Shri Vaishnav Vidyapeeth Vishwavidyalaya
Bachelor of Technology (Civil Engineering)
SEMESTER V

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE501	DCS	STRUCTURAL ANALYSIS-I	3	1	0	4	60	20	20	0	0

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;
***Teacher Assessment** shall be based on 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 student's 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 one degree indeterminate beams by method of consistent deformations; Analysis of fixed and continuous beam by three moment equation.

UNIT II
Slope Deflection Method - Analysis of beam by slope deflection method with support displacements; Analysis of frame with and without sway.

UNIT III
Moment Distribution Method - Analysis of beam by moment distribution method; Analysis of beam by moment distribution method subjected to support displacements; Analysis of non sway and sway frame by moment distribution method.

UNIT IV
Moving Load and Influence Line Diagram- Maximum shear force and bending moment curves for various types of Rolling loads; Influence line of indeterminate beams and continuous beams by Muller Breslau's Principle

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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 cable; Stiffening girders.

Text Books:
1. B.C Punamia, Ashok Jain., Theory of Structure, Lakshmi Publication Delhi.
2. S. Ramamrutham,Theory of Structure, Dhanpat Rai Publishing Company Private Limited-New Delhi; Ninth edition (2014)
3. S.S Bhavikatti, Structural Analysis, - Volume 1 and 2, Vikas Publishing House; Fourth edition (2013).

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. Elementary Structural Analysis, McGraw Hill International.

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE502	DCS	TRANSPORTATION ENGINEERING	2	1	2	4	60	20	20	30	20

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

Course Objectives:
The aim of this course is to teach students about the transportation planning, geometric design of roads, traffic control, railway and harbor, 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; 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 MORTH 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 un channelized intersections; Grade & grade separated intersections; Description of rotary-design elements; Advantages and disadvantages of rotary; Road marking, signs and signals; Types of signals and design of signals.

UNIT IV
Railway Engineering- Role of Indian Railways in National Development; Permanent way, its components and their functions; Rails - types of rails, rail fastenings, concept of gauges, coning of wheels, sleepers functions and materials; 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; Depth Sounding; Satellite Ports – requirements; Classification of Harbours - site selection & selection investigation- Speed of water; Dredging; Range of tides; Waves and Tidal currents; Transport with erosion and deposition; 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 and Justo, Highway Engineering, Nem chand and Brothers, Roorkee.
2. L.R Kadiyali and N.B. Lal, Principle and Practices of Highway Engineering, Khanna Publications, Delhi.
3. Subhash C Saxena, Highway and Traffic Engineering, Jain Book Depot, Delhi.
4. Railway Engineering, Rangwala, Charottar Publication.

Reference Books:
1. Fred L Mann, Principles of highway Engineering, Hoboken, N.J ,Wiley ; Chichester : John Wiley, 2009.
2. Transportation Laboratory manual

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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OURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE503	DCS	GEOTECHNICAL ENGINEERING -I	3	1	2	5	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;
***Teacher Assessment** shall be based on 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 and Index Properties: Definition, scope of soil mechanics; Historical development, formation of soils; Soil structure (two and three phase system); Index properties water content, void ratio, porosity, unit weight etc; Determination of index properties; Atterberg's limits; Classification systems based on particle size; consistency limits.

UNIT II
Soil Water and Permeability: Soil water; Permeability, determination of permeability in field, laboratory (Falling head and Constant head test); Seepage, seepage pressure; Flow nets, uses of flow net; Effective, neutral, total stresses; Measurement of pore pressure, pore pressure parameters; Critical void ratio; Liquefaction.

UNIT III
Compressibility & Consolidation: Compressibility, consolidation (primary and secondary); Relationship between pressure and void ratio; Theory of one dimensional consolidation; Consolidation test; Fitting Time curves; Normally and over consolidated clays; Determination of pre consolidation pressure; settlement analysis; Calculation of total settlement.

UNIT IV

Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq, Westergaard'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 and parameters (C and ø); Shear box test; Triaxial compression test; Unconfined compression test; Vane shear test.

UNIT V

Lateral Earth Pressure: Active, passive earth pressure at rest; Rankine's, Coulombs, Terzaghi's, Cullman's theories; Analytical, graphical methods of determination of earth pressures on cohesion less and cohesive soils; Effect of surcharge, water table, wall friction; Arching in soils.

Text Books:
1. Soil Mechanics and Foundations Engineering by Dr. K.R. Arora, Standard Publishers Distributors, New Delhi, 2009.
2. Soil Mechanics and Foundations by Dr. B.C. Punamia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi, 2017.
3. Geotechnical Engineering by C. Venkatramaiah, New Age International Publishers, New Delhi, 2006.

Reference Books:
1. Soil Mechanics & Foundation Engineering by S.K. Garg, Khanna Publishers, New Delhi, 2003.
2. Geotechnical Engineering laboratory Manual.
3. Relevant Indian Standard Codes.

List of Practicals:
1. To determine the natural moisture content of soil samples.
2. To determine the density of soil by Core Cutter.
3. To determine the specific gravity of soil 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.
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 settlement of soil due to primary consolidation by conducting one dimensional test.
9. To determine the shearing strength of the soil using Direct shear apparatus.

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE504	DCS	DESIGN OF REINFORCED CONCRETE STRUCTURES - I	3	1	2	5	60	20	20	30	20

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

Course Objective
1. To analyze various loads acting on structure.
2. To design different components of RCC structure at particular site economically & safely.

Course Outcomes:
3. Calculate the different types of loadings on the structure.
4. Identify the method of analysis and design.
5. Design the structures and draw the reinforcement detailing

Syllabus:

UNIT I
Introduction to Working Stress Method- Introduction; Ultimate load and limit state methods of design; Derivations for moment of resistance and lever Arm; Behaviour of singly reinforced section; Doubly reinforced section and 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- stair slab spanning longitudinally and transversely; Design of Slab-less Staircase (Tread Riser Staircase).

Text Books:
1. Reinforced Concrete Structure, Pillai & Menon; Tata McGraw Hill, New Delhi
2. Plain and reinforced concrete , B.C. Punamia, Laxmi Publications; Fifth edition , 2015
3. Design of Reinforced Concrete Structures - N. Subramanian, Oxford, 2013

Reference Books:

1. Structural Design & Drawing, N.K.Raju, CBS Publishers & Distributors, 2016
2. Limit State Design by P.C.Varghese , Prentice Hall of India, New Delhi

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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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE505(1)	DCS	ADVANCED SURVEYING	2	1	2	4	60	20	20	30	20

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

Course Objective:
4. To gain experience regarding the advance techniques of surveying.
5. To provide an opportunity to learn how to use and apply the techniques in measurement to collect the data.
6. To impart knowledge about the changing scenario in field of surveying.

Course Outcomes:
1. To learn on the principles of electronic distance measurements, total station and their accuracy.
2. To learn the use of digital theodolite, digital Planimeter, GIS in as advanced techniques in measurement
3. To get introduced to the concept of photogrammetric in preliminary identification and map making
4. 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 Planimeter.

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 and procedure of aerial survey; Photomaps and mosaics; Stereoscopes and parallax bar.

UNIT V

Remote Sensing: Remote Sensing: Introduction; Principles of energy interaction in atmosphere and earth surface features; Image interpretation techniques, visual interpretation, digital image processing.

DGPS: Introduction and 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 and 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. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune, 2014.
2. Engineering Surveying: Theory and Examination Problems for Students by W. Schofield, Butterworth-Heinemann, Oxford, Subsequent edition (July 18, 1984).
3. Surveying: Problems Solving with theory and objective type questions by Dr. A.M. Chandra, New Age International Publishers N. Delhi, 2005.

Reference Books:
1. Higher Surveying by Dr. A.M. Chandra, New Age International Publishers N. Delhi, 2015.
2. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi, 2013.
3. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W., Jonathan Chipman, Kindle Edition, Feb.2015.

List of Practicals:
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	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE505(2)	DCS	HYDRAULICS AND HYDRAULIC MACHINES	2	1	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;
***Teacher Assessment** shall be based on 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 by Modi and Seth, Standard Book house, March 2018, Delhi
2. Open Channel Flow by Rangaraju, Tata Mc Graw Hill Publishing Company Ltd., New Delhi
3. Fluid Mechanics including Hydraulic Machine by A.K. Jain, Khanna Publishers, 2010, Delhi
4. Fluid Mechanics, Hydraulics and Hydraulic Mechanics by K.R. Arora, Standard Publishers Distributors, 2009, New Delhi

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

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