Category of Course	Course Title	Course Code	Credits -6			Theory Papers (ES)
Civil Engineering Department DC-08	Transportation Engineering - II	**CE501**	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	2	

Branch: Civil Engineering V Semester

Course: CE501 Transportation Engineering – II
Unit - I
High way planning, Alignment & Geometric Design: Principles of highway planning,
road planning in India and financing of roads, classification patterns. Requirements, Engg. surveys for highway location.
Cross sectional elements- width, camber, super-elevation, sight distances, extra
widening at curves, horizontal and vertical curves, numerical problems.

Unit – II
Bituminous & Cement Concrete Payments: Design of flexible pavements, design of
mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and realiability.

Unit – III
Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning:
Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures.
Surface and sub-surface drainage, highway materials: properties and testing etc.
Channelised and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

Unit - IV
Airport Plaaning, Runway & Taxiway: Airport site selection. air craft characteristic
and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports.
Geometrical elements: taxi ways and runways, pattern of runway capacity.

Unit - V
Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach
area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental lending system, precision approach radar, VOR enroute traffic control.

List of Experiments:
1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate

Reference Books & Study Materials:
1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherty
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Mannual by Dr. S.K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker

Course Contents

Category of Course	Course Title	Course Code	Credits -6			Theory Papers (ES)
Civil Engineering Department DC-09	Advanced Surveying	CE502	**L**	**T**	**P**	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	2	

Branch: Advanced Surveying V Semester
Course: CE502 Advanced Surveying

UNIT-I
Modern equipments for surveying : Digital levels and theodolites, Electronic Distance measurement(EDM), Total Station and Global Positioning Systems (GPS), Digital Plannimeter .

UNIT-II
Surveying Astronomy: Definitions of astronomical terms, coordinate systems for locating heaven ly bodies, geographic, g eodetic, geocentric, Cartesian, local and projected coordinates for earth resources mapping, convergence of meridian, parallel of latitude, shortest distance between two points on the earth, determination of latitude and lon gitude.

UNIT-III
GPS Surveying: Introduction & components of GPS, Space segment, control seg ment and user segment, Elements of Satellite based surveys-Map datums, GPS receivers, GPS observation methods and their advantages over conventional methods.

Digital Terrain Model (DTM) : Topographic representation of the terrain and generation of DTM on computers using spot heights and contour maps.

UNIT-IV

Photogrammetry : Principle, definitions and classifications of terrestrial and aerial photogrammentry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic.

UNIT-V

Remote Sensing: Principle, components, classification, remote sensing data acquisition process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellites (IRS) and applications. Geographic Information Systems (GIS) : Definition, components and advantages.

Surveying Project - Student will go for one week Surveying Camp to carry out Project Work.

SUGGESTED TEXT BOOKS AND REFERENCES :

1. Surveying and Leveling-Part-I & II by T.P. Kanetkar and S.V. Kulkarini, Pune Vidyarthi Griha Prakashan, Pune
2. Engineering Surveying : Theory and Examination Problems for Students by W. Schofield, Butterworth, Heinemann,Oxford.
3. Surveying: Problems Solving with theory and objective type questions by A.M. Chandra, New Age International Publishers N. Delhi.
4. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
5. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi.
6. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.

Category of Course	Course Title	Course Code	Credits -6			Theory Papers (ES)
Civil Engineering Department DC-10	Fluid Mech. - II	**CE503**	**L**	**T**	**P**	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	**1**	**2**	

Branch: Civil Engineering V Semester
Course: CE503 Fluid Mech. – II
Unit-I
Turbulent flow : Laminar and turbulent boundary layers and laminar sublayer, hydrodynamically smooth androough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes,commercial pipes, aging of pipes.
Pipe flow problems : Losses due to sudden expansion and contraction, losses in pipe fittings and valves,concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel,branching of pipes.
Pipe Network : *Water Hammer (only quick closure case). transmission of power. *Hardy Cross Method
Unit-II
Uniform flow in open channels : Channel geometry and elements of channel section, velocity distribution,energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections, Saint Vegnet equation.
Unit-III
Non uniform flow in open channels : Basic assumptions and dynamic equations of gradually varied flow,characteristics analysis and computations of flow profiles, rapidly varied flow-hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.
Unit-IV
Forces on immersed bodies: Types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift, lifting vanes, magnus effect.
Unit-V
Fluid Machines:
Turbines : Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, cavitation.
Pumps:
Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitation, principle of working and characteristic curves.
Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.

List of Experiment

1. Study the performances characteristics of Pelton Wheel
2. Study the performances characteristics of Francis Turbine
3. Study the performances charactristics of Kaplan Turbine
4. Caliration of multistage (Two) Pump & Study of characteristic of variable speed pump
5. To study the performance & details of operation of Hyd. Ram
6. Determination of coefficient of discharge for a broad crested weir & to plot water surface profile
over weir
7. Study of the characteristic of the Reciprocating pump

Suggested Books & Study Material:

1. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
2. Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New Delhi
3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
4. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705-
B, Nai Sarak, Delhi-6
5. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
6. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
7. Engineering Hydraulics By H. Rouse
8. Centrifugal & Axial Flow Pump By Stempanoff A.J. New York
9. Relevant IS codes.

Category of Course	Course Title	Course Code	Credits -6			Theory Papers (ES)
Civil Engineering Department DC-11	Structural Design & Drawing – I (RCC)	**CE504**	**L**	**T**	**P**	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	**1**	**2**	

Branch: Civil Engineering-V Semester

Course:CE504 Structural Design & Drawing – I (RCC)

Unit - I.

Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors.

Unit - II.

Design of Beams: Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and bond.

Unit-III.

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continous slabs, Slabs spanning in two directions, Circular slabs, Waffle slabs, Flat slabs, Yield line theory.

Unit -IV.

Columns & Footings: Effective length of columns, Short and long cloumns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

Unit -V.

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions,Slabless tread-riser staircase.

NOTE :- All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)

Suggested Books: -

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammuttham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju.

Category of Course	Course Title	Course Code	Credits -6			Theory Papers (ES)
Civil Engineering Department DC-12	Theory of Structures -I	**CE505**	**L**	**T**	**P**	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	**1**	**2**	

Branch: Civil Engineering-V Semester
Course: CE505 Theory of Structure -I
Unit. I
Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.
Unit. II
Indeterminate Structures-I : Static and Kinematics indeterminancy, Analysis of Fixed and continuous beams by theorem of three moments, Effect of sinking and rotation of supports, Moment distribution method (without sway)
Unit. III
Indeterminate Structures - II : Analysis of beams and frames by slope Deflection method, Column Analogy method.
Unit. IV
Arches and Suspension Cables: Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects.
Unit. V
Rolling loads and Influence Lines: Maximum SF and BM curves for various types of Rolling loads, focallength, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.
Reference Books:
1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
3. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
5. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill International, Tokyo