### Course Content & Grade

<table>
<thead>
<tr>
<th>Branch</th>
<th>Subject Title</th>
<th>Subject Code</th>
<th>Grade for End Sem</th>
<th>CGPA at the end of every even semester</th>
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<tbody>
<tr>
<td>Civil Engineering Department</td>
<td>Construction Planning &amp; Management</td>
<td>C.E.-1181</td>
<td>Theory Min.&quot;D&quot; Practical Min.&quot;D&quot;</td>
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</table>

### Unit -I
**Preliminary and detailed investigation methods:** Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

### Unit -II
**Construction equipments:** Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

### Unit -III
**Contracts:** Different types of controls, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

### Unit -IV
**Specifications & Public Works Accounts:** Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

### Unit-V
**Site Organization & Systems Approach to Planning:** Accommodation of site staff, contractor’s staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.

### Reference Books :-
1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai
(A) R.C.C. STRUCTURES

Unit - I.
Design of Multistory Buildings - Swaty and nonswaty buildings, Shear walls and other bracing elements.
Earth Retaining Structures : Cantilever and counter fort types.

Unit - II.
Water Tanks : Tanks on ground and underground-square, rectangular, circular tanks, overhead tanks-square, rectangular, circular & intze tanks.
Silos and Bunkers

Unit - III.
T-beam & slab bridges- for highway loading (IRC Loads).
Pre-stressing concepts materials, systems of pre-stressing & losses Introduction to working & limit State Design.

(B) STEEL STRUCTURES

Unit - IV.
Steel Bridges : Welded plate girders & trussed girders for railway & highways (IRC & railway standard loading).

Unit - V.
Water Tanks : Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.
Chimneys : Guyed and self supporting type, bunkers, silos and towers.

Reference Books :-

i) R.C.C. by O.P. Jain Vol. II
ii) R.C.C. by B.C. Punmia
iii) Steel Str. by D. Ramchandra
iv) Steel Str. by Arya & Ajmani
v) Advance R.C.C. Design by N.K. RAJU
vi) N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.
### Course Content & Grade

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<td>Civil Engineering Department</td>
<td>Irrigation Engg.</td>
<td>C.E.-1183</td>
<td>Theory Min.&quot;D&quot;</td>
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#### Unit - I
**Irrigation water requirement and soil-water-crop relationship:** Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development.
Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods-surface and subsurface, sprinkler and drip irrigation.
Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

#### Unit - II
**Reservoirs and storage works:** Types of reservoirs, reservoir planning, various investigations, estimation of storage capacity by mass curve analysis, fixing of principal levels in a storage project, economical height of dam, reservoir redimentation, suitable site for a reservoir project.
Dams - classification, selection of suitable type of dam at a particular location.

#### Unit - III
**Diversion Works and River training methods:** Purpose, selection of site, layout and functions of component parts, types of weirs and barrages, weir design for surface and subsurface flows, Bligh’s, Lane’s and Khosla’s theories, silt excluders and silt ejectors.
River training methods - objectives, design principles of levees, guide bunds & launching aprons.

#### Unit - IV
**Canal irrigation:** Types of canals, alignment, design of unlined and lined canals, Kennedy’s and Lacey’s silt theories, typical canal sections, canal losses, lininings-objectives, materials used, economics.
Canal falls & cross drainage works, - description and design, head and cross regulators. escapes and outlets, canal transitions.

#### Unit - V
**Well irrigation:** Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.
Reference Books :-

i) Irrigation & Water Power Engg. - Dr. B.C. Punmia, Dr. Pande, B.B. Lal

ii) Irrigation, Water Resources & Water Power by Dr. P.N. Modi

iii) Irrigation Engineering by Varshney

iv) Irrigation Engineering by Santosh Kumar Garg

v) Irrigation, Water Power & Water Resources Engg. by K.R. Arora
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(A) **ENVIRONMENTAL IMPACT ASSESSMENT**

**UNIT-I**

**Concept of EIA** : Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

**UNIT-II**

**Methods of Impact Identification** : Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

**UNIT-III**


**UNIT-IV**

**Preparation of written documentation** : Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

**UNIT-V**

**Public Participation in Environmental Decision making** : Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.
(B) PAVEMENT DESIGN

Unit -I.
Equivalent Single Wheel Load (ESWL) : Definition, calculation of ESWL, repetition of loads and their effects on the pavement structures.

Unit -II.
Flexible Pavements : Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque’s theory, Burmister’s two layered theory, methods of design, group index method, CBR method, Burmister’s method and North Dakota cone method.

Unit -III.
Rigid Pavements : Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard’s stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions.

Unit -IV.
Rigid pavement design : IRC method, Fatigue analysis, PCA chart method, joints, design and construction & types, AASHTO Method, Reliability analysis.

Unit -V.

Reference Books :--
1. Principles of pavement design by E.J.Yoder & M.W. Witczak
4. DSIR, Conc. Roads Design & Construction
5. Srinivasan M. "Modern Permanent Way"
Unit I

Importance of soil dynamics, different types of dynamic loads, permissible dynamic amplitude and its relation with frequency.


Unit II

Determination of natural frequency of soil foundation system - empirical and semi-empirical methods, Dynamic Soil constants Cu, Cd, Cφ, Cψ, Gr and D factors affecting and determination methods and approximate values, Calculation of dynamic amplitude, Lysner's lumped parameter approach.

Unit III

Approaches to design of Machine Foundations, types of foundations for different types of machines, nature of dynamic forces produced by common machines, design criteria and permissible amplitudes, Principles of design of machine foundations, design of impact type of machine and reciprocating machine.

Unit IV

Effects of dynamic loads on bearing capacity and earth pressure and slope stability, Design of retaining walls subjected to dynamic earth pressure and stability analysis under earthquake forces.

Unit V

Body and surface waves, Elastic theory Velocities of waves, its determination in laboratory, effects of Rayleigh surface wave on engineering structures, Compaction of soils under dynamic loads, vibro-flotation , factors affecting liquefaction and preventive measures.

Text Book:-

1. Soil Dynamics by Shamsher Prakash.
2. Soil Dynamics by B.M.Dass.
3. Handbook of M/c Foundation by Srinivasan & Vaidyanathan
(D) FLUID TRANSPORTATION ENGINEERING

Unit – I
Mechanism of Solid Transportation by Fluids: Types of fluids and basic equations flow, rheology and classification of complex mixtures, Fundamentals of two phases, flow phases, separation and setting behaviour.

Unit – II
Sediments Transport in open channels: rigid mobile boundary channels, motion of grain on channel bed, analysis of sediment motion, bed forms, hydraulic of channels, alluvial channels.

Unit – III
Slurry Pipe Lines: Introduction to slurry pipeline system. Mechanics of hydraulic transport of solids by pipe lines, transport of settling solids, flow of non-settling slurries, design methods.

Unit – IV
Terminal facilities: Selection and design of equipments for terminal facilities.
Pipe Protection: Factors affecting life of pipeline system and methods of protection

Unit – V
Pneumatic conveyance, hydraulic capsule pipelines, methodology associated with slurry pipeline.

Reference Books:
1. Fluid Transportation Engineering by S.W.Yoan.
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<td>Practical Min.&quot;D&quot;</td>
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(A) DESIGN OF PRESTRESSED CONCRETE STRUCTURE

Unit - I.
1. Principle of prestressing, materials for prestressing, loss of prestress, pretensioning and post-tensioning anchorage.

Unit - II.
2. Design of pretensioned and post-tensioned (Type I, II,III) beams. choice of section and cable profile, design for shear and bond, stresses in end block. calculation of deflections. limit state design.

Unit - III.
3. Design of composite prestressed beams, stresses due to shrinkage, shear connectors.

Unit - IV.
4. Circular prestressing, design of cylinder pipes, non cylinder pipes and water tanks.

Unit - V.
5. Design of continuous beams.
6. Design of portal frames.

Reference Books :-

1. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi
3. Lin T.Y. Design of Prestressed Conc. Structures
4. Chi, Michael & Bibersten F.A. - Theory of Prestressed Concrete
5. Dayratnam P., Prestressed Conc. Structures
6. Abeles P.W. Introduction to Prestressed Conc.
(B) RECENT ADVANCES IN CONSTRUCTION MATERIALS

Unit - I
Foams and light weight materials, fibre reinforced concrete. Types of fibres, workability, mechanical and physical properties of fibre reinforced concrete.

Unit - II

Unit - III
Corrosion of reinforcing steel. Electro chemical process, measures of protection. Ferrocement, material and properties.

Unit - IV
Polymers in Civil Engineering Polymers, fibres and composites, Fibre reinforced plastic in sandwich panels, modeling. Architectural use and aesthetics of composites. Adhesives and sealants.

Unit - V
Structural elastomeric bearings and resilient seating. Moisture barriers, Polymer foams and polymers in Building Physics. Polymer concrete composites.
(C) REINFORCED EARTH AND GEOSYNTHETICS ENGINEERING

Unit - I

Reinforced Earth: History, field of applications, natural fibers, overview of Geotextiles, Geomembranes, Geogrids, Geonets, Geowebs, Geomats and Geocomposites and economic aspects of their applications.

Unit - II

Production of Geotextiles, composites, physio-mechanical, hydraulic and chemical properties. Functions of Geosynthetics, fluid transmission, filtration, separation, protection.

Unit - III

Soil Reinforcement: Basic principle of soil reinforcement, shear strength of reinforced soil, theoretical strength models, factors affecting, requirements on synthetic reinforcement, installation techniques.

Unit - IV

Calculation methods: Basic concepts, embankment on soft soils, internal stability, overall stability, foundation stability and bearing capacity failures - Construction of the steep slope, retaining walls, external stability, internal stability.

Unit - V

Use of Geosynthetics in Roads and Railways, drainage system- Control of groundwater level, dewatering and reclamation of land, use of Geomembranes - For lining application, management and maintenance

References Books:-

v) "Modern Geotechnical Engg." by Dr. Alam Singh, IBT Publishers & distributors, Delhi
vi) International conference on Soil Reinforcement, Reinforced Earth & Other Techniques Paris, March 1979
Unit I


Unit II

Mathematical models of fluid dynamics, Equations of motions, Compressible and Incompressible flows, inviscid flows, viscous laminar and turbulent flows, Navier-Stokes equations, Laplace & Poisson Equation.

Unit III

Computational techniques, finite difference methods, Explicit and Implicit formulations, Finite element methods, weighted residual, finite Volume method, panel method.

Unit IV

Numerical Integration, Newton-cotes, Guass-Lagendre quadrature, essential and necessary, Dirichlet Neumann, Newton boundary condition, coordinate transformations.

Unit V

Physical aspects of grid generation, element geometries, structured and unstructured mesh, mesh refinement, conformal mapping, algebraic grid generation, transfinite interpolation, Delaunay triangulation and voronoi diagram.

Reference Books:-

(C) Computational Methods for Fluid Dynamics by Joel H. Ferziger et.al.
(D) Introduction to Computational fluid Dynamics by Anil Date
(E) Computational Fluid Dynamics: The Basics with Applications by John David Anderson.
(F) Computational Fluid Dynamics by Douglas
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<tr>
<td>Civil Engineering Department</td>
<td>Major Project</td>
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</table>

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.

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

The project should be presented in a standard format.

The term work should be continuously evaluated as per the norms/guidelines.