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BCE501 Transportation Engineering-I

Unit I

Basics of Railway: Introduction, Tractive resistances & Permanent way: Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations, Route surveys and alignment, railway track, development and gauges, Hauling capacity and tractive effort. i) Rails: types, welding of rails, wear and tear of rails, rail creep. ii) Sleepers: types and comparison, requirement of a good sleeper, sleeper density. iii) Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails. iv) Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track

Unit II

Railway: Geometric Design; Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipment, layouts, marshaling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and inter-locking.

Unit-III

Bridges: Site Investigation and Planning; Loading Standards &Component parts: Selection of site, alignment, collection of bridge design data: essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges. : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure. Bridge Foundations, Construction, Testing and Strengthening of Bridges : Different types of foundation: piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants. inspection and Data collection, strengthening of bridges, Bridge failure.

Unit-IV

Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts 2, Construction of tunnels in soft soil, hard soil and rock, Different types of

lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

UNIT-V

Harbours and Docks: Types of Harbours; Harbours - layouts, shipping lanes, anchoring, location identification; Littoral transport with erosion and deposition; sounding methods; Dry and Wet docks, components and operational Tidal data and analyses. Inland waterways: advantages and disadvantages; Development in India. Inland water operation.

Reference

1.Chakraborty and Das; Principles of transportation engineering; PHI
2.Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3.Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4.Ponnuswamy; Bridge Engineering; TMH
5.Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
6.Railway Track by K.F. Antia
7.Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons.
8.Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
9.Railway, Bridges & Tunnels by Dr. S.C. Saxena
10.Harbour, Docks & Tunnel Engineering - R. Srinivasan 11.Essentials of Bridge Engg. By I.J. Victor; Relevant IS & IRS code

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BCE502 – Quantity surveying & Costing

Unit – I

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit – II

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

Unit – III

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

Unit – IV

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

Unit – V

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

Suggested Books:

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala

BCE502P – Quantity surveying & Costing

Practical & Sessional Works:

1. Preparation of detailed estimate.

2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.

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BCE503 –Structural Analysis –II

Unit. I

Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Unit. II

Plastic analysis of beams and frames.

Unit. III

Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Unit. IV

Matrix method of structural analysis: force method and displacement method.

Unit. V

Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

Reference Books :-

1. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
2. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
3. Reddy C.S., Basic Stgructural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
4. Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi.

BCE503P Structural Analysis –II Practicals

List of experiments:

(1) To verify the Betti's law.

(2) Study of a three hinged arch experimentally for a given set of loading and to compare the results with those obtained analytically.

(3) To obtain experimentally the influence line diagram for horizontal thrust in a three

hinged arch and to compare the same with the theoretical value.
(4) To determine the flexural rigidity of a given beam.
(5) To study the behavior of different type of struts.
(6) To verify moment area theorem for slopes and deflection of a beams.

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BCE504 Construction Management & laws.

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

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Elective – I BCE505 (1) Water Resources Engineering

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

Ground Water and Well irrigation:

Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence causes and effects. reclamation of water logged and salt affected lands. Types of wells, well construction, yield tests, specific capacity and specific yield, advantages and disadvantages of well irrigation.

Unit-III

Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

Unit - IV

Canals and Structures: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, lining-objectives, materials used, economics. Introductions to Hydraulic Structures viz.Dams, Spillways, Weirs,Barrages, Canal Regulation Structures.

Unit-V

Floods: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control,

Suggested Books :-

1. Irrigation & Water Power Engg. by Punmia & Pandey B.B.Lal
2. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
3. Engg. Hydrology - J.NEMEC - Prentice Hall
4. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
5. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
6. Engg. Hydrology by H.M. Raghunath

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Elective – I (2) BCE505 Building Services

Unit-I: Plumbing work :- water supply and sanitary provisions, Accessories of sanitary provision, methods of plumbing, problems associated with plumbing work.

Unit-II: **Acoustics, Sound Insulation and Noise Control**: Basic terminology and definitions, Physics of sound. Behaviour of sound in an enclosed space. Requisites for acoustic environment , Acoustic design approaches for different building types, with reference to applicable standards. Selection of acoustic materials.Noise and its control, control of structure borne sound and noise from different mechanical equipment.

Unit-III: Electrical and Allied Installations: day lighting , basic design, artificial lighting .Different types of wiring, need of earthing, comparison between fuse and MCB, substation, types of lightening fixtures, electricity distribution in multi-storeyed building. Building protection against lightening, Planning and layout of electrical installations within a building complex.

Unit-IV: **Ventilation**: Functions of ventilation, supply of fresh air, convective cooling, Stack effect, physiological cooling, provision for air movement; wind effect, Air flow through buildings, cross-ventilation, position and size of openings, air flow around buildings, humidity control. Air Conditioning, Heating and Mechanical (Thermodynamics of human body.) Ventilation: Requirement of air conditioning, air conditioning system, elements of air conditioning, Working and p-H diagram of vapour compression cycle, refrigeration effect,

Unit-V Mechanical Equipment & Installation: Installation of lifts and escalators, different types of Security and alarm systems. Hot Water Provision (Solar and Electrical), Special features required for physically handicapped and elderly,

Unit-VI: **Firefighting and safety measures** : Planning considerations in buildings using non-combustible materials, escapes, Fire detection and fire fighting systems. Heat and smoke detectors, Fire alarm system, Automatic sprinklers. Assignment: Case Study of any Building & its services

Reference Books:

1 Building Services Engineering by David V Chadderton
2 General Specification for Electrical Work – Part – I, II & III, Government of India Publication, Jain Book Depot.
3 General Specification of Heating & Ventilation - 2004, Government of India Publication, Jain Book Depot.
4 Handbook on Functional Requirement of Buildings.
5 Building Services Environmental & Electro – Mechanical Services, by S M Patil, Jain Book Depot.

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Elective – I BCE505 (3) Environmental Engineering

Unit I: Estimation of Water Quality and Population forecasting

Estimation of ground and surface water resources. quality of water from different sources, demand & quantity o f water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

Unit – II: Design of Sewer

Introduction of Water and Waste water. Estimation of Sewage Discharge. Design periods. Hydraulic Design of Sewers. Sewer Construction, Sewer Appurtenances. Intake structure, conveyance of water, pipe materials, pumps - operation & pumping stations

Unit III: Quality of water and Wastewater

Qualities of water and wastewater and their significance , Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis of water and wastewater, water and wastewater standards for different uses.

Unit – IV : Treatment of Water

Water Treatment methods- theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment. Layout and hydraulics o f different distribution systems.

Unit – V : Treatment of Waste Water

Wastewater Treatment Technologies. Screening, Grit Chamber, Skimming Tank, Sedimentation, Sedimenattion with Coagulation, Biological Filtration treatment of sewage. Oxidation Pond/ditch, Activated Sludge Process, Sludge Blanket Reactor.

Suggested Books and Reading Materials:-

1. Water Supply and Waste Water Engineering by B. C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitar y Engg. by G.S. Bird i - Laxmi Publications (P) Ltd. New Delhi
3. Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi.
4. Environmental Engineer ing - H.S. Peavy & D.R.Rowe - Mc Graw Hill Book Company, New Delhi
5. Water Supply & Sanitar y Engg. by S. K. Husain
6. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
7. Sewage Disposal and Air pollution Engineering by S. K. Garg Khanna Publishers.
8. Relevant IS Codes.

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Elective – I BCE505 (4) Advance Fluid Mechanics

Unit-I: Water Power

Introduction. Sources of Energy. Status of Power in the world. Hydro Power. Place of Hydro Power in a power System. Transmission voltages and Hydro-Power. Estimation of Water Power Potential.

Unit-II: River Hydro-Power Plant

Types of Hydro Power plants. Runoff River Plants. Valley Dam Plants. Diversion Canal Plants. High Head Diversion. Storage and Pondage.

Unit-III: Pumped Storage Power Plant

Introduction of Pumped Storage power plants. Types of Pumped Storage plants. Advantages and disadvantages of pumped Storage power plants. Two unit and three unit arrangement. Reservoir and water conveyance.

Unit-IV: Hydraulic Machines –Centrifugal Pumps

Introduction of Centrifugal pump. Centrifugal pumps : Various types and their important components. Working principle of pump. Priming of a pump. Characteristic Curves of a centrifugal pump. Velocity triangle of centrifugal pump.

Unit V: Hydraulic Machines -Reciprocating pumps

Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.

Suggested Books & Study Material:

1. Water Power Engineering – M M Dandekar and K N Sharma; Vikas Publishing House PVT LTD.
2. Fluid Mechanics - A.K. Jain - Khanna Publisher s, Delhi
3. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705- B, Nai Sarak, Delhi-6
4. Centrifugal & Axial Flow Pump By Stempanoff A.J. New York

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BCE506 Civil Engineering Software Lab

Auto CAD

Laboratory Works/ Exercises

1. Introduction to tools of Auto CAD.
2. Formation of Layers
3. Draw Orthographic Drawings
4. Draw Isometric Drawings
5. Draw Perspective Drawings.
6. Scale setting &Plotting.
7. Drawing Plan of a building in Auto CAD
8. Drawing Section and Elevation of a building in Auto CAD
9. Section and Elevation of a building in Auto CAD
10. Detailing of building components like Doors, Windows, Roof Trusses