IV Year

DISTANCE EDUCATION PROGRAMME IN ENGINEERING (Civil)

Subject Code	Subject	Type of Course	Internal Marks	External Marks	Total Marks	Duration of Univ. Exam.
DMCIV401	Concrete Technology	Theory	25	75	100	3 hrs
DMCIV402	Water Resources Engineering-II	Theory	25	75	100	3 hrs
DMCIV403	Transportation Engineering	Theory	25	75	100	3 hrs
DMCIV404	Project Planning and Management	Theory	25	75	100	3 hrs
DMCIV405	Elective –I Multistoreyed Structures	Theory	25	75	100	3 hrs
DMCIV406	Elective -I Elementary Environment Sanitation	Theory	25	75	100	3 hrs
DMCIV407	Transportation Engineering Lab	Practical	50	50	100	3 hrs
DMCIV408	Computer Applications Lab	Practical	50	50	100	3 hrs
DMCIV409	Project Work		100	100	200	3 hrs
Total Marks					1000	

IV year
Civil Engineering
DMCIV-401: Concrete Technology
Unit I

Types of Cements and testing of cement, IS code provisions, significance of blended cements, selection of right cement for different purposes.

Unit-II

Aggregates and testing of aggregates, relevance and significance of various tests, IS code provisions, tests on Water for suitability in concrete.

Unit-III

Admixtures and Construction materials, role of chemicals on the properties of green concrete and hardened concrete etc., curing compounds, Viscosity modifying agents etc. Suitability of chemicals for use in concrete.

Unit-IV

Tests on fresh concrete, strength of concrete, elasticity, creep and shrinkage, testing of hardened concrete, concrete mix design, special concrete and concreting methods, Factors affecting workability, Non destructive testing methods and their importance in quality assurance and durability assessment, sampling for tests.

Unit-V

Durability aspects of concrete, identification of failure reasons, repairs and rehabilitation schemes for various types of failures/damages of structures, Grouting, guniting and other techniques. Protective coatings. Treatments to reinforcements.

Text Books:

1) Concrete Technology by M.S.Shetty

DMCIV-402: Water Resources Engineering

Unit-I

Storage works: a) Definition- Classification of Dams-Factors governing selection of type-Selection of site-Preliminary investigations. Gravity Dams-Forces acting-Stability criteria-modes of failure-Elements &b Practical profiles-Stability analysis –Principal and shear stress-methods-of construction-Joints, keys, water-steps-openings-in Dams-Galleries Temperature control in concrete dams Foundation treatment; b) Earth Dams-Types-Foundation for earth dams-Design of earth dams-causes of failure-criteria for safe design-Safety against over topping-Phreatie line-Safety against piping-protection of U/S and D/S slopes-Seepage control through body & foundation Typical cross sections – Design considerations in earth quake regions.

Unit-II

Apartment Structures of Storage Works: a) Spillways-Essential requirements – Spillway capacity – Components –Types of spillways and their working-Design of Ogee spillway. Energy dissipation below spillways-scour protection-Use of Hydralic jump as energy distipator – Design off stilling basins – USBR and ISI standard basines – IS. Spillway crest gates different types-Their description and working principles. Outlet works –Sluice ways, Typical outlet arrangements through concrete and earth dams – Hydraulic of outlet works; b) Diversion Head Works : Types –Location and Components – Ejects of construction of weirs on permeable foundations-Design principles of wells and Barrages Design of floors on impelmeable foundations – Bligh's Lamp's and Khosla's theories – Design of Vertical Drop weir-Caunal Head Regulator-Silt control Divices.

Unit-III

a) Regulation Works: Canal falls-Definition-Necessity and location-Development of falls – Classification of Falls-Sarada type fall-Its design-Design principles of straight glacies fall-off takes alignments-Cross regulator and distributary head regulator-Design of Distributory head regulator; b) Cross drainage works: Types-Factor affecting the suitability of each type-Classification of acqueducts and siphon aqueducts – Type-I, II, III –Design Features of C.D.M.S. Design principles of different types of aqueducts – Design of type-III aqueducts c) River Training Works: River training and its objectives – classification of RT works- Marginal embankments –Guide banks, Groynes, cutoffs, Bank pitching, Launching appotns, miscellaneous other types of river training.

Unit-IV

Water power engineering a) Development of Hydro-electric power in India – Comparison of Thermal and Hydropower costs – assessment of available power – Definitions of different terms in water power-Load curve-Load factor, capacity factor, Utilisation factor, Diversity factor-Storage and Pondage-Stream flow data and its analysis-Flow duration curves Firm and by Principal components of Hydel Scheme – Fore bay, intake structure, Trash racks, design of penstocks-water Hammer analysis-Simple equations-Surge tanks-Their functioning and types-Selections of type of turbines –No. of units – Specific speed power house- Substructure and super structure-Layout of units.

Unit-V

Design and Drawing of minor irrigation structures: 1. Tank surplus weir 2. Syphon well drop 3. Tank sluice 4. Notch fall 5. Canal regulator 6. Under tunnels.

Ref.Books: 1) Irrigation and water power engineering – B.C. Punmia 2. Irrigation, water resources and –after power engineering – P.N. Modi 3. Water resources engineering – Garg 4. Design of minor irrigation and canal structures – C.S.Murthy 5. Hydraulic Mahcines – Jagadishlal 6. Fluid Mechanics – Jagadishlala 7. Water power engineering – Dandekar and Sharma

DMCIV-403: Transportation Engineering

UNIT-I

Highway-Engineering-1:Highway-development-in-India,classification-of Highways, Highway-alignment,Geometries-Cross-Section-elements,Sight-distance-considerations, horizontal & vertical alignment. Pavement Design - CBR Method, Westorgaard's Gravel roads, water Bound Macadam roads, Bituminous roads and cement concrete roads-IRO specifications.

UNIT II

Highway Engineering-2 : Maintenance of **Roads,** Highway Drainage,Erosion control, Road side development-Arbori-culture, Street lighting.Traffic Engineering-Traffic surveys, traffic control devices, Channelisation of traffic, Types of intersections.

UNIT III

Railway Engineering:Permanent way cross section - Components and their functions, Geometric Design, points and crossings, Track design, Track drainage, layout of Railway station and Railway yard.

Unit IV

Dock and Harbour Engineering:Layout of a Port components and functions, classification, site selection, Navigational Aids.

UNIT-V

Airport-Engineering:Airport-Layout,components&functions,aircraft characateristics, Airport site selection,Airport obstructions, Rinway Design, Visual Aids Air Traffic Control.

Reference Books : 1) Highway Engineering by Khanna Justo; 2) Highway Engineering by Sharma & Sharma; 3) Railway Engineering by Rangwala; 4) Railway Engineering by Sexena & Arora; 5) Dock & Harhbour Engineering by Birdie; 6) Airport Planning & Design by Khanna & Arora; 7) Highway material testing by Khanna & Justo

DMCIV- 404:Project Planning and Management

UNIT I: Pert and CPM : Introduction : Origin of PERT and CPM, planning, Scheduling and controlling Bar charts, Milestone charts, weaknesses in Barcharts, PERT and CPM networks Comparision,Event.Activity, Rules for drawing networks, Numbering the events (Fulkerson's law : Lummy activities, Time estimates - Expected time, Earliest allowable occurence time, Latest allowable occurence time, slack, project duration, probability of completion, Start and Finish time estimates, Floats, Project scheduling, Critical and subcritical path.

UNIT II :Cost analysis/updating/resouce scheduling : Cost Analysis -direct and indirect costs, operation time, Normal and Crash points, optimising project cost, crash limit, Free float limit, Optimisation. Updating - Process of updating: When to update. Resource scheduling - Resource smoothening, Resource levelling, circle notation and arrow notation.

UNIT III : Contracts : Contracts - Elements of contract, offer acceptance and consideration, valid and void contract, Departmental execution of works. Master Roll Form 21. Piece workAgreement, piece work agreement form, work order; Contract system with tenders - Definitions - Contract Contractor, Quotation, Earnest money, Security money, Tender, Tender notice, Tender form, Bidding proceedure, Irregularities in Bidding, award, Types of contracts - Lumpsum contract; lumpsum and schedule contract, Item rate contract, sub-contracts, joint ventures, Areitration Disputes and claim settlement.

UNIT IV:Works-Management:Execution of works-Estimates, supplementary estimates, revised estimates,petty works, repair works.Stores-Stores orgnisation, procedures for procuring controlled materials, stores accounting and control, suspense head, stock taking and shortage. Tools and Plant and Accounting Register, Accounting Verification, Cash account, Debit and Credit cash account, Running bill, first and final bill, Head receipt, Refund of security money.

UNIT V : Management : Scope of the Construction Management, Significance of Construction Management. Concept of Scientific Management, Qualities of Manager, Organisation -Authority, Policy, Recruitment process and Training, Development of Personnel Department; Labour - Labour problems, Labour legislation in India, Workmen Compensation Act 1923, and subsequent amendments, Minimum Wages Act 1948.

Reference Books : 1.PERT and CPM - L.S.Srinath; 2. PERT and CPM -Punaia; 3. Estimating and Costing-B.N. Dutta; 4.Construction Management and Planning–Guna&-Sen Gupta, B.

DMCIV-405: (Multistoreyed Structures) Elective

Introduction: Types of structural systems, practical adoptability.
UNIT I: Analysis of frames with and without sway by moment distribution method and Kani's method.

UNIT II: Analysis of frames for horizontal loads by portel, cantilever, and factor methods.

UNIT III : Introduction to matrix methods: Analysis of continuous beams and single bay single storey portal frames by stiffness method.

UNIT IV : Analysis of single bay single storey portal frames and continuous beams by Flexibility matrix methods.

UNIT V: Shear walls: Introduction , behavior of cantilever walls with rectangular cross section, flange cantilever shear walls, moment-axial load interaction for shear wall sections.

Textbooks *:* 1. Reinforced concrete structures - Park and Paulay, John Wiley & sons,
2. Design of Reinforced Concrete Structures- P. Dayaratnam, 3.Reinforced concrete' A.K. Jain.

DMCIV-406: (Elementary Environment Sanitation) Elective

UNIT I

Origin and spread of Communicable diseases like Cholera, Small pox, Tuberculosis, Malaria, Filaria, and Plague-common methods. Role of Public Health Engineering in the preventive aspects of the above diseases-Roll of vectors in transmitting diseases and Rodent control methods.

UNIT II

Rural water supply and sanitation-Sanitary protection of wetis-springs, Economic methods of treatmen-Excrete disposal systems -types of sanitary privies.

UNIT III

Refuse sanitation-Quality and quantity of garbage night Soil -methods of conveyance and sanitary disposal methods latest technologies adopted to disposes of the solid wastes.

UNIT IV

Food Sanitation - milk and milk products sanitary maintenance of catering-establishments measures.

UNIT V

Sanitary requirements and maintenance of the Public Utility Services like schools, hospitals and offices and in other public buildings.

Textbooks:1 Municipal&Rural Sanitation by Ehlers Steel2.Environmental Sanitation of Salvito.

DMCIV-407: Transportation Engineering Laboratory

A. Tests on Aggregates(I.S.2386):1.Specific gravity and sieve analysis2. Flakiness Index3. Elongation Index4.Angularity Number;5.Aggregate crushing value6.Aggregate Impact value;7.Aggregate Abrasion value Using DevaJ's and/or Los Angel's Machine).B.Tests on Tar&Bituminuous Materials(I.S.1201to1223):1.Specific gravity test;2. Determ-ination of penetration;3.Determination of softening point4.Determination of viscosity of Radiator (Industrial Viscosity)5.Determination of Ductility 6.Determination of Equi-viscous Temperature.C. Tests *dn* pavement materials1.Californda bearing Ratio Test (I.S.2720 Part-XVI); 2.North Dakota Coen PenetratioirTest.9(i.e.,I.S.2720 part-XXXIl);3.Group Index Method.

DMCIV -408 : Computer Applications Laboratory

Development of programmes in C / FORTRAN for the following applications:

Group-A:

1) Determination of Bending Moment Diagram and Deflections for different loading conditions for a simply supported Beam and Cantiliver Beam.
2) Determination of fixed end moments for different loading conditions of a fixed beam.
3) Calculation of influence line diagrams at any section of a Simply supported Beam.

Group-B

4) Estimation of Run off for a Catchment
5) Estimation of Friction factor for laminar and Turbelent flow
6) Minor losses in pipe flow
7) Determination of normal depth and critical depth for rectangular & Trapezoidal channels

Group-C:

8) Classification of Soils.
9) Determination of coefficient of permeability, Degree of Consolidation and Shear Strength
10) Settlement of foundations in Cohesive Soil
11) Estimation Earth Pressures in Cohesive and Cohesion less soils

Group-D:

12) Analysis of pipe network through Hardy cross method
13) Applications of problems in Environmental Engg.,

Group-E:

14) Quantity estimation of Civil Engineering Structures and Construction Management.
15) Application of problems in Transportation Engg.,
16) Conversion of Angles from WEB to RB
17) Calculation of Stopping sight distance and overtaking sight distance on plain terrains as well as slopes.
18) Calculation of extra-widening for pavements.
19) Determination of length of transition curve.

Group-F:

20) Computation of water surface profiles in open channel flows.(Demonstration only)
21) Design of Slabs using IS code method.(Demonstration Only)
22) Analysis and Design of Beams by using Limit state method.(Demonstration only)
23) Design of columns subjected to axial load and Uni axial Moment.(Demonstration only)
24) Design of Isolated Footing. (Demonstration only)
25) Design of rolled steel columns, Beams and built up Beams.(Demonstration only)
26) Stability Analysis of Slopes.(Demonstration only)
27) Basic AUTO CAD commands, Introduction to AUTO LISP Programming. Analysis and Design of R.C.Building Frames by using Staad III, Analysis and Design ofGrid Floors by using Staad –III.(Demonstration nly)
28) Preparation of Contour Maps and Alignment fixing of Roadsby using AUTO CIVIL.(Demonstration only)
29) Deisng of valley curves and summit curves for stopping sight distanceand save overtaking sight distance.(Demonstration only)
30) Designing the rate of superrelevatin for cuves on highways.(Demonstration only)

At least two programmes from each of the above groups A to E have to be developed and executed by the students. The University practical examination should cover the programmes listed in the above groups. The programmes listed under Group-F are excluded for practical examination.

DMCIV-409: PROJECT WORK