J. S. University, Shikohabad

M. Tech.

(Civil Engineering)

Scheme

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Syllabus

[Effective from the session 2015-16]

I- SEMESTER

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
1	MTCE-11	Construction Management andEquipment	3	1	-	-	50	100	150	3
2	MTCE-12	Concrete Construction Technology	3	1	-	-	50	100	150	3
3	MTCE-13	Computational Techniques	3	1	-	-	50	100	150	3
4	MTCE-14	Building Planning And Design	3	1	-	-	50	100	150	3
5	MTCE-15 MTCE-16	Elective-1(Any one) Environment Engineering & Management Bridge Engineering	3	1	-	-	50	100	150	3
								Grand Total	750	

II- SEMESTER

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
1	MTCE-21	Foundation Design And Construction	3	1	-	-	50	100	150	3
2	MTCE-22	Maintenance of Building Structures	3	1	-	-	50	100	150	3
3	MTCE-23	Computer Aided Design	3	1	-	-	50	100	150	3
4	MTCE-24	Building Cost and QualityManagement	3	1	-	-	50	100	150	3
5	MTCE-25 MTCE-26	Elective-II(Anyone)Rural Construction Technology Pavement Design,Construction and Maintenance	3	1	-	-	50	100	150	3
								Grand Total	750	

III- SEMESTER

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
1	MTCE-31 MTCE-32	Elective-III(Any One)Advance Structural Design and DetailingComposite Materials	3	1	-	-	50	100	150	3
2	MTCE-33 MTCE-34	Elective-IV(Any One)Disaster Reduction and ManagementConstruction Costing and Financial Management	3	1	-	-	50	100	150	3
3	MTCE-35	Project	-	-	4	-	50	100	150	3
4	MTCE-36	Seminar	-	-	2	-	-	100	100	3
								Grand Total	550	

IV- SEMESTER

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
1	MTCE-41	DISSERTATION a) Continuous Evaluation b) Project Report c) Viva Voice	-	-	3	-	50	300	350	3
								Grand Total	350	

[MTCE-11] CONSTRUCTION MANAGEMENT AND EQUIPMENT

Engineering economy: Principle of Engineering Economy, Minimum cost point analysis, Break even point analysis, Depreciation and depletion.

Safety in construction: Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: For storage and handling of building materials. Construction of elements of a building In demolition of buildings Safety lacuna in Indian scenario.

construction planning: Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control.

general management: Introduction and characteristics of management, Principle and function of management, Scientific management.

Materials management: Scope, Objective and functions of material management, Procurement and store management, Materials handling management, Inventory control and management. Disposal of Surplus Materials

Earth moving equipment: Crawler and wheel tractors their functions, types an specifications; Gradability Bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade an rolling resistance on the output of tractor pulled scrapers Earth loaders; Placing and compacting earth fills. Power shovels-functions, selection, sizes, shovel dimension and clearances, output, Drag lines functions , types sizes, output clam shells ;Safe lifting capacities and working ranges cranes; Hoes, Trenching machine types and production rate calculation of production rates of equipment; examples.

Hauling equipment : Trucks; Bottom dump wagons ;capacities of trucks and wagons Balancing the capacities of hauling units with the size excavator; effect of grade, rolling resistance and altitude on the cost/performance of hauling equipment; balancing excavating hauling equipment examples.

drilling ,blasting and tunneling equipment: Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors.

Pile driving equipment: Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact.

Reference:

1. Construction equipment and its planning and application Dr. Mahesh Verma.
2. Construction Planning equipment and Methods by RL Peuripo Tata McGraw Hill.
3. Heavy construction planning equipment and methods -Jagman Singh Oxford and IBH.
4. Rock Engineering-Ry John A Franklin and Maurice B Dusseault, Tata McGraw Hill.
5. Management Machines and Methods in Civil Engineering-John, Christan, John Wiley and Sons.
6. Modern Construction Equipment and Methods. Frankharris John Wiley and Sons.

[MTCE-12]CONCRETE CONSTRUCTION TECHNOLOGY

Introduction of Concrete materials, Admixtures, Fly Ash, Polymers, Early Age Properties, Strength, Permeability & Durability.

Principles of Concrete mix design, Concrete Mix Design procedure by: IS/ACI/British Standards. Concreting Operations-Practices and Equipment, Batching; Mixing; Transporting; Placing and Compacting; curing.

Properties and technique of construction for concrete, Fiber reinforced concrete, light weight concrete, Heavy weight concrete, Foam concrete, High performance Concrete.

Special concrete operations shot Crete, grouting, Grunting, underwater concreting, hot and cold weather concrete, pump able concrete.

Construction techniques for reinforced concrete elements-materials, Principles and procedures for beams, slabs, columns, Foundations, walls and tanks, design and fabrication of form work for R.C.C elements.

Pre stressed concrete construction-Principle, methods, materials, Tools and equipment for the construction of a pre stressed bridge.

Inspection and Quality Control of Concrete Construction-Stages, Principles, Checklist, Statistical Controls,procedures.

Practical Exercises:

Testing of aggregates-fine and coarse as per BIS procedure.

Testing of cement with reference to IS specifications and Cement Grade.

Concrete Mix Design for desired grade from given materials.

Design and testing of workability of concrete for a given C.C. proportion.

Design and determination of Cube Strength with given materials and proportions.

Design of Concrete Mix proportions.

Study of effect of compaction of strength of concrete.

Study of effectofplasticixers on workability of concrete.

Study of permeability of concrete.

Conduct chemical analysis of hardened concrete to determine the cement content.

Inspection of a concrete construction site and preparation of report showing correct and incorrect practices.

Reference:

1. Concrete Technology by M.L. Gambhir
2. Concrete Technology, by Neville and Brooks
3. Properties of Concrete by Neville.
4. Concrete Microstructure, Properties and Materials P.K. Mehta and PJM Monteiro
5. Concrete Technology M.S. Shetty.

[MTCE-13] COMPUTATIONAL TECHNIQUES

Equations: Rotts of Algebraic, Transcendental equations, Solution of linear simultaneous Equations by different methods using - Elimination, Inversion, Gauss - Jordan methods. Homogeneous Problems and Eigen Value Problems.Non linear Equations, Interpolation.

Finite Difference Technique : Initial and Bundary Value Problems of Ordinary and Partial differential equations, Solution of Various types of Plates.

New Marks Method: Solution of determinate and indeterminate Structures by using New Mark's Procedure.

Statistical Methods: Method of Correlation and Regression Analysis.

Initial Value Problems: Galerkin's Method of Least Square, Initial Value problem by Collocation points, RungaKutta Method.

Newmark's Implicit and Explicit Solutions for Non Linear Problems and Convergence Criteria.

Reference:

1. Numerical Methods, Problems, and Solutions by M.K. Jain, S.R.K.Iyenger, R.K. Jain
2. Numerical Methods by Dahlquist, G. andBjorck, A.
3. Numerical Receipes in Fortran by W.H. Press, S.A. Tenkolsky, W.T. Vellerling, B.P. Flannery.
4. Computer Programming & Numerical Analysis, by Syal& Gupta

[MTCE-14] BUILDING PLANNING AND DESIGN

The final paper shall be set out covering 20% marks from Section A, 40% marks from Section B and 40 % marks from Section C

Section A-Architecture

Land Acquisition Act 1894 (short titles, extent & definitions ONLY)

Municipality act 1911 (short titles, extent & definitions only, Power of committee for making bylaws, for punishment ,to sanction)

Architectural Planning and Layout: Principles of planning a building, Factors affecting selection of site for building, Sun & the building

Section B-SOIL

Soil formation, particle size analysis, Indian Standard Soil Classification, time-settlement curve, Proctor test, compaction of sand, factors affecting compaction, field compaction methods, calculation of Bearing Capacity of soil by Standard Penetration Test, soil investigation report, types of shear failures, effect of water *table* on B.C., Settlement cases, calculation of B.C. by Plate Load Test. Note: IS : 6403 is allowed in Exam

Section C Structure

Earthquake: Hazardous effects on structures & Ground, General guidelines for earthquake resistance buildings. Liquefaction, factors affecting liquefaction & prevention,

Various Loading Conditions and Analysis of Multi storied Complex (Kani's Method for vertical loads and Portal Method for Lateral loads)

Structural Design of Beams, Columns, Slabs, Foundations and Stairs. Structural Drawings

Reference:

1. Soil Mechanics and Foundation EnggDr K R Arora Standard Publishers.
2. Building planning designing and scheduling Gurcharan Singh
3. Construction equipment and its planning and application Dr. Mahesh Verma.
4. Construction Planning equipment and Methods by RL Peurify Tata McGraw Hill.
5. IS-1888(1978):Plate Load Test IS 6403 (1981): Bearing capacity of shallow Foundation.

[MTCE-15] ENVIRONMENTAL ENGINEERING & MANAGEMENT

1 Environment &Ecology : Definition and understanding of concepts. Ecosystem, Energy flow in ecosystem, water, carbon and nitrogen cycle community's inter-relationships in and ecosystem.

2 Type of Pollutants and Protection of Environment:

2.1 Environmental Protection: Importance of clean Environment, Control of Environment pollution w.r.t. air, land and water.

2.2. Water pollution : Sources, causes and measurement of water pollution surface water and underground water, water Quality criteria for various uses of fresh water, river basis studies for surface water pollution control biochemical oxygen demand, effect of oxygen demanding wastes on rivers.

2.3 Domestic and industrial wastes : Sources, standards for disposal of waste water Industrial effluents, Basic unit operation in control of waste water pollution, design features for treatment for disposal of sewage effluents ; guidelines of CPCB for abatement of industrial pollution technologies for control of water pollution from industries.

2.4 Air and Noise pollution: definition Principle materials causing pollution types of air contaminants. their sources and effects on living and nonliving materials permissible limits. Air pollution control Basis principles, natural self cleansing, pollution control methods and various engineering devices to control particulate and gaseous pollutants, controlling and pollution from automobiles. Noise Pollution : Definition ,sources of noise and its units, adverse effects of noise pollution, sound pressure level and its measurement, octave hand and its importance; noise pollution control measures.

3 Land damage due to Mining: Open cast mining and its ill effects, Environmental protection practices in Mining and Environment Management Plans.

4 City and Housing Environment: Introduction, stage of Housing/city environment, Environmental consideration in town planning, Measures for improving city environment.

5 Current issues in Environmental Engineering: Global warming Ozone depletion, Acid Rain, Oil pollution, Radiation Hazard and control, Role of non-convention sources of energy in environment.

6 Acts/Legislation Provisions: Need for laws various acts, Rules and notifications. Salient features of various acts: The water (Prevention and Control of pollution) Act 1974. The water (prevention and Control of pollution) Cess Act, 1977.Air(Prevention and control of Pollution) Act 1981. The Environment (Protection)Act 1986,The Public liability insurance Act, 1991. The forest Act 1927, The wild life (Protection)Act 1927, The Forest (Conservation) Act,11980, various other Rules and notification for control of pollution.

7 Environmental Impact Assessment: Definition and its importance for Environment Management, Constituents of Environment Impact Assessment Report, Steps involved in preparing EIA,EIA methodologies Projects under EIA, Environment Impact Statement, Constraint in implementation of EIA. Impact prediction water, Resources Projects and other relevant case studies. Application of Biotechnology for Environmental Management: Basic concepts and techniques, Application for industrial effluent: Solid waste Management, Bio fertilizers and Bio-pesticides; Plant issue culture in forestry. Bio safty aspects, Bio-remedial.

Laboratory Work/Field Tasks:

Testing of water for various parameters such as pH,DO, conductivity.

Determination of BOD for Domestic Waste / Industrial Waste.

Determination of MPN of given sample.

Air sampling to particulate matter and other gaseous contaminants.

Determination of concentration of Metallic pollutants by using Atomic Absorption Spectrometer.

Monitoring of vehicular pollution emission.

Determination of noise levels for indoor and outdoor noise levels.

Visit and submission of Report for treatment of waste water plant of any industry.

Reference:

1. Peavy, Rowe, Techobanoglous, Environmental Engg. Mac Graw Hill.
2. Mackenzie L Davis, Environmental Engg. Tata Mac Graw Hill.
3. BaljeetKapors Environmental Engg. An overview, Publishers.
4. GlbertH.Msters, Environmental Engineering and Sc Prentice Hall of India Pvt. Ltd.

[MTCE-16]BRIDGE ENGINEERING

Introduction: Definition and components of abridge, Classification of bridges, Choice of abridge type.

Investigation for Bridges: Need for investigation, Selection of bridge site, Determination of design discharge for River, Bridge, Linear waterway, Economical span, Vertical clearance, Scour depth, Afflux, Traffic projection.

Standard Specifications: for Road Bridges: Indian Road Congress Bridge Code, Width of carriageway, Clearances, Loads to be considered; Dead load, I.R.C. standard live loads, Impact effect, Application of Live load on decks, Wind load, Longitudinal forces, Centrifugal forces, Horizontal forces due to water current, Buoyancy effect, Earth pressure, Deformation stresses, Erection stresses, Temperature effects, and Seismic force.

Reinforced Concrete Bridges: General, Types of bridges; Balanced cantilever bridges, Continuous girder bridges, Rigid frame bridges, Portal Frame and Arch bridges. Detailed design of solid slab and T-beam bridges,

Steel Bridges: General, Type of Steel bridges; Plate girder bridges, Box girder bridges, Truss bridges, Cantilever bridges, Cable stayed bridges, and Suspension bridges.

Sub-structure and Foundation: Design of piers and abutments (Masonry & R.C.C.). Types of foundations; Shallow, Pile, and Well foundations including their construction details.

Bearings & Appurtenances: Different types of bearings, joints and handrails.

Construction and Maintenance of Bridges: Methods of construction of concrete bridges. Causes of Bridge failures, Inspection and maintenance. Instructions to the Examiner: Total eight questions are to be set, covering the complete syllabus, out of which, the students are required to attempt any five questions.

Reference:

1. Essentials of Bridge Engineering by Johnson Victor.
2. A text book of bridge Construction by Khadilkar.
3. Bridge Engg. byRangwala.
4. Concrete Bridge Design SP-23 (ACI Publication)
5. Concrete bridges Handbook by Raina.
6. Bridge Engineering by S. Ponnuswamy
7. Bridge Engineering by Rakshit.

[MTCE-21] FOUNDATION DESIGN AND CONSTRUCTION

General Principle of foundation Design. Functions of foundations, Essential requirements of a good foundation, Types of foundations, Principal modes of failure, Estimation of allowable bearing pressures, calculation of ultimate bearing capacity by theoretical and empirical methods : Terzaghi's Method, Skempton's analysis for clays, Mayerhof's analysis BIS Method (IS:6403) settlement of foundations, Factors to be considered in foundation design; Environmental considerations.

Shallow Foundations : Introduction, Essential requirements Type and depth of footings, contact Pressure below footing strip footing, Isolated footing or Pad footing, Eccentrically loaded footings, Grillage foundations; Design features and construction details of combined footing, Strap footing or Cantilever footing Problem of frost heave, its causes and prevention effect of ground water Raft footing.

Pile Foundations: Purpose/Uses of pile foundations, Classification of piles based on different criteria, Details of Timber, Concrete, Steel Piles their advantages and dis advantages selection of Pile Type, Pile action behaviour of pile and pile groups under load. Definition of failure load. Estimation of carrying capacity: Single driven pile in cohesion less soils-methods based of on SPT and CPT, ultimate load on Driven and cast-in-place piles and Bored and cast-in place piles in cohesion less soils. Factors affecting pile capacity. Ultimate capacity of single pile driven in cohesive soils.Modification for driven and cast- in place piles and Bored and Cast-in-place piles.Carrying capacity of piles on rocks. Piles in fills- negative skin friction. Carrying capacity of Pile groups in cohesive soil and cohesion less soils, efficiency of pile group. piles subjected to horizontal or inclined loads.

Soil Stability. Retaining walls-Types Elements for design, construction of cantilever and counter for retaining walls. Un braced excavations, Braced excavations. Sheet Piles and Bulkheads-Types and design of cantilever and Anchored sheet piles; Anchors and Tie backs. Shorting and Underpinning-Necessity and methods.

Improvement of Foundation Soils. Purpose:

Improvement of Granular Soils : Terms used to describe degree of compactness-Relative Density, Density Ratio and Degree of Compaction ; Methods- Vibration at ground surface, factors influencing, roller compaction; Dep Dynamic Compaction, Vibro compaction, Impact at depth.

Improvement of Cohesive soils: Preloading or Dewatering, Methods of installing sand drains, drain wicks, Electrical and Thermal methods.

Grouting: Purpose, Functions Types of grouts; Soil Bentonite-cement mix, cement mix, emulsions, solutions: Grout Injection method

Geosynthetics: Types, Functions, Manufacturing of geo textiles, Classification of geotextiles. Specific **Applications**: Bearing capacity improvement, Reinforcement, Retaining walls, Embankment etc. Testing of geo synthetics usage in India and a case study.

Special Considerations in Foundation Design and construction: Elementary Principles of design and construction of foundations subjected to earth quake or dynamic loads Special measures for foundations constructed under water.

Practical Exercises :

Conduct of standard Penetration Test and estimation of bearing capacity.

Determination of shear strength characteristics by field tests like insitu vane shear test, pocket penetrometer etc.

Computation of bearing capacity and settlement for given conditions of soil depth and type of foundation and loading.

Recommend a field investigation program to obtain design data.

Design of a shallow foundations.

Recommend suitable dimensions. depth and spacing of pile/pile group for given loading conditions.

References.

1. Tomlinson Mj. Foundation Design and Construction, ELBS Longman,6, 1996.
2. Bowles Joseph E, Foundation Analysis and Design, McGraw Hill, 4 e,1988.
3. Brahma, SP Foundation Engineering, Tata McGraw Hill 1985.
4. Koerner, Robert M, Construction and Geotechnical Methods in Foundation Engineering McGraw Hill, 1985.
5. Dinesh Mohan, Pile foundations, oxford & IBH,1998.

[MTCE-22] MAINTENANCE OF BUILDING STRUCTURES

UNIT-I

Principles of Maintenance: Importance of Maintenance, Deterioration and durability, Factors affecting decision to carryout maintenance, Maintenance and GNPA gencies causing deterioration, effect of deterioration agencies on materials.

Design and economic consideration in Maintenance: Factors to reduce maintenance at design stage, Consideration of maintenance aspects in preparing tender document and specifications, Sources of error in design which enhances maintenance, Importance of working drawings and schedules Provision of access for maintenance and its importance at design stage. Economic consideration in Maintenance: Physical life, Functional life, Economic lige of different types of buildings, discounting technique for assessment of economic life.

Maintenance Management : Definition, Organisation structure, work force for Maintenance, Communication needs, Building inspections, Maintenance budget and estimates, Property inspections and reports, Specification for maintenance jobs, Health and safety in maintenance, Quality in Maintenance, maintenance Manual and their importance.

Materials for maintenance: Compatibility of repair materials, Durability and maintenance. Types of materials, their specification and application, Criteria for selection of material, Use of Commercial available materials in maintenance.

Investigation and diagnosis for Repair of structures: Basic Approach to investigations, Physical inspection, Material Tests, Non destructive testing for diagnosis, Estimation of actual, loads and environmental effects, Study of design and construction practices used in original construction, Retrospective analysis, and Confirmation of repair steps.

Building Defects and Remedial Measures:

6.1 Nature, types of problems, their causes, remedial measures and special treatment for building elements.

- Foundation, Basements, D.P.C. Walls, Wall finishes, Chimney, stacks and shafts Columns and beams, Roof and roof terraces, Floor and floor finishes, Joinery work, Decorative/decorative finishes, Services, Materials, Dampness,

Unit-II

Acoustics : Basic problems criteria and terminology, Transmission of sources in rooms, speech privacy between offices, co-efficient of source absorption, noise reduction co-efficient, classification selection of acoustical materials, design and installation of acoustical Treatment for of auditorium, schools religion buildings.

Air Conditioning Heating and Ventilation : Different types of heating equipment viz radiation converters, electric radiant panel heaters, requirements comfort conditions, temperature control, humidity control Mechanical ventilation plenum system, exhaust system fans, air filters of different types, air conditioning plants layout of ducts for cinema auditoriums and offices etc.

Fire Fighting: Fire regulations and requirements, cause of fire, fire resistance of materials, fire tests, fire resistance of elements, layout escape means for Multi storied buildings, Fire Training equipment different methods of fire fighting fire protection.

Electrical Services : General distribution of electric power : Sub-stations for small schemes and industrial units, meter-rooms, electrical instillations in buildings, Fuses and Circuit breakers, various types of conduits, earthling, switches and outlet, lamp holder electrical wiring -different materials employed specifications, electrical appliances and electrical service bye-laws pertaining to electrical installations. Different types of artificial lighting systems, lighting systems for residential buildings, public buildings, hotels, cinemas, hospital exhibition, halls, libraries, schools, college, scientific laboratories etc.

Lifts and Escalators: Classification types of lifts, lift codes and rules. Traffic analysis and selection of lifts, Quantity of service, Quality service, Car speed. Provision form fire safety Angle Arrangements of lifts, Details of information to be given to manufacturers, Escalators, Types and their installation.

Reference:

1. IVOR H. Seeley, Building Technology Mac Millian.
2. Chudley , Building Finishes, fittings and domestic sercielongman, Scientific and Technical.
3. Fred Hall,Building Services & Equipment ,Longman Scientific and Technical.
4. Lee Smith, Harry Slecter, Plumbing Technology, Design and installation Delmar Publisher INC.
5. Fred Hall, Plumbing Cold water supplies, Drainage and Sanitation, Longman Scientific & Technical.

[MTCE-23]COMPUTER AIDED DESIGN METHODS

Introduction to CAD and its scope simple description of computer hardware.

- Micro, mini etc.
- memory, processor
- Peripheral devices-disks, printer. Video terminals. Graphic floater, graphic screen digitizer.

Computer Graphics: introduction, point plotting techniques, line drawing displays, two-three dimensional transformation, clipping and windowing, segmentation geometric modeling. Three dimensional graphics, curves and surfaces, hidden surface elimination, shading. Graphic input devices. Graphic in put technique, input functions. Raster graphic fundamentals, interactive raster graphics, raster graphic systems.

Computer aided linkage displays and synthesis, interactive acceleration analysis. Appreciation of graphic packages.

Matrix methods of structural analysis and associated computer programme assembly of matrices. Solution of equilibrium equations.Flow charts.Typical listing as illustrations. Introduction to interactive computer programme for the design detailing of simple structural elements: RCC's lab, beams, columns, isolated footings etc. Steel typical member sand connections.

Data base management, storing and retrieving of data

References:

1. Principles of interactive computer graphics by William M. Newman & Robert F.Sproul.
2. Programming in Finite Element by Hunton and owan
3. Principles of Computer Aided design by Joe Rooney & Philips Steadman
4. Computer Fundamentals-P.K.Sinha, BPB Publications
5. CAD/CAM-Mikell T. Groover.

[MTCE-24]BUILDING COST AND QUALITY MANAGEMENT

Estimation of quantities for R.C.C. multi storied complex viz. earthwork, concrete in foundation, D.P.C., R.C.C. work, flooring and roofing , plastering and pointing etc., wood work, white washing.

Analysis of rates for multi storied building works Brick working of undations and Super structure, cement concrete, R.C.C., Plastering, Flooring, Timber work etc.

Checking of construction quality various tests for bricks, cement, concrete, aggregates, and steel as per IS codes.

Preparation of bills for payment, measurement book, mode of payment, running account bill. Ledger and Cash book details, Arbitration.

Estimation of building services viz. water supply works, electrification, sanitary fitting etc, and their cost analysis.

Completion report of the project; Checking of Plan, Details of various works, and issue of completion report of the project. Instructions to the Examiner: Total eight questions are to be set out of which the students are required to attempt any five questions.

Reference:

1. Estimating and Costing by B.N. Dutta
2. Estimating and Costing by G.S. Birdie
3. Estimating and Costing by Chakaraborty

[MTCE-25]RURAL CONSTRUCTION TECHNOLOGY

Rural Development Planning and Concept of Appropriate Technology. Scope, Development Plans; Various approaches to rural development planning Concept of Appropriate technology; Role of Civil Engineering in Rural Development; Organizational structures & management rural development programmers /projects.

Rural Housing : Low cost construction materials for housing low cost housing designs-architectural considerations for individual and group housing ; composite material-Ferro cement & flay ash, Autoclaved Calcium silicate bricks and soil-stabilized un burnt brick; Plinth protection of Mud Walls; Design Consideration and Construction of non erodable Mud Plaster, water-proof and fire-retardant roof treatment for thatch roofs, Pre cast stone Masonry Block walling scheme; rat-trap bond for walls; Prefab Brick Panels for roof, ferro cement flooring /roofing units, Thin R.C. Ribbed slab fon floors & roofs, Pre cast R.C. Channel Unit for flooring/roofing scheme, Pre cast R.C. cored unit for flooring/roofing scheme, Pre cast R.C. Plank flooring/roofing scheme, L-Pan roofing scheme; Glued Plywood Web Beams and Roof Panels; manual & Power Scaffold hoist, lifting device for prefab components; solar passive building design; Building economics and management.

Water Supply and Rural Sanitation: Epidemiology sources of water, BIS & WHO wate standards. Quality, Storage and distribution for rural water supply works; Basic Design principles of treatment-Low Cost water treatment technologies; Hand pumps-types, installation operation, and maintenance of Mark-II hand pump sp; Conservation of water; Rainwater, Harvesting; Drainage in rural areas, Design of low cost waste disposal systems; Design and constructions of low cost latrines: 2 pit pour flush wate seal VIP latrines, septic tank etc; Biogas technology: Low cost community & individual Garbage disposal systems, Recycling of organic/agricultural wastes: Development of village ponds; ferro cement water storage tanks & latrines. Cattle shed management; Sewage farming-standards for disposal and use for irrigation.

Low Cost Roads and Transport : Low cost pavement materials-testing suitability criteria processing materials; factors affecting pavement thickness & composition of various layers; CRRI Design for rural roads-Traffic Index, strength Index, CBR curve Intermediate Technology & Technology options for specify areas. Labour intensive techniques of road construction Mechanical stabilization; lime stabilization; water bou Macadam Construction; utilization of waste in rural construction one/two coat surface dressing; bitumen premix carpet; low cost improved transport system rural areas.

Low Cost irrigation : Design & Construction of Tube well, Drip &Sprink irrigation systems; Water logging Reclamation land watershed and catchments area development-problem and features of watershed Management Plans watershed structures and their basic design catchments treatment and Rehabilitation Plans ,types of M Hydel Plants, site selection, Advantages of Mini &Mi Hydel projects, structures required for plants.

Field visits to any 3-4 of the following to arranged and prepare the report of the visit.

Laboratories :

- Testing of construction materials for Housing.
- Testing of construction materials for Roads.
- Testing of construction materials for Ferro cement.

Reference:

1. A.G. Madhov Rao, D.S. RamachandraMurthy,ApprorityTechnologiesforlowcostHousingoxfordandIBHPblishingCo. Pvt. Ltd.
2. CBRI, Roorkee Advances in building Materials Construction.
3. C. Satyanarayan Murthy, Design of Minor Irrigation and Canal Structures, Wiley Eastern Ltd.
4. K.Park Preventive and Social Medicine, M/s BanarsiBhnot.
5. yashPalBedi,AHnadBookofPreventiveandSocMedicine;AtamRam&Sons,Delhi.

[MTCE-26]PAVEMENT DESIGN, CONSTRUCTION AND MAINTENANCE

Introduction: Types of pavement structure. Functions of pavement components, Factors affecting pavement design. Design wheel load, Strength characteristics of pavement materials.

Design of Flexible Pavements: General design considerations, Methods for design of flexible pavements; Group Index method, California Bearing Ratio (CBR) method, California Resistance Value method, Triaxial Test method, Burmister method, Mc Leod'smetod.

Design of Rigid Pavements: General design considerations, Methods for design of rigid pavements; Westergard's method, F.A.A. method, IRC recommendations for design of concrete pavements, method, Types of joints and their design in cement concrete pavements. Thickness design for Airport pavement, LC N system of pavement design, and design of airport pavement over lays.

Highway Construction: Types of highway construction and their selection, materials for construction, construction procedure of different highways: Earth roads, Gravel roads ,WBM roads, Bituminous pavements, Cement concrete pavements, Low cost roads, Introduction to various equipment used for highway construction.

Highway Maintenance: Need for highway maintenance, Pavement failures their causes and remedial measures. Typical flexible and rigid pavement failures, Types of high way maintenance: Routine, periodic and special type, materials used for maintenance of different pavements, Strengthening of existing pavements, Maintenance management system.

Practical Exercises :

Determination of CBR value of sub grade soils.

Determination of Ductility of bituminous materials.

Determination of stripping value of road aggregate.

Determination of Marshall Stability value of bituminous mix.

Field visit for study of Batching and Mixing plant for bituminous construction of roads. Instructions to the Examiner: Total eight questions are to be set, covering the complete syllabus, out of which, the students are required to attempt any five questions.

Reference:

1. Principals of Pavement Design by E.J.Yoder
2. Highway Engineering by Khanna and Justo
3. Principles, Practice and Design of Highway Engineering by S.K. Sharma
4. Handbook of Road Technology by M.G. Lay
5. Pavement Analysis and Design by Yang and Huang
6. The Design and Performance of Road Pavements by D. Croney and P. Croney
7. Planning and Design of Airports by Horenjeff

[MTCE-31]ADVANCED STUCTURAL DESIGN AND DETAILING

Introduction to limit state method of design, provisions in the Indian standard codes for loading wind loads and seismic loads, design and detailing of concrete structures.

BIS Hand book for design, Examples of design using hand book.

Design of Structures as perI.S.1893 for Earth quake Resistant Design Construction.

Design and Detailing Requirements as per 4326-1993.

Design and Detailing of Earthen Buildings as per 13827-1993.

Design and Detailing of Masonry Structures as per I.S. 13828-1993

Design and Ductile Detailing of R.C.C. Structures as perI.S.13920-1993

Repair and Seismic Strengthening of Buildings as per I.S.13935-1993.

Reference:

1. Dayaratnam, P. Reinforced Concrete Structure
2. Jain, A.K. Reinforced Concrete, Limit State Method of Design.
3. Punmia, B.C. Reinforced Concrete Structures, Vo lII
4. Jainand jai Krishna Plain and Reinforced Concrete VolII.
5. Design of Steel Structures by P.Dayaratnam
6. Design of Steel Structures by S.K.Duggal
7. B.I.S.Codes1893,4326,13827,13828,13 20,13935

[MTCE-32]COMPOSITE MATRIALS

FIBRE REINFORCED CONCRETE: Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fibre reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

FLY ASH CONCRETE : Classification of Indian Fly ashes, Properties of Fly ash, Reaction Mechanism, Proportioning of Fly ash concretes, Properties of Fly ash concrete in fresh and hardened state, Durability of fly ash concrete.

POLYMER CONCRETE: Terminology used in polymer concrete, Properties of constituent materials, Polymer impregnated concrete, Polymer modified concrete, Properties and applications of polymer concrete and polymer impregnated concrete.

FERRO CEMENT: Constituent materials and their properties, Mechanical properties of ferro cement, Construction techniques and application of ferro cement.

HIGH PERFORMANCE CONCRETE: Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.

SULPHUR CONCRETE AND SULPHUR INFILTRATED CONCRETE : Process technology, Mechanical properties, Durability and

applications of Sulphur concrete, Sulphur in filtrated concrete, Infiltration techniques, Mechanical properties, Durability and applications of sulphur infiltrated concrete.

LIGHT WEIGHT CONCRETE: Properties of light weight concretes, Pumice concrete, Aerated cement mortars, No fines concrete, Design and applications of light weight concrete.

Reference:

1. Concrete, its Properties and Micro structure by P.K. Mehta, and P.J.M. Monterio.
2. Ferro cement by B.K. Paul, and R.P. Pama
3. Fibre Reinforced Concrete by Bentur and Mindess
4. Fly ash in Concrete by Malhotra and Ramezanianpour

[MTCE-33]DISASTER REDUCTION AND MANAGEMENT

Disaster Reduction : Earthquake resistant design of structures, Response spectra and design earthquake parameters, Principles and philosophies, Codal provisions, Factors affecting damage to structures, Enforcement of codal provisions, Strong motion instrumentation and data processing, Effective rescue operation, General planning and design aspects, Conventional earthquake resistant design, Seismic base isolation method, retrofitting, Training and lecturing at various levels, Preparedness to meet earthquake disaster, Programmes for public awareness, demonstrations and exhibitions, Information management (Safety, emergencies, management and planning, design, response, user experience problems and case studies), Proper land use practices, long term disaster preparedness measures. Precautions after a major earthquake, Preparedness for medical supply Emergency care (First aid, Home remedies), Disposal of dead bodies (Human and Cattle), Care for old and orphans.

Indirect Damages : Damage due to ground failures, Landslides, rockslides, liquefaction, fire, floods, tsunamis, release of hazardous material like poisonous gas, nuclear radiation.

Disaster Management : Management cell, Central crisis management core group, damage reconnaissance, Management of relief and rehabilitation (Infrastructure rehabilitation, Housing rehabilitation, Social rehabilitation), Role of volunteers, Emergency operation centers , Information system, Danger zone restrictions, Cooperation with local authority, Coordination for international relief, Role of government, NGO's, Business and donors, Role of remote sensing in relief operations, Information management and related technologies in engineering and disaster management. The design and management of Disaster Information Resource Network, Asian Disaster Prepare dness Centre, Regional data base, Contacts and Sources, CD - ROM Library for Natural Disaster Management, Regional Disaster Documentation Centre, Non GovernmentalOrganisations.

Reference:

1. Disaster Mitigation Experiences & Reflections by PardeepSahni, AlkaDhameja,and Uma Medury.
2. Disaster Management Report by Department of Agriculture and Cooperation, Govt. of India.

[MTCE-34] CONSTRUCTION COSTING AND FINANCIAL MANAGEMENT

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, variations in individual items of work and their effect to total contract price, valuation of variations.

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.

Cash and payment of works; Precautions in custody of cash, imp rest account and temporary advance, Maintenance of temporary advance and advance account, different types of payment, first running advance and final payments.

Material Management : Objectives and scope of material management classification, codification, ABC analysis, standardization and substitution, Introduction to inventory control, Stores management organization and lay out, receipt, inspection and issue, care and safety, store records and store accounting.

Financial Management: Meaning and scope financial statement analysis, funds flow analysis, Capital budgeting, cost benefit analysis.

Practical Exercise ;

Filling up of prescribed treasury challan form and imprest account form with given data.

Preparation of cash flow statement for a small construction project with given data.

Filing up of Daily labour report on prescribed form with given data.

Recording measurement in M.B. for different work components.

Preparation of analysis of rates for different items of work.

Preparation of cost estimates for a small project.

Material statement and material analysis.

Carry out financial statement analysis, ratio analysis and funds flow analysis for projects from given case studies.

Reference:

1. Mueller, F.W. Integrated cost and schedule control for construction projects.
2. Gobourne: Cost control in the construction industry.
3. Schedule of rates ,specification manuals etc from PWD.
4. Chris Hendrickson and Tung Au: project Management for construction.
5. Datta: material Management procedures, Text and Cases, 2e. Prentice Hall
6. Gopala Krishanan,P, Sundaresan, M Material Management-an Integrated Approach, Prentice Hall
7. Dobbler and Bart: Purchasing and supplies Management, Text and Cases,6e.
8. Chitkara, K.K. Construction Project Management, Tata-

[MTCE-35]PROJECT WORK

OBJECTIVE

The objective of the project work is to enable the students in convenient groups of not more than 3 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution.

The student should select any one of the topics offered from the department or select one on his own duly approved from the department. Candidate is required to submit the detailed synopsis of the work that he would complete in the part-II

Each student shall finally produce a comprehensive report covering back ground information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

[MTCE-36]SEMINAR

OBJECTIVE

The students are to select one technical topic related its branch for Seminar. The student is to submit the synopsis for assessment and approval. Progress for preparation of the seminar topic would be continuously assessed from time to time. Two periods per week are to be allotted and students are expected to present the seminar Progress. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain the attendance.

Students have to give a final presentation for 15 minutes on his topic. Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews

[MTCE-41] DISSERTATION

The student will submit a synopsis at the beginning of the semester for the approval fromthe University project committee in a specified format. Synopsis must be submitted within atwo weeks. The first defense, for the dissertation work, should be held with in a onemonth. Dissertation Report must be submitted in a specified format to the University forevaluation purpose.