Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER IV

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*				
BTM A 301	BS	APPLIED MATHEMATICS-III	60	20	20	0	0	3	1	0	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

To introduce the students with the Fundamentals of the Calculus of the Complex Variable, Random Variable and Fourier analysis.

Course Outcomes:

After the successful completion of this course students will be able to

1. Understand and apply the basics of the Calculus of the Complex variables.
2. Know the fundamentals of the Probability Theory and Random Process.
3. Apply the concepts of the Fourier Analysis
4. Know the techniques of the Fourier Transform.
5. Find the solution of the PDE

Syllabus:

UNIT I

Complex Analysis: Complex numbers, geometric representation, powers and roots of complex numbers. Functions of a complex variable: Limit, Continuity, Differentiability, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Harmonic conjugates. Elementary Analytic functions (polynomials, exponential function, trigonometric functions), Complex integration, Cauchy's integral theorem, Cauchy's integral formula. Taylor series and Laurent series. Zeros, Singularities and its classifications, Residues, Residue theorem and its applications.

UNIT II

Probability Theory and Random Process : Axiomatic construction of the theory of probability, independence, conditional probability, and basic formulae, random variables, binomial, poisson and normal random variable, probability distributions, functions of random variables; mathematical expectations, Definition and Classification of random processes, discrete-time Markov chains, Poisson process, Correlation and Regression; Expectation and Variance

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UNIT III

Fourier series: Fourier Integral, Fourier series of 2p periodic functions, Fourier series of odd and even functions, Half-range series, Convergence of Fourier series, Gibb's phenomenon, Differentiation and Integration of Fourier series, Complex form of Fourier series.

UNIT IV

Fourier Transformation: Fourier Integral Theorem, Fourier Transforms, Properties of Fourier Transform, Convolution and its physical interpretation, Statement of Fubini's theorem, Convolution theorems, Inversion theorem

UNIT V

Partial Differential Equations: Introduction to PDEs, basic concepts, Linear and non-linear first order PDE, Higher order linear homogeneous PDE, Separation of variable and its application to the one dimensional wave and heat equation.

Text Books:

1. R. V. Churchill and J. W. Brown, Complex Variables and Applications, 5th Edition, McGraw-Hill, 1990.
2. K. Sankara Rao, Introduction to Partial Differential Equations, 2nd Edition, 2005.
3. G. R. Grimmett and D. R. Stirzaker, Probability and Random Processes, Oxford University Press, 2001.
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2000.
5. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edition, Wiley, 1968.
6. K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, Prentice Hall of India, 1998.
7. Papoulis and S. Unnikrishna Pillai, Probabilities, Random Variables and Stochastic Processes, 4th Edition, Tata McGraw-Hill, 2002.
8. S.M. Ross, Stochastic Processes, 2nd Edition, Wiley, 1996.
9. J. Medhi, Stochastic Processes, New Age International, 1994.
10. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi

Reference Books:

1. J. H. Mathews and R. W. Howell, Complex Analysis for Mathematics and Engineering, 3rd Edition, Narosa, 1998.
2. N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1957.
3. E. Kreyszig, Advanced Engineering Mathematics, 5th / 8th Edition, Wiley Eastern / John Wiley, 1983/1999

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 401	DCS	STRUCTURAL MECHANICS	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 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.
Shells and pressure vessels: thin walled cylindrical and spherical pressure vessels under internal and external redial pressure. Wire wound thin tubes

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 Application to Beams Curved in Plain.
Springs: closed coiled and open coiled helical springs. Stress in the spring materials. Stiffness of springs, spring subjected to axial loads and couples. Grouping of springs.

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, Introduction to Beam-Column behaviour and Column with Lateral Loads.

UNIT V

Basics of Mechanical Vibration: Signal degree of freedom system: Free & Forced vibration, Linear viscous damper, Coulomb Damper, response Harmonic Excitation Rotation Unbalance & support Excitation, Vibration isolation and Transmissibility. Single Degree of freedom system as vibrometer and accelerometer.

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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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 402	**DCS**	**CONCRETE TECHNOLOGY & ADVANCED CONSTRUCTION MATERIAL**	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

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.

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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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 403	**DCS**	**FLUID MECHANICS**	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

The candidate will be able to understand the behaviour of fluid in rest and motion with the concepts of fluid static, kinematic and dynamic.. Basic concepts of model study are also developed along with laws of similarity and similitude's. Further the concepts of pipe flow & free surface flow are developed and the student will be able to analysed different pipe flow and open channel flow systems.

Course Outcomes:

To familiarize with the properties of fluids and the applications of fluid mechanics

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, Free and Forced Vortices.

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.

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,

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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. Introduction to Turbines & Pumps.

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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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 404	**DCS**	**SURVEYING**	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 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

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 lemniscate, vertical curves, setting out.

UNIT III

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

UNIT IV

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.

UNIT V

Control Surveys: Providing frame work of control points, triangulation principle, co naissance, selection and marking of stations, angle measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.

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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.