Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER V

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 501	DCS	STRUCTURAL ANALYSIS-I	60	20	20	0	0	3	1		4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

The objectives of the course are to build on the students knowledge on the theory and application of structures in buildings and to introduce the students to concept of structural stability, methods in structural analysis.

Course Outcomes:

1. Distinguish between determinate and indeterminate structure
2. Analysis of Indeterminate structure by various methods
3. Analysis of beams under moving load and to draw influenced line diagram.
4. Analysis of two hinged three hinged arch and suspension bridges.

Syllabus:

UNIT I

Indeterminate Frames- Degree of static and kinematic Indeterminacy of rigid jointed and pin jointed frames for space and plane, Analysis of fixed and continuous beam by three moment equation, Analysis of indeterminate beams and frames by method of consistent deformations

UNIT II

Slope Deflection Method Slope Deflection Method Analysis of beam by slope deflection method with support displacements, analysis of frame with and without sway, analysis of frame by slope deflection method with support displacements

UNIT III

Moment Distribution Method Analysis of beam by moment distribution method with support displacements, analysis of frame with and without sway by moment distribution method with support displacements

UNIT IV

Moving Load and Influence Line Diagram

Maximum SF and BM curves for various types of Rolling loads, Influence line of indeterminate beam, continuous beam by Muller Breslau's Principle

UNIT V

Arch and Suspension bridges: Three hinged arches of different shapes, Eddy's Theorem-settlement and temperature effects, Two Hinged- settlement and temperature effects, Suspension

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cable, stiffening girders.

Text Books:

1. Punmia, B.C., Ashok Kumar Jain, "Theory of Structure", Lakshmi Publication.
2. Ramamrutham, "Theory of Structure",
3. Bhavikatti,S.S, Structural Analysis, - Vol 1 and Vol 2,Vikas Publication.
4. Vaidhyanadan, R and Perumal , P, "Comprehensive Structural Analysis-Vol 1 & 2, Lakshmi Publication

Reference Books:

1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach,
2. Chapman and Hall, New York.
3. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
4. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
5. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
6. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill
7. International,Tokyo

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 502	DCS	TRANSPORTATION ENGINEERING	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Objectives:

The aim of this course is to teach students about the transportation planning, geometric design of roads, traffic control, railway and harbour, Aircraft characteristics and air traffic control.

Course Outcomes:

1. Understand the importance of transportation and traffic planning
2. Perceive the signal design and traffic control measures
3. Get knowledge about component and functioning in railway and harbour engineering.
4. Get knowledge about air traffic control and design of airport components

Syllabus:

UNIT I

Engineering Surveys for Highway

Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, and numerical problems.

UNIT II

Bituminous & Cement Concrete Payments: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, BC,SDBC, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Comparison of flexible and rigid pavements, use of MOST code in design, causes of failures of flexible pavement and rigid pavement,

UNIT III

Traffic Engineering - Introduction**,** traffic capacity and level of service**,** channelized and unchannelized intersections, grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages of rotary, road marking, signs and signals, types of signals and design of signals

UNIT IV

Railway and harbour Engineering- Role of Indian Railways in National Development, Ballast and its properties, Permanent Way its Components and their Functions, Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Sleepers ,Functions, Materials,

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Geometric Design of Railway Tracks Gradient and, Grade Compensation, Super-Elevation.
Docks and Harbour- Definition of Terms - Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports - Requirements and Classification of Harbours - Site Selection &Selection Investigation – Speed of water, Dredging, Range of Tides, Waves and Tidal Currents, Littoral Drift, Transport with Erosion and Deposition, Soundings, Winds & Storms, General considerations in tunnelling, size and shape of tunnels ,Alignment of tunnels, Methods of tunnelling in rocks tunnel lining, Ventilation ,lighting and drainage in tunnels.

UNIT V
Airport Planning and Management: Airport site selection, Air craft characteristic and their effects on runway alignments, wind rose diagrams, basic runway length and corrections, taxi ways and runways, pattern of runway capacity. Classification of airports.
Zoning regulations, approach area, approach surface-imaginary, conical, and horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system (ILS), precision approach radar, VOR en-route traffic control. Specifications of national and international airports

Text Books:

1. Khanna &Justo Highway Engineering, Nemchand and Brothers Roorkee
2. L.R Kadiyali and N.B.Lal, Principle and Practices of Highway Engineering,KhannaPublications, Delhi
3. Subhash C Saxena Text Book of Highway and Traffic Engineering,Jain Book Depot,Delhi
4. Railway Engineering: Rangwala. Charottar Publication

Reference Books:

1. Fred L Mann Principles of highway Engineering
2. LeasterA Traffic & Highway Engineering
3. Martin Roge Highway Engineering
4. Subramaniya, Railway Engineering

List of Practical's:

1. Determination of aggregate Crushing Value
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

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 503	DCS	GEO TECH -I	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

1. To gain experience regarding the determination of properties of different types of soils and understand how they behave
2. To provide an opportunity to learn how to measure the shear strength of the soil and its importance
3. To impart knowledge about the Lateral Earth Pressure.

Course Outcomes:

1. Determine the index properties of the soil
2. Classify the soil.
3. Identify the suitability of the soil for different foundations

Syllabus:

UNIT I

Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil structure (Two & Three phase system). Index properties (water content,Void ratio,porosity, Unit weight etc.) and their determination. Atterberg's limits (LL,PL, SL.) Classification systems based on particle size and consistency limits.

UNIT II

Soil Water and Permaeability: Soil water, Permeability Determination of permeability in laboratory (Faliing head and Constant head test) and in field. Seepage and seepage pressure. Flownets, uses of a flownet.
Effective, neutral and total stresses. Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

UNIT III

Compressibility and consolidation: Compressibility and consolidation (Primary&Secondary), Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of preconsolidation pressure, settlement analysis. Calculation of total settlement.

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UNIT IV

Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and Westergaurd's analysis. Newmark's influence chart. Contact pressure distribution.

Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength & Parameters (C and ø) , Shear box test, Triaxial compression test, unconfined compression test, Vane shear test

UNIT V

Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulombs, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cosion-less and cohesive soils. Effect of surcharge, water table and wallfriction. Arching in soils.

Text Books:

1. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
2. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi

Reference Books:

1. Soil Mech. & Found. Engg. by S.K. Garg- Khanna Publishers, Delhi.
2. Geo technical Lab Manual Prepared by SVVV (SVITS-CED) Staff.
3. Relevant I.S. Codes.

List of Practical's:

1. Determination of the natural content of the given soil sample.
2. To determine the Density of soil by Core Cutter method
3. To determine the specific gravity of soil fraction passing 4.75 mm I.S sieve by density bottle.
4. To determine the particle size distribution of soil by Sieve Analysis.
5. To determine the particle size distribution of soil by hydrometer method
6. To determine plastic limit, liquid limit, shrinkage limit of given soil sample.
7. To determine the coefficient of permeability of a soil using constant head and Falling head method.
8. To determine the settlements due to primary consolidation of soil by conducting one dimensional test.
9. To determine the shearing strength of the soil using the direct shear apparatus.
10. To determine shear strength parameters of cohesive soil by unconfined compression
11. To find the shear of the soil by Triaxial Test.
12. To find shear strength of a given soil specimen by Vane shear test.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 504	DCS	STRUCTURAL DESIGN –I (R.C.C)	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

Student (A) will be able to analyze various loads acting on structure and design different components of RCC structure (B) at particular site (C) economically & safely (D).

Course Outcomes:

1. Calculate the different types of loadings on the structure.
2. Identify the method of analysis and design.
3. Design the structures and draw the reinforcement detailing

Syllabus:

UNIT I

Introduction to working stress method, Ultimate load and limit state methods of design: Basic Concept, Assumption, Derivations for Moment of resistance & Lever Arm, Behavior of Singly Reinforced Section, Doubly Reinforced Section & flanged sections.

UNIT II

Reinforced Concrete Beams- Design of Reinforced Concrete Beams, Design of singly reinforced rectangular beams:-Simply supported, cantilever and Continuous beams., Effect of shear, bond and torsion in beam. Design of doubly reinforced rectangular beams.

UNIT III

Slabs -Design of Slabs spanning in one direction:-Simply supported and Continuous slab, Design of Two way slab

UNIT IV

Compression Member- Design of columns: - Square, Rectangular and Circular columns.
Design of uniaxial and biaxial column.
Design of footing by limit state method: - Square and Rectangular footing

UNIT V

Staircase- Design of Staircases with waist slab: - Stair slab spanning Longitudinally, Stair slab spanning transversely. Design of Slab-less Staircase (Tread Riser Staircase).

Text Books:

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1. Reinforced Concrete Structure – Pillai & Menon; Tata McGraw Hill, New Delhi
2. Plain & reinforced concrete – B.C. Punmia
3. Design of Reinforced Concrete Structures - N. Subramanian
4. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi

Reference Books:

1. Structural Design & Drawing by N.K.Raju
2. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH

List of Practical's:

1. Details of reinforcement in a simply supported RCC beam (singly reinforced and doubly reinforced) with the given design data regarding the size and number of bars, stirrups their size and spacing.

2. Details of reinforcement in a one way slab with the given design data regarding the size and spacing of bars.

3. Details of reinforcement in a two way slab with the given design data regarding the size and spacing of bars.

4. Details of reinforcement for a RCC square and circular column with footing.

5. Details of reinforcement of staircase (Staircase with waist slab and without waist slab) with the given design data regarding the size and spacing of bars.

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SEMESTER V

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 505(1)	DCS	ADVANCED SURVEYING	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Object

To collect the knowledge about significance of advanced surveying in field measurements in terms of utility and precision of data collection.

Course Outcomes:

1. To know about significance of advanced surveying in field measurements in terms of utility and precision of data collection
2. To learn on the principles of Electronic distance measurements, Total station and their accuracy
3. To get introduced to the concept of photogrammetry in preliminary identification and map making
4. To know in detail the concept of remote sensing in identification of land features from space and to get introduced to different data acquisition techniques.
5. To get introduced to the field of geodesy, coordinate systems, Map projections, GPS, its working principles, data collection, data processing and analysis

Syllabus:

UNIT I

Modern Surveying Instruments Types of various modern surveying equipments, Electromagnetic distance measurement, Digital Theodolite, Total station, Digital Terrain Model (DTM), Digital Plannimeter.

UNIT II

Triangulation Horizontal and vertical control, Methods, specifications, triangulation, baseline, instruments and accessories, corrections, satellite stations, reduction to center, trigonometrically leveling, single and reciprocal observations, traversing, Gale's table.

UNIT III

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.

UNIT IV

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.

UNIT V

Remote Sensing, DGPS & GIS

Remote Sensing:-Introduction, Principles of energy interaction in atmosphere and earth surface features, Image interpretation techniques, visual interpretation, Digital image processing, **DGPS:-**Introduction & components of DGPS, Elements of Satellite based surveys-Map datums, DGPS receivers, DGPS observation methods and their advantages over conventional methods.**GIS:-**Definition of GIS , Key Components of GIS & Functions of GIS, Spatial data, spatial information system, Geospatial analysis, Integration of Remote sensing and GIS, and Applications.

Text Books:

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.

Reference Books:

1. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
2. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi.
3. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.

List of Practical's:

1. Prepare contour maps of ground surface.
2. Determine the water storage capacity in case of probable storage site assuming the height of barriers located at selected places.
3. Determine the optimal alignment for the site giving minimum cross drainage works and decide the proper gradient giving equal quantity of cutting and filling
4. In surveyed terrain, planning of small colony and road networks, water supply & drainage system.
5. Calculate the height of building using total station.
6. Calculate the height of building using digital theodolite.
7. Measure the distance between two points of field using total station.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 505(2)	DCS	HYDRAULICS AND HYDRAULIC MACHINES	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

1. To learn the fundamentals of Uniform and Non-Uniform flow in open channels.
2. To understand about the concepts of specific energy, critical flow and their applications.
3. To give an idea about the gradually varied flow and rapidly varied flow and their equations and computations.
4. To introduce the concepts of momentum principles.
5. To impart the knowledge on pumps and turbines

Course Outcomes:

1. To know the different types of flows and channels.
2. To understand the performance of turbines and pumps.
3. To know the applications of momentum principles.
4. To make the student is expected to prepare models for prototypes of hydraulic structures.
5. To make the student is expected to have thorough knowledge on the selection of turbines and pumps for practical purposes

Syllabus:

Unit-I

Turbulent flow: Laminar and turbulent boundary layers and laminar sub-layer, hydro dynamically smooth and rough 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.

Unit-II

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-III

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.

Unit-IV

Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitations, 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.

Unit-V

Hydropower Engineering:

Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential. Intakes, tunnel, penstocks and draft tubes, Water hammer analysis, surge tanks, classification, working principle.

Text Books:

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 Mechanics - K.R. Arora - Standard Publishers Distributors 1705- B, Nai Sarak, Delhi-6

Reference Books:

1. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
2. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
3. Engineering Hydraulics By H. Rouse
4. Centrifugal & Axial Flow Pump By Stempanoff A.J. New York
5. Relevant IS codes

List of Practical's:

1. Study the performances characteristics of Pelton Wheel
2. Study the performances characteristics of Francis Turbine
3. Study the performances characteristics of Kaplan Turbine
4. Calibration 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