repairs, Rehabilitation, Retrofitting of Structure.
- 4) Building Environment & Services.

First Year Term – II

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Resource Management	3	--	3	100	--	--	--
2	Construction contract Administration & Management	3	--	3	100	--	--	--
3	Construction Economics & Finance	3	--	3	100	--	--	--
4	Advance Construction Equipments	3	--	3	100	--	--	--
5	Elective-II	3	--	3	100	--	--	--
	Laboratory Practice-II	--	6	--	--	100	--	50
	Seminar-II	--	4	--	--	100	--	--
	Total	15	10	--	500	200		50
	Grand Total	25			750			

Elective-II

- 1) Advance Construction Technology – II.
- 2) Construction Disaster Management.
- 3) Advance RCC Structure.
- 4) Architecture & Town Planning.

ME Construction Technology & management**Second Year Term I**

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Seminar - III	--	4	--	--	50	--	50
2	Project Stage - I	--	18	--	--	100	--	--
Total		--	22	--	--	150	--	50
Grand Total		22		200				

Second Year Term II

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Progress Seminar	--	--	--	--	50	--	
2	Project Stage - II	--	18	--	--	150	--	100
Total		--	18	--	--	200	--	100
Grand Total		18		300				

SEMESTER – I

1. MANAGEMENT AND PROJECT PLANNING IN CONSTRUCTION

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. **General Management** – Comparison between traditional management and modern scientific management, roles of Taylor, Fayol, Mayo and Megregor. Management functions, Management styles. Objectives of Management, Management technique & use, organizations, forms of organizations.
2. **Project Management** – Basic forms of organization with emphasis on Project and matrix structures; project life cycle, planning for achieving time, cost, quality, safety requirements of projects, project feasibility reports based on socio-techno-economic-environmental impact analysis, project clearance procedures and necessary documentation for major works like dam, multi-storied structures, ports, tunnel, Qualities. Role, responsibility of projects Manager, Role of PMC (Project Management Consultants) on major projects, Web based project management.
3. **Construction Scheduling** – Work break down structure, activity cost and time estimation in CPM, PERT.. Precedence Network Analysis software in Construction scheduling (MSP-Managed Service Providers, primavera, Construction manager).
4. **Cost Analysis** - Cost analysis, cost curve, optimization & crashing of network for civil engineering project, updating of network.
Job layout, Mass housing & value engineering, small scale industries.
5. **Construction Management** – Site mobilization, demobilization aspects, various Resources management based on funds availability, organising and monitoring of the construction work with respect to cost-time schedules, coordinating communicating reporting technique, Application of Managing information Software (MIS) to construction, monitoring and control mechanisms, Training of Construction Managers.

Reference books

- a) Construction Management – *O'Brien*.
- b) Project Management – *K Nagarajan* (New Age International Ltd.)
- c) Professional Construction Management – *Barrie – Paulson* (McGraw Hill Institute Edition.)
- d) Construction Management – *Roy, Pilcher*
- e) Construction Project Management Planning, Scheduling and Controlling (Tata McGraw Hill, New Delhi)
- f) Project Management – *Ahuja H.N.* (John Wiley, New York.)
- g) Construction Management and Planning – *Sengupta and Guha* (Tata McGraw Hill publication)
- h) Construction Planning & management- P.S. Gahlot & B.M. Dhir (New Age international (p) Ltd.
- i) Construction Planning & management- Mahesh Varma.

2. NEW CONSTRUCTION MATERIALS & TECHNIQUES

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

Material composition and properties, production, storage, distribution, testing, acceptance criteria, applications, limitations of use, economic consideration, and recent development related to the following materials to be studied.

- 1. Industrial Waste** - Fly Ash, Blast furnace slag, Red mud, Waste glass, etc.
- 2. Agricultural Waste** - Rice husk, Banana leaves, Sisal fibers, Coconut wastage, etc.
- 3. Concrete Construction Technology**
 - a. Silica fume concrete
 - b. Self compacting concrete – Properties, testing, etc.
 - c. Smart materials
 - d. Materials used in nuclear-containment structures
 - e. Glenium Concrete
- 4. Properties and technique of construction for concrete, Fiber reinforced concrete, Light Weight concrete, Heavy weight concrete, Foam concrete, High performance Concrete.**
- 5. Special concrete operations shortcrete, grouting, grunting, under water concreting, hot and cold weather concrete, pumpabale concrete.**

Reference Books

- a) New Building Materials and Construction World magazine
- b) Concrete Technology - *Neville*
- c) Civil Engineering and Construction Review magazine
- d) Building Materials - *Ghosh*
- e) Concrete Technology - *M. S. Shetty*
- f) Concrete Technology – M. L. Gambhir
- g) New building material & cost effective construction techniques – Published magazines

3. CONSTRUCTION COST AND QUALITY MANAGEMENT

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

- 1. Construction Costing** : Costing of construction Works, different methods of costing, cost elements in a project, Analysis of rates, Non-scheduled items of work, Cost estimation for a small construction job, Purpose, methods and stages of cost control, cost monitoring, cost forecasting methods,
- 2. Cash flow**: Determining the funds required for a construction job, preparing cash flow statements, Cash inflow and outflow during contract period, Project expectations and performance models.
- 3. Cash and payment of works**; Precautions in custody of cash, imprest account and temporary advance, Maintenance of temporary advance and advance account, different types of payment, first running advance and final payments.
- 4. Quality** - Necessity for improving Quality in the context of Global Challenges. Concept of Quality Control, Quality Assurance, Quality Management and Total Quality Management (TQM). Designing of quality manuals, checklists and inspection reports, installing the quality assurance system, monitoring and control. Quality Assurance Department and quality control responsibilities of the line organization. Quality in foundations and piling work, structural work. Concreting, electrical system building facilities, waste recycling and maintenance
- 5. Preparation of Bill and Report** - Preparation of bills for payment, measurement book, mode of payment, running account bill. Ledger and Cash book details, Arbitration.
Completion report of the project; Checking of Plan, Details of various works and issue of completion report of the project.

Reference books

- Mueller, F.W. Integrated cost and schedule control for construction projects.
- Gaborone: Cost control in the construction industry.
- Schedule of rates, specification manuals etc from PWD.
- Chris Hendrickson and Tung Au: project Management for construction.
- Datta: material Management procedures, Text and Cases, 2e. Prentice Hall
- Gopalakrishanan, P, Sundaresan, M Material Management- an Integrated Approach, Prentice Hall
- Dobbler and Bart: Purchasing and supplies Management, Text and Cases, 6e.
- Chitkara, K.K. Construction Project Mangement, Tata-McGraw Hil
- Construction Management – *Gehlot and Dhir*
- Construction Management – *Dr. B. V. Pathak*.
- ISO 9000, ISO 14000 and QS 9000 standards and certifications.

4. CONSTRUCTION SAFETY

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

- 1. Construction Safety Management** – Role of various parties, duties and responsibilities of top management, site managers, supervisors etc. role of safety officers, responsibilities of general employees, safety committee, safety training, incentives and monitoring. Writing safety manuals, preparing safety checklists and inspection reports.
- 2. Safety in construction operations** – Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, etc. safety at various stages of construction. Prevention of accidents. Safety measures.
- 3. Safety in use of construction equipment** e.g. Vehicles, cranes, hoist and lifts etc. Safety of scaffolding and working platforms. Safety while using electrical appliances. Explosives
- 4. Various safety equipment and gear used on site.** First aid on site. Labour laws, legal requirement and cost aspects of accidents on site.
- 5. Study of safety policies,** methods, equipment, training provided on any ISO approved construction company.

Reference books

- Construction Safety Manual - Published by National Safety Commission of India.
- Safety Management in Construction Industry – A manual for project managers. NICMAR Mumbai.
- Construction Safety Handbook – *Davies V.S.Thomasin K, Thomas* (Telford, London.)
- ISI for safety in Construction – Bureau of Indian Standards.
- Safety management – Girimaldi and Simonds (AITBS, New Delhi)

5. ELECTIVE – I

i. ADVANCE CONSTRUCTION TECHNOLOGY - I

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1. **Underground Construction** – Tunnel - Shaft sinking, Tunnel driving in hard and soft strata, bedding of conduits.
2. **Under Water Construction** – Problems encountered. Underwater drilling, blasting, and concreting. Construction of under deep water-concrete diaphragm walls
3. **Grouting Methods** – Cement grouting, colgrout, colcrete process, prepacked concrete, intrusion grout, Alluvial grouting, various types of clay grouting, *Chemical grouting* – grouts for injection of fine sands, Resin – grouting, Polymerisation technique, Field procedure, applications and limitations.
4. **Dewatering** – Dewatering of shallow and deep open excavations, Effect of ground water movement, Methods of groundwater control. Shallow and deep well points, Horizontal drainage, vacuum dewatering by electro-osmosis, single and multiple well system, group of wells. Draw down factors, vertical sand drains, pressure relief beneath excavation, well point pumps, headers discharge lines control of surface water, Installation and operation of well point system.
5. **Piling** – Behavior of single pile and a group piles during driving, under loads-ultimate loads on driven and cast in Situ piles. Construction details of precast piles, prestressed piles, and steel piles, friction piles.

Reference books

- a) Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
- b) Construction Equipment Planning and Applications – Dr. Mahesh Verma
- c) Brochures Published by various agencies associated with construction.
- d) Journals such as CE & CR. Construction world, International Construction. Document Reports of actual major works executed.

ii. INFRASTRUCTURE DEVELOPMENT

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. Construction Industry – Nature, characteristics, size and structure Role of infrastructure development in employment generation and improving of the National economy.
2. Various Agencies associated with infrastructure development in India as regards various sectors.
3. Status of Infrastructure in India- Indian government policy, Roads and buildings, communication, water supply, irrigation, power energy sectors, ports and aviation, health and educational services, rural development.
4. Issues related to infrastructure development – pre – requisites necessary to ensure success for switching over from public sector management to private sector management, issues in developing,
5. Funding and managing infrastructure projects, role, and responsibility of project management consultants.

Reference Books

- a) India Infrastructure Report – Rakesh Mohan
- b) Infrastructure Today - Magazine
- c) Document of five year plans, published by Govt. of India
- d) CE & CR Magazine.
- e) Construction World Magazine.

iii. REPAIRS, REHABILITATION & RETROFITTING OF STRUCTURES

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. Importance of rehabilitation as a part of construction engineering.
2. Rehabilitation studies of buildings, underground construction, bridges, streets & highways,
3. Steel Structures - Types of distress. Numerical condition surveys for foundation, structural and functional deterioration, design criteria, materials and techniques.
4. Predictive performance models, evaluating alternatives based on technical, commercial, management, financial feasibilities, data collection and database management, maintenance of rehabilitated structures. Procedure adopted by BIFR (Board of Industrial and Financial Reconstruction)
5. Earthquake damages of buildings, their retrofitting, restoration, effects of earthquakes, response of buildings to earthquake motion, factors related to building damages due to earthquake, methods of seismic retrofitting, restoration of buildings.

Reference books

- a) Fundamentals of Earthquake Engineering – *N. W. Newman & E. Rosen Blueth.*
- b) Masonry & Timber Structures including Earthquake Resistant Design - *A. S. Arya.*
- c) Earthquake Engineering – *R. L. Wieegel.*
- d) Deign of Multistoried Buildings for Earthquake Ground motions - *Blume, Newmark & Corning.*
- e) Structural dynamics – *Mario Paz.*
- f) Earth Quake Engineering – *Agrawal & Shrikhande*

iv. BUILDING ENVIRONMENT & SERVICES

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. a) Acoustics, Acoustical Designs, Noise and its control.
b) Natural and artificial Light in Building, Lighting, Measurement. Design of Lighting system.
c) Fire protection of Buildings.
2. a) Energy conservation in Buildings, thermal properties of buildings, Thermal insulation and insulating material, Thermal design of enclosures.
b) Thermal environment inside building, cooling & heating loads, Systems of air-conditioning.
3. a) Principle of non-conventional energy systems.
b) Elevators, Escalators and conveyer, Design, Type, Location, bye-laws etc.
c) Electric wiring system in building, conductor, cable and conduits, Electrical grounding in buildings.
4. a) Water supply to building
- Water supply systems for building.
- Domestic and commercial Hot water and water supply system for multistoried buildings.
b) Swimming pools-Design criteria, Springboards, pressure filters for recirculation, maintenance.
5. a) Building Drainage system, Nature of Drainage phenomenon,
Ant siphon & vent piping - Installation, jointing & listing of pipes,
b) External drainage System in building.
c) Domestic gas supply-characteristics of gas service & distribution piping
d) Approval of authorities for water supply, sanitary schemes for building
e) Roof water harvesting & water conservation.

Term Work: - An five Assignment based o above syllabus.

Reference Books:-

- a) National Building code, Bureau of Indian standard
- b) Acoustical designing in Architecture, by V .O.Kusen &C.M.Harris, John.Wiley & Son .
- c) Acoustic designing & practice, by R.L.Suri,Asia Publishing House.
- d) Architecture acoustics, by Anita Lawrence.
- e) Main climae & rchitecture b B.Govoni, Elsvire Publishing co.
- f) Thermal Performance of Building by J.P Van Stratten, Elsvier Publishing Co.
- g) Functional requirement of building (other than Industrial Building) ,BIS Handbook

LABORATORY PRACTICE – I / SITE VISIT

Teaching Scheme:

Practical: 6 Hrs. /Week

Examination Scheme:

Term Work: 100 Marks

Oral: 50 Marks

Term work should consist of any (Four) exercises from the following:

1. Minimum Two site visits to study construction techniques and use of major construction equipment associated with ongoing major construction works. Visit Report to be submitted.
2. Collection of techno-commercial information as regards new construction materials, new construction methods.
3. To prepare study report on Earthquake Resistant Building Construction.
4. Preparation of network analysis, crashing and updating of precedence-network for a major construction work.
5. Minimum one site visit to Ready Mix Concrete Plant use for major construction, Visit report to be submitted.
6. To study report on new building material & Cost Effective Construction Techniques.
7. Elective –I - Two assignments.

SEMINAR – I

Teaching Scheme:

Practical: 4 Hrs. /Week

Examination Scheme:

Term Work: 100 Marks

Each student will select a topic in the area of Civil Engineering and related area in the state of art area & technical development. The topic will be decided by the student, guide and departmental research committee. Each student will make seminar presentation with audio/ video aids, for the duration of 45 minutes and seminar work shall be in the form of report to be submitted by the students at the end of the semester. The report copies must be duly signed by guide and Head of department. (One copy for institute, one copy for guide and one copy for candidate for certification). Attendance of all students for all seminars is compulsory.

SEMESTER – II

1. RESOURCE MANAGEMENT

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. Materials Management

Importance of materials management and its role in construction industry-scope, objectives and functions, integrated approach to materials management, Role of materials manager.

Classification and Codification of materials of construction. ABC analysis-Procedure and its use, Standardization in materials and their management, Procurement, identification of sources of procurement, vendor analysis. Vendor analysis concept of (MRKP) Material requirement planning, planning, purchase procedure, legal aspects.

2. Inventory Management – Inventory Control techniques. EOQ, Advantages and limitation of use of EOQ, Periodic ordering, order point control, safety stock, stock outs, application of AC analysis in inventory control, concept of (JIT)- Just in time management, Indices used for assessment of effectiveness of inventory management.

Stores Management: Receipt and inspection, care and safety in handling, loss on storage, wastage, Bulk purchasing, site layout and site organization, scheduling of men, materials and equipment.

3. Use of (MMS) – Materials Management Systems in materials planning, procurement, inventory, control, cost control etc.

4. Equipment Management – Working out number of construction equipment required based on the individual equipment work cycle, and based on the total time available and quantum of work. Working out the total hourly cost and the cost per unit of item for the various construction machinery. Concept of equipment log book. Concept of equipment selection based on optimal used.

5. Need for Development of Human Resource, flow diagram of human resource development and human resource management. Training, competency development, capacity building of resources required at grass root level and at the managerial level in construction.

Reference books

- a) Purchasing and Inventory Control - *K. S. Menon* (Wheeler Publication)
- b) Construction equipment planning and applications - *Dr. Mahesh Verma*
- c) Construction planning, equipment and methods – *Peurifoy* – (Tata McGraw Hill pub.)
- d) Human Resource Management - *Biswajeet Pattanayak*
- e) Managing Human Resources - *Bohlander & Snell*

2. CONSTRUCTION CONTRACT, ADMINISTRATION & MANAGEMENT

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

- 1. Contracts Administration** – The standard forms of building contracts, the rights of building owners, adjoining owners and third parties. The Indian Contract Act, Sale of Goods Act. Professional ethics, Global tenders and B.O.T. System
- 2. Contract system** – Various types, Importance & clauses of contract.
- 3. Arbitration Awards & Dispute Resolving boards** – Indian Arbitration Act, arbitration agreement, conduct of arbitration, power and duties of arbitrator, rules of evidence/preparation and publication of awards, methods of enforcement, impeding and award. Limitations of arbitration in the Indian context (DRB's) Dispute resolving boards-necessity, formation, functioning advantages.
- 4. Industrial Act and Labour Laws** – Industrial Dispute Acts, payment of wages act, Minimum Wages Act, Indian Trade Union Act, and Workmen's Compensation Act.
- 5. Administration of Incentive Schemes** – Necessity, Merit rating, job evaluation, installation, modification and maintaining and incentive scheme based on implementation experience.

Reference books

- a) Construction contracts and claims – *Simon M.S.* (McGraw Hill, New York)
- b) Construction Contract Management-NICMAR publication
- c) Handbook of estimating & costing for Quantity Surveyors - *P. T. Joglekar*
- d) Estimates and contracts *B. S. Patil*

3. CONSTRUCTION ECONOMICS & FINANCE

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. **Principles of Economics** – Importance of the economic background to measurement, objectives of business firm. Factors bearing on size of firms. Motives to growth. Obstacles to growth of firms, Study of present economy.
2. **Capital** – Analysis of need working capital, Estimation of requirements of working capital, Credit Management, Cash Management, Managing payments to suppliers and out standings.
3. **Economic Analysis** – Capital investment in project, Cost analysis by traders and by functional element, Cost planning techniques, Cost control during design and Construction, Depreciation, Various Appraisal Criteria Methods. Break-even analysis, Cash flow analysis, Risk Analysis and Management Practice.
4. **Financial Planning** – Long term finance planning, Stock, Borrowings, Debentures, Loan Capital, Public Deposit, Dividend Policies, Bonus Shares, Market value of shares, Reserves. Over and under capitalization.
5. **Budget** –Budgetary control system. Types of budgets, Procedure for master budgets. Budget manual. Cash now forecast.

Problems of expansion and merger of companies, Corporate tax planning, Public policies on ICRA grading of exchange, World financial market, Role of financing institutes in Construction, CIDC- grading of construction entities.

Reference books

- a) Projects planning, Analysis Selection, Implementation and Review - Prasanna Chandra (Tata McGraw Hill, New Delhi)
- b) Construction Management and Accounts - Singh H. (Tata McGraw Hill, New Delhi.)
- c) Construction Management : “Planning and finance” - Cormican D. (Construction press, London.)
- d) “Principles of Corporate Finance” Brealey R.A. (Tata McGraw Hill, New Delhi.)
- e) ‘Engineering Economy’ - Leland T. Blank. Anthony Tarquin.(McGraw Hill.)
- f) ‘Engineering Economics’ - David Bedworth, Sabah Randhawa. (McGraw Hill)
- g) ‘Real Estate, Finance and investment’ Bruggeman. Fishr (McGraw Hill.)
- h) ‘Foundations of Financial Management’ - Block Hirt (McGraw Hill.)
- i) ‘Case studies in finance’ - Burner (McGraw Hill)
- j) ‘Cases in Finance’ - DeMello (McGraw Hill)
- k) ‘The cost management toolbox : A Managers guide to controlling costs and boosting profits.’ Oliver, Lianabel (Tata McGraw Hill)

4. ADVANCED CONSTRUCTION EQUIPMENTS.

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

- 1. Pile driving Equipments:-** Pile hammers, drop, single acting steam, double acting steam, differential acting steam, diesel, vibratory , hydraulic hammers , sonic hammers, selection of pile driving hammers.
- 2. Crushers & plants –** types , primary, secondary ,tertiary crushers, jaw, gyratory, stone crushers, hammer mills, roll crushers, rod and ball mills Screening aggregate, revolving, vibrating screens.

Ready mix concrete plants :- central concrete batch plant , portable concrete batch plant, ready mixed concrete – central mixed , shrink mixed, truck mixed concrete, concrete pumps.
- 3. Excavating & Hauling Equipments:-** Power shovels; size, basic parts, selection ,factors affecting output. Draglines:- types, size, basic parts, effect of job and management conditions on the output of dragline. Clamshells – clamshell buckets. Hoes- basic parts working ranges. Bulldozers-types, moving earth with bull dozers.
- 4. Compacting Equipments:-** Types of compacting equipments. Such as tamping rollers, smooth wheel rollers, pneumatic tyred rollers, Hoisting equipments : Chain, hoist, fork trucks
- 5. Cranes:** Classification, derrick crane, mobile crane, Tower crane, Hydraulic crane, overhead or gantry crane. Safety in crane operation. Use of cranes in steel construction. Use of cranes in concrete construction

Reference books

- a) Construction Planning, Equipments and Methods - *R.L.Peurifoy*
- b) Construction Equipments and its Planning & Application - *Dr. Mahesh Verma*
- c) Construction Equipment and Planning - *Dr. S.V. Deodhar*

5. ELECTIVE – II

i. ADVANCED CONSTRUCTION TECHNOLOGY – II

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1. Advance formwork techniques for major civil engineering project.
2. Bridges, type's construction of special type of bridges such as cable stayed bridge, suspension and Prestressed Bridge, construction of foundation and super structure.
3. Off shore structure, types, methods of construction and maintenance, Construction, maintenance of underground railways.
4. Trenchless technology.
5. Principles, methods of fast track construction projects.

Reference books

- a) Same as those for Construction Technique.
- b) Manuals brochures publications from construction companies, firms etc.
- c) Reports of actual works executed.
- d) NICMAR Publications on Construction Engineering.

ii. **CONSTRUCTION DISASTER MANAGEMENT**

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. **Nature Disasters** – Natures and extent of disasters, natural calamities such as earthquake, floods, coasts hazards, landslides etc.
2. **Manmade disasters** such as chemical and industrial hazards, nuclear hazards, fire hazards etc.
3. **Disaster Management** – Financing relief expenditure, legal aspects, rescue operations. Casually management, risk management.
4. **Emergency Management Programme** – Administrative setup and organization. Hazard analysis, training of personnel, information management, emergency facilities and equipment necessary.
5. **Public awareness & Management-** creation, preparation and execution of the emergency management programme.

Reference books

- a) Construction Engineering and Management – Seetharaman
- b) Project Management – K Nagarajan (New Age International Ltd.)
- c) Different sites on internet on disaster management
- d) NICMAR Publications
- e) CECR's Journals

iii. ADVANCED RCC STRUCTURES

Teaching Scheme:

Lectures: 3 Hrs. /Week

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

1. Yield Line Theory for analysis of slabs: Equilibrium and virtual work method of analysis, Rectangular Slabs and with various edge condition – yield line pattern, square, rectangular, circular Slabs, Design for limit state of serviceability, orthotropic ally reinforced slabs.
2. Gird or coffered Floors: General features, Rigorous and Approximate method of analysis Design of grid floors. Design of aqueduct.
3. Spherical and Conical domes,
4. Prestressed Concrete Tanks – Circular prestressing general features (analysis & design)
5. Design of prestressed concrete one way & two way slabs

Reference Books

- a) Reinforced Concrete Vol. II – *Jain & Jaikrishna*
- b) Presstered Concrete – *Krishna Raju N.*
- c) Limit State Design of Prestressed Concrete – *Guyon Y.*
- d) Advance reinforced concrete Design – *P. C. Verghese* (Prentice – Hall)
- e) Fundamentals of Reinforced Concrete – *N. C. Sinha & S.K. Roy* (S. Chand)
- f) Advance reinforced concrete Design – *N. Krishnaraju.*
- g) Plain & Reinforced concrete – *O. P. Jain & Jai Krishna.*
- h) Advance RCC Structure – *Neville.*

iv. **ARCHITECTURE AND TOWN PLANNING**

Teaching Scheme:

Lectures: 3 Hrs. /Week

Tutorial: 01 Hrs. /Week

Term Work: 50 Marks

Examination Scheme:

Theory Paper: 100 Marks

Duration: 3 hours

Course Contents :-

Introduction history & concept of Architecture. Urban & landscape Design, Advance planning theory & practice.

Town Planning & its scope , planning for Transportation & utility services. Social formation & Housing Law in relation to planning, Urban renewal, conservation & planning for rural development . Economic Aspect of planning & computer programming.

Term Work:-

1 Sub division of plots, junction improvement

2 Town Planning Schemes.

3 Study & report on life important town planner & architects.

LABORATORY PRACTICE – II / SITE VISIT

Teaching Scheme:

Practical: 6 Hrs. /Week

Examination Scheme:

Term Work: 100 Marks

Oral: 50 Marks

Term work should consist of any (Four) exercises from the following.

1. To prepare the study report on Resource management of a major Civil Engineering Structure.
2. Minimum two site visits to study the feasibility aspects, Tendering procedures, accounting systems, funds raising and other financial management aspects, billing procedures etc. associated with on-going major construction work-visit report to be submitted.
3. . Collection and study of Tender notices, tender documents of contract document associated with Civil Engineering works.
4. Collection of techno-commercial information s regards new types of construction equipments.
5. Study and use of various computer software's, use in the field associated with i) Project Management ii) Estimating, Costing, Tendering (At least one software package in each)
6. Web based project management
7. Elective-II - Two assignments.

SEMINAR – II

Teaching Scheme:

Practical: 4 Hrs. /Week

Examination Scheme:

Term Work: 100 Marks

Each student will select a topic in the area of Civil Engineering and related area in the state of art area & technical development. The topic will be decided by the student, guide and departmental research committee. Each student will make seminar presentation with audio/ video aids, for the duration of 45 minutes and seminar work shall be in the form of report to be submitted by the students at the end of the semester. The report copies must be duly signed by guide and head of department. (One copy for institute, one copy for guide and one copy for candidate for certification). Attendance of all students for all seminars is compulsory.

SEMESTER – III

SEMINAR-III

Teaching Scheme:

Practical: 4 Hrs. /Week

Examination Scheme:

Term Work: 50 Marks

Oral: 50 Marks

Each student will select a topic in the area of Civil Engineering, related to M.E. project Stage-I. The topic will be decided by the student, guide and departmental research committee. Each student will make seminar presentation with audio/ video aids, for the duration of 45 minutes and seminar work shall be in the form of report to be submitted by the students at the end of the semester. The report copies must be duly signed by guide and head of department. (One copy for institute, one copy for guide and one copy for candidate for certification). Attendance of all students for all seminars is compulsory.

PROJECT STAGE - I

Teaching Scheme:

Practical: 18 Hrs. /Week

Examination Scheme:

Term Work: 100 Marks

The project work will start in second year term-I, and should preferably be a live problem in the industry or macro-issue having a bearing on performance of the civil engineering construction industry and should involve scientific research, design, collection, and analysis of data, determining solutions and must preferably bring out the individuals contribution.

The dissertation should be presented in a standard format.

The term work should be continuously evaluated as per the norms/guidelines and its assessment of 100 marks.

SEMESTER – IV

PROGRESS SEMINAR

Examination Scheme:

Term Work: 50 Marks

Each student will select a topic in the area of Civil Engineering and related to M.E. project Stage-II. The topic will be decided by the student, guide and departmental research committee. Each student will make seminar presentation with audio/ video aids, for the duration of 45 minutes and seminar work shall be in the form of report to be submitted by the students at the end of the semester. The report copies must be duly signed by guide and head of department. (One copy for institute, one copy for guide and one copy for candidate for certification). Attendance of all students for all seminars is compulsory.

PROJECT STAGE – II

Teaching Scheme:

Practical: 18 Hrs. /Week

Examination Scheme:

Term Work: 150 Marks

Oral: 100 Marks

The project work will start in second year (continue to project stage - I).

The term work should be continuously evaluated as per the norms/guidelines and its assessment of 100 marks.

The dissertation should be presented in a standard format.

The oral examination shall be conducted with the help of approved external examiner, appointed by university.

* * *