

IEI-IIMT combine certificate project course - Civil

1. Fluid Mechanics

Unit I Introduction

Fluids, Types of fluid flow, Hydrostatics, Fluid Kinematics- Dynamics, Flow through pipes, boundary layer phenomena, Measurement of flow- quantities measurement, Compressible fluid flow, Turbo-machines, dimensional analysis.

Unit II Hydrology and water management

Hydrologic cycle, Climate and water availability, Water balances, Precipitation, Hydrologic cycle, Climate and water availability, Water balances, Precipitation, Hyetograph and Hydrograph Analysis, Groundwater, Reservoir, Hydroelectric Power, Flood Management, Hydrologic Analysis and Design, Water Resources Planning and Development.

Water quantities Requirement, Collection and Conveyance of Water, Water Treatment Processes, Distribution System, Collection and Estimation of Sewage, Hydraulic Design of Sewer, Unit Operations for Waste Water Treatment, Design of Facilities for Physical, Chemical & Biological Treatment of Waste Water.

2. Surveying

Basic survey

Plane Table Survey, Theodolite Traversing, Trigonometric levelling, Curves, Computation of Areas, Hydrography, Setting out Works, Building, Culvert, Bridge, Tunnel

Tacheometric Surveying :

Introduction, purpose, principle, instruments, stadia constants, methods of tacheometry, anallatic lens, subtense bar, field work in tacheometry, reduction of readings, errors and precisions.

Geodetic Surveying-

Principle and Classification of triangulation system- Selection of base line and stations- Orders of triangulation- Triangulation figures- Station marks and signals- marking signals- Extension of base, Reduction of Centre, Selection and marking of stations

Theory of Errors :

Introduction, types of errors, definitions, laws of accidental errors, laws of weights, theory of least squares, rules for giving weights and distribution of errors to the field observations, determination of the most probable values of quantities.

Field Astronomy:

Introduction, purposes, astronomical terms, determination of azimuth, latitude and longitude.

Aerial photogrammetry

Introduction, Principle, Uses, Aerial camera, Aerial photographs, Definitions, Scale of vertical and tilted photograph,, Ground Co-ordinates, Displacements and errors, Ground control, Procedure of aerial survey,Photomaps and mosaics, Stereoscopes, Parallax bar.

Modern Surveying Instruments:

Introduction, Electromagnetic spectrum, Electromagnetic distance measurement, Total station.

Remote Sensing-

Introduction, Principles of energy interaction in atmosphere and earth surface features, Image interpretation techniques, visual interpretation, Digital image processing, Global Positioning system

Geographical Information System-

Definition of GIS, Key Components of GIS, Functions of GIS, Spatial data, Geospatial analysis, Integration of Remote sensing and GIS and Applications in Civil Engineering.

3. Structural Analysis and design

Unit I Analysis

Displacement of determinate beams and plane truss, Moment distribution, Fixed and continuous beams, Consistent deformation method, Slope deflection method, Kani's method, Influence lines for indeterminate structures, Matrix Methods, Beam Curved in Plan, Stiffness Method (Member- special Approach), Finite Element Method, Columns and struts, Arches, cables and suspension bridges, Influence lines, Direct and bending stresses.

Unit II Design

Limit state design of RC elements:

Flexural design, Flexural and shear design, Axial load design, Torsion design, Combined shear and torsion, Shear, flexural, punching, torsion, Bond and development length, Combined axial, shear, flexure. Loading standards as per I.S, distribution & flow of loads, lateral load due to wind as per IS: 875(Part - III), load combinations - Analysis, design & detailing of G+3 RC framed building for residential /commercial Purpose including ductile detailing in beams and columns, underground and elevated circular & rectangular RC water tanks, cantilever & counter fort retaining wall for various ground Conditions.

Limit State design of Steel elements:

Axial force design, Flexural design for beams, Footing, Torsion design, Connections, Plastic Design. Design of bolted / welded plate girder for static and rolling loads, design of supporting systems, Structural layout of industrial building, roofing system, bracing system, columns, gantry girder,

Structural system for through & deck type's bridges, design of foot over bridge & its Supporting system, Design principles for tall steel structures like microwave towers, transmission line tower, chimney etc.

4. Construction

Unit I Concrete technology

Ingredients of Concrete, Fresh concrete, Hardened concrete, Durability and permeability of concrete, Concrete in aggressive environment, Special Concrete, Special concreting techniques, Concrete mix design, Repair and rehabilitation

Unit II Building Construction

Subsurface Investigation, Masonary Construction (Stone, Brick, composite, Hollow concrete blocks and construction, Cavity walls, Lintels & arches), Doors and Windows, Stairs & staircase, Flooring, Roofs & roof covering, wall finishes, Special treatment.

Unit III Mega Construction.

Hydraulic Structures

Dam engineering- Spillways and ancillary works, site assessment and selection of type of dam, Embankment dam engineering - Nature and classification of soil, engineering characteristics of soil, principles of design, Material and construction- Internal seepage, Stability and stresses, Settlement and deformation in rock fill embankments

Concrete dam engineering: Loading -Concepts and criteria, Gravity dam analysis design features and stability- elementary profile of gravity dam- Concrete for dams –roller compacted concrete gravity dams

Dam outlet works: Spillways – Ogee spillway - cavitation on spillway – design feature- design principles and design of spillways – Chute spillways –Energy dissipation – stilling basins – plunge pools

Drop structures: Sarda fall – Glacis fall –Design principles- Cross regulator, head regulator and functions.

Docks & Harbour Engineering

Harbour Planning, Natural Phenomena, Marine Structures, Docks and Locks, Port Amenities, Navigation Aids, Harbour Maintenance.

AIRPORT

Air Port Planning, Run Way Design, Taxiway Design, Terminal Area Design, Grading and Drainage, Air Traffic Control and Visual Aids.

Railway

Introduction, Railway Track Gauge, Alignment of Railway lines, Track and Track stresses, Rails Sleeper Ballast, Track fittings, Geometric design of Resistance to Traction, Points and crossings, Railway Stations and yards, Signaling and interlocking.

Highway Engineering

Highway Planning and Development, Field Surveys, Highway Geometric Design, Road Sub-Grade, Low Cost Roads, Highway Pavements, Highway Drainage, Hill Roads, Roadside Developments, Road Administration and Finance, Traffic Engineering.

Unit IV Repairs And Rehabilitation Of Structures

repair strategies, serviceability and durability of concrete, materials and techniques for repair, repairs, rehabilitation and retrofitting of structures, demolition techniques.

Unit V Construction Management and Equipments

Conventional Methods

Network Analysis-Critical Path Method (CPM) -Resource allocation and Resource Scheduling-Programme Evaluation and Review Technique (PERT)-Cash Flow analysis and expenditure schedules-Job Lay out, Supervision and Safety in Large Construction Projects.

Construction Equipment:

Classification of Equipment, Financial aspects related to construction equipments, Discounted present worth analysis, Depreciation, Cost of owning and operating construction equipment, Basics of equipment replacement policy. Engineering fundamentals: Related to performance of IC engines, rimpull, drawbar pull, Coefficient of traction, Gradability, Soil

Other Equipments:

Bulldozers, Rippers, Scrapers.Excavating Equipment: Power Shovels, Draglines, Hoes, Clam, Shells and trenching machines, Belt conveyor system, Hauling equipment: Trucks and wagons.

5. Geology

Unit I

Branches and Scope of Geology, Physical geology, Elements of crystallography, mineralogy and petrology Structural geology, Hydrogeology, Geology in Civil Engineering.

Unit II

Origin and Nature of Soil, Index Properties, Relationships and Tests, Particle Size Analysis, Soil consistency, Soil Classification, Soil Water, Permeability and Seepage, Compaction Shear Strength of Consolidation of Soils.

Unit III

Stability of Slopes, Earth Pressure, Stress Distribution of Soils, Basics of foundation, Subsurface investigation, Bearing Capacity of Shallow ,Pile foundations.

Unit IV

Fundamentals of Earthquake Vibrations of buildings, Earthquake Basics, Earthquake resistant Masonry features, Design Philosophy, Lateral Loads on Buildings, Lateral Load Distribution, Ductile Detailing, Special topics.