Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

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*
BTCE 401	**DCS**	**STRUCTURAL MECHANICS**	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 following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:
Course objective is to make aware the students about behavior of different structural members. In this subject detail study of analysis of, columns, methods of deflections, unsymmetrical bending is given. This subject deals as a base for the students in the structural engineering field.

Course Outcomes:

1. Identify and discuss the fundamentals of mechanics of solids.
2. Able to calculate strain energy of structure under various load conditions
3. To understand the stresses and strains in thin cylinders and spherical shells
4. To understand the concept of unsymmetrical bending.

Syllabus:

UNIT I
Strain Energy: Elastic Strain Energy in Materials subjected to Tension, Compression, Shear, Bending and Torsion; Theories of Elastic Failure; Gradually and suddenly applied Loads. Impact and Falling Loads
Deflection of Structures: Strain Energy Method for Deflection of Beams and Determinate Trusses, Castigliano's First Theorem and its Application to find Deflections

UNIT II
Unsymmetrical Bending: Principal Moment of Inertia, Unsymmetrical Bending of Standard Structural Section, Change in Orientation of Neutral axis-plane, Shear Centre.

UNIT III
Curved Flexural Members: Circumferential Stresses in Curved Beam, Correction Factors for Straight Beams Formula, Radial Stresses in Curved Beams.; Bending of Curved Bar out of its Plane of Initial Curvature

UNIT IV
Columns and Struts: Long and Short Columns, Axial and Eccentric Loads. Euler's Theory and Rankine's Formula for Axially Loaded Columns; Eccentrically Loaded Columns; ISI-Formula for Columns

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

UNIT V

Shells and pressure vessels: Thin walled cylindrical and spherical pressure vessels under internal and external redial pressure; Wire wound thin tubes.

Basics of Mechanical Vibration: Signal degree of freedom system: Free & Forced vibration, linear viscous damper, Coulomb Damper.

Text Books:

1. Punmia B.C., Strength of Material and Mechanics of Structure, Vol. II., Standard Publishers Distributors
2. Mario Paz, Structural Dynamics., Springer; 5th Corrected ed. 2004

Reference Books:

1. Ryder G.H., Strength of Material., Palgrave Macmillan; Student international edition
2. Timoshenko, Strength of Material. , CBS Publishers & Distributors

List of Practical's:

1. To determine the deflection of beams & Trusses.
2. To determine the unsymmetrical bending of a beam.
3. To determine the deflection of different types of curved beam
4. To determine the stiffness of spring.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
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BTCE 402	**DCS**	**CONCRETE TECHNOLOGY AND ADVANCED CONSTRUCTION MATERIAL**	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 following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

To gain the discrete knowledge of concrete and its technology, subject involves theoretical and practical approaches which help in exploring the different kinds of concrete & its properties, so that students can understand the nature and their significance in the field of Civil Engineering.

Course Outcomes:

1. To have the deep knowledge of concrete material
2. To acquire and apply fundamental knowledge in the fresh and hardened properties of concrete
3. To identify the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
4. To design a concrete mix which fulfils the required properties for fresh and hardened concrete
5. To acquire the knowledge about advance construction materials.

Syllabus:

UNIT I

Introduction Classification, properties, grades, advantage & disadvantages of concrete, Ingredients of concrete, types of cement, aggregates, water, Inspection & testing of materials as per Indian Standard Specifications.

UNIT II

Properties of Fresh and Hardened Concrete: Introduction, Workability, Testing of concrete, Factors affecting, Rheology of concrete, Compressive & Tensile strength, Stress and strain Characteristics, Shrinkage and temperature effects. Creep of concrete, Permeability, durability, Thermal properties.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

UNIT III

Design of Concrete Mix ;Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhi and other Pozzolanic materials, design of plastic concrete mix, computer aided design of concrete mix; Inspection & Testing of Concrete.

UNIT IV Special Concretes: Light weight concrete, Ready mix concrete, Vacuum concrete, Ferrocement, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Guniting, Rubble concrete, Resin concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete.

UNIT V

Advance Construction Materials & Admixtures : Use of fly ash in mortars, concrete, Fly ash bricks, stabilized mud blocks, non-erodible mud plinth, D.P.C. materials, Building materials made by Industrial & agricultural waste, clay products P.V.C. materials .Admixtures – Types & Properties

Text Books:

1. Varshney RS; Concrete Technology; Oxfored & IBH publishing co.
2. Gambhir ML; Concrete Technology – TMH
3. Sinha SN; Reinforced Concrete Technology; TMH
4. Properties of Concrete - A.M. Neville - Pearson Education

Reference Books:

1. New Building Materials Published by B.M.T.P.C., New Delhi
2. Hand books on Materials & Technology - Published by BMTPC & HUDCO
3. Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction
4. Jackson N; Civil Engineering materials.

List of Practical's:

1. Determination of fineness of cement.
2. Determination of consistency of cement, initial and final setting time.
3. Determine soundness of cement.
4. Determine compressive strength of cement.
5. Determine compressive strength of concrete by mix design method.
6. Determine compressive strength of concrete by use of admixtures.
7. Determine tensile strength of concrete by split tensile test.
8. Determine workability of concrete by slump cone test.
9. Determine workability of concrete by compaction factor test.
10. Determine workability of concrete by Vee Bee Consistometer.
11. Non destructive test to determine compressive strength of concrete by rebound hammer test.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
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BTCE 403	**DCS**	**MECHANICS OF FLUID**	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 following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

1. To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.
2. To develop understanding about hydrostatic law, principle of buoyancy and stability of a floating body and application of mass, momentum and energy equation in fluid flow.
3. To imbibe basic laws and equations used for analysis of static and dynamic fluids.

Course Outcomes:

1. Understand the broad principles of fluid statics, kinematics and dynamics.
2. Understand definitions of the basic terms used in fluid mechanics.
3. Understand classifications of fluid flow.
4. Be able to apply the continuity, momentum and energy principles.
5. Be able to apply dimensional analysis.

Syllabus:

UNIT I

Introduction : Scope and Application of Fluid Mechanics : Physical Properties of Fluids: Density, Specific Weight, Specific Volume, Specific Gravity, Viscosity, Dynamic & Kinematic Viscosity, Newton's Law of Viscosity, Classification of Fluids, Compressibility, Cohesion, Adhesion, Surface Tension, Capillarity, Vapour Pressure.

Equilibrium of Fluids: Pressure at a Point, Pressure Variation, Barometer, Gauges, Manometers, Hydrostatic Forces, Equilibrium of Fluid in Motion, Floatation - Stability of Floating and Submerged Bodies, Fluid Masses subjected to Rotation.

UNIT II

Kinematics of Fluid Flow: Velocity field, classification of flows, Stream, Path & Streak Lines, Continuity Equation, Stream Function, Velocity Potential, Flow-nets.

Dynamics of Fluid Flow: Euler's Equations of Motion, Bernoulli's equation, Pitot tube, Prandtl Tube, Flow through Openings - Orifices, Mouth pieces etc., Flow through Notches Weirs, Empirical formulae.

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Bachelor of Technology (Civil Engineering)

SEMESTER IV

UNIT III

Dimensional Analysis & Model Study: Units and Dimensions, Dimensional Homogeneity, Buckingham-II-Theorem, Dimensionless Numbers, Principles of Similitude & Applications.

UNIT IV

Flow Through Pipes : Laminar Flow, Flow between Parallel Plates, Measurement of Viscosity, Reynold's experiment, Turbulent flow in Pipes, Solution of Pipe Flow Problems, Flow in Pipe Network- Hardy Cross Method, Losses in Pipes, Measurement of Pipe Flow - Orifice, Nozzle, Bend Meters, Rotameters. Concept of Water Hammer and Surges.

UNIT V

Flow Through Open Channels: Classification, Geometric Elements, Continuity, Energy and Momentum Equations, Pressure, Velocity Distributions, Uniform flow, Concept of Normal Depth, Chezy, Manning and other formulae. Best Hydraulic Sections, Specific Energy, Specific Force, Hydraulic Jump and its characteristics, Gradually Varied Flow, Surface Profiles, Dynamic Equations, Measurement of flow in Open Channels.

Text Books:

1. Nagaratnam S., Fluid Mechanics
2. Jain A.K., Fluid Mechanics, Khanna publication
3. Subramanyam K., Fluid Mechanics, McGraw Hill Education (India) Private Limited
4. Modi P.N.& S.M. Seth, Hydraulics & Fluid Mechanics, Standard Book House, New Delhi

Reference Books:

1. Chow V.T., Open Channel Hydraulics, The Blackburn Press
2. Rangaraju K.G., Flow Through Open Channels, Tata McGraw Hill, New Delhi.
3. Streeder V.L., Fluid Mechanics, Tata McGraw-Hill

List of Practical's:

1. To determine experimentally the metacentric height of a flat bottomed pontoon.
2. To study the flow of liquid through orifice meter.
3. To calibrate a venturimeter and to study the variation of coefficient of discharge with the Reynold's number.
4. To determine discharge by notches and weir.
5. To study different flow conditions and to obtain the Reynold's number in different flow conditions.
6. To study the variation of friction factor 'f' for turbulent flow in rough and smooth commercial pipes.
7. To study the working of Hydraulic Ram and determine the efficiency of the Hydraulic Ram.
8. To study the operation of Pelton Turbine and determine its efficiency.
9. To study the operation of Kaplan Turbine and determine its efficiency.
10. To study the operation of Francis Turbine and determine its efficiency.
11. To study the characteristics of Reciprocating pumps.
12. To measure the performance of a centrifugal pump and to study the characteristics of a centrifugal pump.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

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*
BTCE 404	**DCS**	**SURVEYING**	2	1	2	4	60	20	20	30	20

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

1. To understand the principles of land and hydrographic surveying
2. To know the application of surveying in civil engineering projects

Course Outcomes:

Students at the end of the course will be able to

1. Choose modern survey equipments to measure angles and distances
2. Extend the knowledge to other civil engineering field
3. Analyze and solve the problems related to survey

Syllabus:

UNIT I

Traversing: Theodolite, Field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrical leveling.

UNIT II

Trigonometric Leveling:

Introduction; Determination of the level of the top of an object,; Determination of the height of the object when the two instrument stations are not in the same vertical plane; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

UNIT III

Tachometry: Tachometric systems and principles, stadia system, uses of analytic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring.

UNIT IV

Curves: Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, vertical curves, setting out.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

UNIT V

Hydrographic Surveying: Soundings, methods of observations, computations and plotting. Principles of photographic surveying, aerial photography, tilt and height distortions, Remote sensing, simple equipments, elements of image interpretation, image-processing systems.

Text Books:

1. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
2. T.P. Kanetkar, Surveying & Levelling, Vol. I & II3. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH

Reference Books:

1. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
2. David Clark &Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co. London..
3. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi

List of Practical's:

1. Determination of elevation of various points with Dumpy Level by collimation plane method & rise and fall method.
2. Fixing bench mark with respect to temporary bench mark with Dumpy level by fly leveling & check leveling.
3. L section & Cross section of the road (one full size drawing sheet each for L-section & cross section).
4. Measurement of horizontal angles with the help of theodolite by method of repetition.
5. Measurement of vertical angles with theodolite.
6. Determination of horizontal distance between two inaccessible points with theodolite.
7. Locating given building by theodolite traversing (One full size drawing sheet).
8. Locating given building by plane table surveying (One full size drawing sheet).
9. Three point problem in plane table surveying.
10. Determination of elevation of point by trigonometric leveling.
11. Counter plan of given area (On full size drawing sheet).
12. Study of planimeter.
13. Determination of area of irregular figure by using planimeter.
14. To give layout for given plan of building.
15. Study of total station.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

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*
BTCE 405	**DCS**	**ENVIRONMENTAL ENGINEERING -I**	3	0	2	4	60	20	20	30	20

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

The course objective is to identify the sources and quantity of surface and ground water bodies and their demand for the public and also to study the quality of water and their treatment techniques.

Course Outcomes:

1. An insight into the structure of drinking water supply systems, including water transport, treatment and distribution.
2. An understanding of water quality criteria and standards, and their relation to public health,
3. The ability to design and evaluate water supply project alternatives on the basis of selection criteria

UNIT I

Introduction: Introduction to environment and its component. Importance of water, sources of water-surface and ground water sources. Water (prevention and control of pollution) Act – 1974.
Water Demand: Types of water demand, Domestic demand, Industrial demand, Fire Demand etc. Per capita demand, variations in demand, Design period. Factors affecting water consumption. Population forecasting.

UNIT II

Quality of Water: Characteristics of water, physical, chemical and biological characteristics. Types of microbes, Water borne diseases and their control. Indian standard for drinking water.
Transmission of Water: Intake structure, types and working, pipe materials (merits & demerits)-cast iron, vertically cast and spun pipes, mild steel pipes, asbestos cement, R.C.C and prestressed pipes, pipe joints- bell and spigot joint, double flanged joints, special joints, rubber gaskets and roll on joints, valves, Corrosion in pipes - Galvanic, Biological, Stress Corrosion, pumps and pumping station.

UNIT III

Treatment of Water: Various types of water treatment (Theory and Applications): Preliminary, secondary and tertiary. Screening: Course and Fine Screen, Design Criteria.

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Sedimentation : Sedimentation tank, types- rectangular and circular settling basins, upward and horizontal flows, detention period, over flow rate, inlet and outlet devices, baffles, Design criteria for sedimentation tank. Coagulation: Theory of coagulation, common coagulants, feeding devices, mixing device, flocculation tank, Dewatering and disposal of sludge.

UNIT IV

Filtration: Theory of filtration, description of slow sand and rapid sand gravity filters, their comparison and merits, media characteristics for filters, size and depth, filter gravel and under drains, negative head and other problems in filtration, back washing of filters.
Disinfection: Mechanisms of disinfection, factors affecting efficiency of disinfection, criteria for a good disinfectant. Chlorination, types of chlorination-plain chlorination, pre chlorination, post Chlorination, double chlorination, super chlorination, dechlorination, Break Point Chlorination, chlorine demand, Doses of chlorine, Determination of Residual Chlorine-O.T. & O.T.A. test, other methods of disinfection in brief ozone, U.V. rays, Iodine, Bromine, Chlorine dioxide. Aeration & Water Softening: Types of hardness, methods of removal

UNIT V

Distribution of Water: Introduction, Requirements of a good distribution system, Layouts of distribution networks, Components of distribution system, method of distribution, system of supply, Hardy cross methods for network analysis. Function and types of distribution reservoirs, stand Pipe, Storage capacity of service reservoir. Leak detection, its importance, methods of leak detection.

Text Books:

1. Water Supply Engineering by S.K. Garg, Khanna Publishing Co

Reference Books:

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi
3. Environmental Engineering by Peavy, H.S., Rowe D.R. and Techobanoglous, Mc Graw Hill, Book Company.
4. Manual of Water Supply and Water Treatment, Ministry of Urban Development, Govt.of India

List of Practical's:

1. To Study of sampling techniques for water.
2. To determine the pH value of given sample of water.
3. To determine the acidity of given sample of water.
4. To determine the alkalinity of given sample of water.
5. To determine turbidity in a given sample of water with the help of turbidity meter.
6. To determine the total hardness and calcium hardness in the given sample of water.
7. To determine the amount of chlorides in the given sample of water.
8. To determine the dissolved oxygen in the given sample of water.
9. To determine the total, dissolved, and suspended solids in the given sample of water.
10. To determine optimum dose of coagulant with the help of jar test apparatus.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
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BTCE 407	**DCS**	**ADVANCE FIELD SURVEY SYSTEMS**	0	0	2	1	0	0	0	30	20

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 field of geodesy, coordinate systems, Map projections, GPS, its working principles, data collection, data processing and analysis

List of Practical's:

1. Electronic Distance Measurement and instruments.
2. Total Station – Parts of a Total Station – Accessories –Advantages and Applications
3. Field Procedure for total station survey
4. Errors in Total Station Survey
5. Global Positioning Systems- Segments
6. GPS measurements, errors and biases
7. Surveying with GPS

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