



G. H. Raisoni College of Engineering and Management, Pune



An Autonomous Institute Affiliated to Savitribai Phule Pune University
(NAAC ACCREDITED)

CIVIL ENGINEERING DEPARTMENT

Curriculum Structure & Detailed Syllabus (UG Program)

Second Year B.Tech.

(Effective from: Academic Year 2017-2018)



G. H. Rasoni College of Engineering and Management, Pune



College Vision and Mission

VISION:

To achieve excellent standards of quality education by keeping pace with rapidly changing technologies and to create technical manpower of global standards with capabilities of accepting new challenges.

MISSION:

Our efforts are dedicated to impart quality and value based education to raise satisfaction level of all stakeholders. Our strength is directed to create competent Professionals. Our endeavor is to provide all possible support to promote research & development activities.



G. H. Raisoni College of Engineering and Management, Pune



Vision and Mission of Civil Engineering Department

VISION:

To create globally competent technical manpower in dynamic changing world of civil engineering with self-learning & lifelong learning attributes to meet challenges by adopting changing technology

MISSION:

To impart quality education and knowledge which help in

- Meeting the requirements of the society by developing sustainable solutions and environment friendly systems
- Carrying out research and development to meet new challenges in the field of civil engineering.



G. H. Raisoni College of Engineering and Management, Pune



Programme Educational Objectives (PEO):

- I. Lead successful career in multiple sector of engineering industry and / or higher studies by acquiring knowledge in mathematical, scientific and engineering fundamentals.
- II. Analyze and design Civil Engineering systems with social awareness and responsibility.
- III. Exhibit professionalism, ethical approach, communication skills, team work in their profession and adapt to modern trends by engaging in lifelong learning.

Programme Outcomes (PO):

- a. Apply knowledge of mathematics, basic science and engineering skills to civil Engineering problems
- b. Identify, formulate and research literature and solve analytically complex civil Engineering problems.
- c. Analyze and design various structures or particular system that meets desired specifications and Requirements.
- d. Design and conduct experiments, interpret and analyze data, synthesize the Information to provide conclusion.
- e. Conduct investigations of problems, locate, search and select relevant data from datasheets and literature to provide valid conclusions.
- f. Elect and use appropriate engineering techniques and software tools to analyze civil Engineering problems with understanding of limitations.
- g. Able to understand the impact of engineering solutions on society and demonstrate the knowledge of, and need for sustainable development.

- h. Demonstrate their professional and ethical responsibilities.
- i. Communicate effectively in both verbal and written forms.

- j. Understand engineering and management principles and apply to their work as a Member and/ or leader in a team to manage projects.

- k. Adapt transform in industry by understanding the need of independent and lifelong Learning.

Program Specific Outcome (For Under Graduation)

On successful completion, Civil Engineering graduates will be able to:

1. Judicially interpret, analyze and apply different standards/Code used in professional civil engineering with special reference to Indian Standards, Indian Road Congress, and Environmental Standards etc.
2. Project planning techniques with special reference to Civil Engineering project from planning, costing/billing, tendering, design, execution, and completion stages.
3. To use various civil engineering computer tools/software for better productivity optimized Civil Engineering System as whole.

Program Specific Outcome (For Post-Graduation)

On successful completion, program in Structural Engineering of Civil Engineering post graduate will be able to:

1. Basic principles and advanced course of technology in field of Structural Engineering so as to formulate analyze and solve structural projects.
2. To act as stepping stone for research work in field of Structural Engineering.
3. To prepare students to adopt the latest software tool available in field of Structural Engineering With proper knowledge of limitations.



G. H. Raisoni College of Engineering and Management, Pune



Department of Civil Engineering

The department of Civil Engineering provides state of the art designing, analyzing and estimating facilities to the students and also promotes active industry-institute collaboration by identifying areas of interest and taking part in sponsored research projects. Some of the major research areas, on which the faculty members and students working are Design, Consulting, Execution, Surveying, Analysis, Estimation and management of Construction site. The following facilities are provided to encourage the students into research & development:

Various UG Laboratories such as

1. Environmental Engineering Lab
2. Strength of Materials Lab
3. Geotechnical Engineering Lab
4. Concrete Technology Lab
5. Engineering Geology Lab
6. Surveying Lab
7. Fluid Mechanics Lab
8. Transportation Engineering Lab
9. UG Computer Lab
10. Engineering Mechanics Lab

Various Civil PG Laboratories Such as

1. PG Lab-1 (Civil Engg.)
2. Research Lab-1 (Civil Engg)

U.G. Structure
(S.Y. to B. Tech)
Effective from Academic Year 2017-2018

Scheme of Examination for S. Y. B. Tech														
Branch- Civil Engineering														
Semester- III														
Subject code	Subject Name	Teaching scheme (Weekly Load in hrs)				Credits	Evaluation Scheme						ESE Duration (Hrs)	
		Lecture	Tutorial	Practical	Total		Theory			Practical		Total		
							TAE 20 %	CAE 20 %	ESE 60%	Cont Ass	Ext.			
											PR			OR
BCVAML201	Engg. Mathematics-III	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVL201	Building Const & Materials	3	-	-	3	3	20	20	60	-	-	-	100	3
BCVL202	Strength of Materials	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVP202	Strength of Materials Lab	-	-	2	2	1	-	-	-	-	-	50	50	-
BCVL203	Geotechnical Engg-I	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVP203	Geotechnical Engg-I Lab	-	-	2	2	1	-	-	-	50	-	-	50	-
BCVL204	Fluid Mechanics I	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVP204	Fluid Mechanics I Lab	-	-	2	2	1	-	-	-	-	-	50	50	-
BCVL205	Water Resources-I	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVGP201	GENERAL PROFICIENCY:-I Foreign Language	1	-	2	3	Audit course								
	Total	19	5	8	32	26	120	120	360	50	-	100	750	-

Scheme of Examination for S. Y. B.Tech														
Branch- Civil Engineering														
Semester- IV														
Subject code	Subject Name	Teaching scheme (Weekly Load in hrs)				Credits	Evaluation Scheme							ESE Duration (Hrs)
		Lecture	Tutorial	Practical	Total		Theory			Practical		Total		
							TAE 20 %	CAE 20 %	ESE 60%	Cont Ass	Ext.			
											PR		OR	
BCVL206	Concrete Technology	3	-	-	3	3	20	20	60	-	-	-	100	3
BCVP206	Concrete Technology Lab	-	-	2	2	1	-	-	-	-	-	25	25	
BCVL207	Surveying	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVP207	Surveying Lab	-	-	2	2	1	-	-	-	-	50	-	50	-
BCVL208	Computer Application in Civil Engg	1	1	-	2	2	10	10	30	-	-	-	50	2
BCVP208	Computer Application in Civil Engg Lab	-	-	2	2	1	-	-	-	25	-	-	25	-
BCVL209	Fluid Mechanics-II	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVP209	Fluid Mechanics-II Lab	-	-	2	2	1	-	-	-	25	-	-	25	-
BCVL210	Geotechnical Engg-II	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVP210	Geotechnical Engg-II Lab	-	-	2	2	1	-	-	-	-	-	25	25	
BCVL211	Structural Analysis-I	3	1	-	4	4	20	20	60	-	-	-	100	3
BCVGP202	GENERAL PROFICIENCY:-II : Hobby Classes	1	-	2	3	Audit course	-	-	-	-	-	-	-	
	Total	17	5	12	34	26	110	110	330	50	50	50	700	-

Semester –III

BCVAML201:ENGINEERING MATHEMATICS III

Teaching Scheme: Lectures:-3Hrs/Week Tutorials:-1Hr/Week Practical: NIL	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme (Laboratory) Cont asses(TW):NIL External(OR):NIL External(PR):NIL
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Credit	4	
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Prerequisites: Differential and Integral Calculus, Taylor series and Infinite series, Differential equations of first order and first degree, Fourier series.

Course Objective:

- 1.Learning Linear differential equation and their applications in civil engineering
- 2.Learning calculus of variation and its relevance in engineering
- 3.Learning partial differential equation and their applications in civil engineering
4. Introduction to optimization method.
5. Numerical solution of ordinary differential equation with various methods.

Course Outcome: Student shall be able to

1. Solve higher order linear differential equations and apply to civil engineering problems such as bending of beams and whirling of shafts.
2. Understand basic facts of mathematics about the field of analysis of any Engineering problem.
3. Solve partial differential equations such as one and two dimensional wave equation
4. Apply basic concepts of optimization to solve engineering Problem
5. Solve system of linear equations using direct and iterative numerical techniques and develop solutions to ordinary differential equations using single step and multistep methods applied to structural systems
6. Know the standard ways in which the problem can be approached.

Course Contents	Hrs
Unit – I:	
Linear Differential Equations (LDE) and Applications: LDE of n^{th} order with constant coefficients, Method of variation of parameters, Cauchy's & Legendre's Differential Equations, Simultaneous & Symmetric simultaneous Differential Equations. Modeling of problems on bending of beams, whirling of shafts and mass springs systems	10
Unit-II	
Calculus of variations : Maxima and minima off uncton, variation and its properties, Euler's equation ,functional dependenton1 stand2nd order derivatives, The Rayleigh -Ritz method, simple application	08
Unit – III	
Partial Differential Equation: Partial Differential Equation of 1st order 1st degree i. e Langrange's form, Linear homogeneous p. d. equation of nth order with constant coefficient method of separation of variables. Application to simple problems of variation of strings and beams, elementary concept of double Fourier series and their application to simple problems of vibration of rectangular membrane	08
Unit – IV	08
Introduction to Optimization Techniques: Linear programming, mathematical model formulation, Solutions by Graphical & Simplex method.	
Unit –V	10
Numerical Methods (Equations): Errors of numerical calculation, Errors in series approximation, rounding of errors solutions of algebraic and transcendental equations. Iteration method, Bisection method, False position method, Newton - Raphsons method and their convergences, solution of system of linear equations, Gauss elimination method, gauss Jordan method, gauss Seidel method, Crouts method and relaxation method,	
Unit – VI	10
Numerical Methods (Differential Equations): Numerical solution of ordinary differential equation by Taylor series method, Picard's method, Euler modified	

method, Runga – Kutta method, Milne’s Predictor corrector method.	
Text Books:	
1. Numerical Methods in Engineering and Science, Grewal B.S.; (Sixth Edition); Khanna Publishers ; 2002	
2. Advanced Engineering Mathematics by Kreyszig	
Reference Books:	
1. Numerical methods for scientific and engineering Computations Jain, M.K., Iyengar S.R.K. ,and Jain, R.K .. (Second Edition); Wiley Eastern Ltd ;1990	
2. Introductory methods of numerical analysis by S.S. Sastri	
Web Links	
1. http://nptel.ac.in/course.php	
2. http://mathworld.wolfram.com/	

BCVL201: Building Construction & Materials		
Teaching Scheme: Lectures:- 3Hrs/Week Tutorials:- NIL Practical: NIL	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme (Laboratory) Cont asses : - NIL External(OR): NIL External(PR): NIL
Credit	3	
Prerequisite (If any):		
Course Objective:		
1. To understand the concept of sub-structure and super- structure.		
2. To know the different types of building, elements of building and material widely used in building construction.		
3. To design and execute the infrastructure projects as per specifications.		
Course Outcome: Student shall be able to		
1. Student Should Understand substructure		
2. To get knowledge of arches, damp proofing and types of floor		
3. Use the knowledge of various construction materials, process and types of building.		
4. Use the knowledge of various construction materials like brick, stone, lime and their uses		
5. Use the knowledge of construction materials like wood ,plastic, glass and their uses		
6. Student Should Understand substructure		
Course Contents :		Hrs
Unit – I :		07
Foundations: Necessity and types of foundation, Details shallow foundations. Bearing capacity of soils and its assessment. Preemptive bearing capacity values from codes. Loads on foundation, Causes of failures of foundation and remedial measures, Foundation on black cotton soils Setting out foundation trenches, excavation, timbering of foundation trenches. Load bearing and framed structures. Brickwork: Qualities of good bricks. Terms used in brickwork, commonly used types of bonds in brickwork, principles of construction. Reinforced brickwork, Parapets, coping, sills and corbels, introduction to cavity walls, load bearing and		

<p>partition walls. Masonry construction using cement concrete blocks and clay walls, load bearing and partition walls.</p> <p>Stone Work: Stone masonry, principles of construction, and joints in masonry. Lifting heavy stones.</p>	
<p>Unit – II :</p> <p>Arches and Lintels: Terminology in contraction, type’s chajjas and canopies, pre cast Lintels & Arches.</p> <p>Damp Proofing: Causes and effect of dampness .Various methods of damp proofing Damp proofing in plinth protection, New Techniques of damp proofing , Epoxy etc.</p> <p>Floors And Roofs: General principle , types and method of construction upper floors finishing quality. Flat and pitches roofs, types and their construction features.</p> <p>Stairs: Types of stairs , functional design of stairs.</p>	07
<p>Unit – III :</p> <p>Doors and Windows: Purpose, materials of construction and types.</p> <p>Plastering and Pointing: Necessity, types and methods.</p> <p>Temporary Timbering: Centering and formwork shoring, underpinning and scaffolding.</p> <p>Painting: White washing, colour washing and distempering new materials & Techniques.</p>	07
<p>Unit – IV :</p> <p>Building stones : Introduction, requirement of good building stones, testing of stones, quarrying of stones, dressing of stones, artificial stones, common building stones in India</p> <p>Brick & clay products: Introduction, Brick earth, manufacturing of clay bricks, properties of burnt bricks, new trends in brick, manufacturing building tiles.</p> <p>Lime: Classification of lime, field slaking of lime, preparation of putty, properties of lime, use of lime of construction.</p>	07

Unit – V :	
<p>Timber & Wood based Product: Introduction, sources of timber, identification of timber felling & conversion, moisture in timber, defects in timber, decay of timber. .Different type of timber used in building construction, wood base product such as plywood, particle board, veneer, sunmica and their manufacturing process.</p> <p>Plastics: Classification, advantages, properties, modern development in plastics.</p> <p>Glass: Ingredients, properties, types of glass, selection of glass, glass fibre.</p> <p>Asphalt and Bitumen: IRC specification, physical properties & its use in construction.</p>	07
Unit – VI :	
<p>Flooring and other tiles : Types, Shahabad, Kotta, Granite, Glazed and Unglazed, ceramic tiles, Plain cement, Mosaic tile, manufacturing process of tiles, cutting and polishing of natural stones used.</p> <p>AC sheets : Corrugated & plain</p> <p>Water proofing material & its uses, termite proofing and fire resisting materials.</p>	07
Text Books	
1. Building Construction Dr. B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, 5th Edition, Laxmi Publications (p) LTD, New Delhi, 1993	
2. Building Materials by S.V.Deodhar, Khanna Publication	
Reference Books:	
1. S. C. Rangwala, Building Construction, 30 th Edition, Charotar Publishing House, 2011	
2. Gurcharan Singh, Building Construction & Material, 14 th Edition, Standard Book House, Rajsons Publication Pvt.LTD, 2011.	

BCVL 202:Strength of Materials		
Teaching Scheme: Lectures: 03Hr/Week Tutorials: 01Hr/Week Practical: 02Hr/Week	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme(Laboratory) Cont Ass.(TW): -NIL External(OR):-50 Marks External(PR):NIL
Credit	4	1
Prerequisite (If any):		
Course Objective:		
<ol style="list-style-type: none"> 1. To study the various mechanical properties of materials. 2. To provide systematic methods for solving engineering problems in solid mechanics. 3. To use the fundamental concepts of stress, strain and elastic behavior of materials. 		
Course Outcome: Student shall be able to		
<ol style="list-style-type: none"> 1. Understand various mechanical properties of materials. 2. Understand concept of Axial Force, Shear Force & Bending Moment Diagrams. 3. Understand the nature of stresses in beam. 4. Understand concept of torsion. 5. Understand concepts of deflection of beam by derivation of differential equation. 6. Understand the state of stresses in two dimensions. 		
Course Contents		Hrs
Unit I		08
<p>Mechanical Properties and Uniaxial Problems: Types of force distribution, Concept of stress and strain, Stress strain behavior of ductile and brittle material in uniaxial state of stress. Elastic, Plastic and strain hardened zones stress - strain relations, Elastic constants, Relation between elastic constants.</p> <p>Uniaxial loading and deformation of simple cases of statically indeterminate problems under axial loading.</p> <p>Thin walled pressure vessel, Cylindrical and spherical subjected to internal pressure.</p>		
Unit II :		09
<p>Axial Force, Shear Force & Bending Moment Diagrams: Concept of free body diagram, Types of loads, Determination of axial forces and Bending moment at a section, Axial forces SF and BM diagram in beams and simple frames, Differential relation between</p>		

shear force and bending moment, Relation between load and shear force.	
Unit III :	09
Stresses in Beam: Bending stresses in simple beam, Assumptions and derivation of simple bending, Theory relation between bending moment, Bending stress and curvature. Homogeneous and composite beams. Shear stresses in simple beams, Shear flow and shear stress distribution, Shear Stress in composite beams. Combined effect of bending and axial force.	
Unit IV	09
Torsion of Shafts: Torsion of circular sections, Assumptions and derivation of relations between torsional moment, Shear stresses and angle of twist. Torsional stress in solid and Circular sections, Torsion in thin walled hollow section, Closely coiled helical springs. Leaf spring.	
Unit V	08
Deflection of Beam: Derivation of differential equation of moment curvature relation, Differential equation relating deflection and moment shear and load, Deflection of simple beams by integration.	
Unit VI	09
State of Stress In Two Dimensions: State of stress in two dimensions, Differential equation of equilibrium, Transformation of stresses, Principal stresses, Maximum shear stresses, Mohr's circle, Combined bending and torsion, Combined effect of Torsion and Shear. Shear flow in thin walled sections, concept of shear center of thin walled section, Unsymmetrical bending.	
Text Books:	
1. Mechanics of Structures Vol. II by S. B. Junnarkar and Dr. H. J. Shah, Twenty second edition, Charotar Publishing House Pvt Ltd.	
2. Strength of Materials by D. Ghosh A. K. Datta, New Age International Publishers	
Reference Books:	
1. Elements of Strength of Materials by Timoshenko and Young, East-West Press Ltd	
2. Strength of Materials by F.L. Singer and Andrew Pyte, Harper and Row Publication	

BCVP (202): Strength of Materials Lab
List of Practical's(Any Ten from the following list)
1. To determine the tensile strength of different metals.
2. To determine the Hardness of different metals
3. To determine Impact strength of different metals by Izod Impact Test
4. To determine Impact strength of different metals by charpy Impact test
5. To determine the shear strengths of different metals
6. To determine the stiffness and modulus of rigidity of the spring
7. To determine the flexural strength of wooden and concrete beams
8. To determine the Torsional strength of different metals
9. To determine the compressive strength of concrete
10. To determine the transverse strength of flooring tiles
11. To determine the compressive strength of wet and dry of Brick
12. To determine the compressive strength of wooden block(Parallel & Perpendicular to the grains)
13. To find the values of bending stress and young modulus elasticity of simple supported beam of carrying concentrated load in centre

BCVL 203: GEOTECHNICAL ENGINEERING I		
Teaching Scheme: Lectures:- 3Hrs/Week Tutorials: 1Hrs/Week Practical: 2Hrs/Week	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme (Laboratory) Cont asses : - 50 Marks External(OR): NIL External(PR): NIL
Credit	4	1
Prerequisite : Applied Mathematics II		
Course Objective:		
<ol style="list-style-type: none"> 1. To provide basic knowledge for determining various soil parameters. 2. To understand stress characteristics and their distribution in soil. 3. To determine the various engineering properties and their impact on the design and construction of various civil engineering structure. 		
Course Outcome: Student shall be able to		
<ol style="list-style-type: none"> 1. Understand the nature and types of soil. 2. Understand various index properties of soil. 3. Understand the permeability of soil and seepage pressure 4. Understand the compaction property of soil and various stresses and their distribution in soil 5. Understand the shear strength of soil and their determination 6. Compute the earth pressure on earth retaining structures and slope stability analysis. 		
Course Contents :		Hrs
Unit – I :		08
Soil Formation : Formation of soil, residual & transported soils, generally used in practice such as sand, gravel, organic silt, clay, Bentonite, black cotton soil etc., major soil deposit of India, field identification of soil, soil minerology Phases of Soil : Various soil weight & volume inter relationship, three phase relations, Physical Properties of soil.		
Unit – II :		09

<p>Physical Properties : Specific gravity, water content, shape and size, grain size distribution curves, relative density, in situ density, consistency of soils, soil classification system-IS and Unified System</p>	
<p>Unit – III</p>	
<p>Permeability: Soil water, permeability definition and necessity of its study, Darcy’s law, factors affecting permeability. Laboratory measurement of permeability – Constant head method and Falling head method as per IS 2720. Permeability of stratified soil deposits.</p> <p>Seepage: Seepage and Seepage Pressure, quick sand phenomenon, critical hydraulic gradient, General flow equation for 2-D flow (Laplace equation), Flow Net, properties and application, Flow Net construction for flow under sheet pile and earthen dam.</p>	09
<p>Unit – IV :</p>	
<p>Compaction- Introduction, compaction tests- Standard Proctor test, Modified Proctor test, Zero air void line. Factors affecting compaction. Effect of compaction on soil properties. Field compaction methods and compaction equipment’s for different types of soil, Placement water content, Proctor needle in field compaction control.</p> <p>Stress Distribution in Soils: Geostatic stress, Boussinesq’s theory with assumptions for point load and circular load (with numerical), Pressure Distribution diagram on a horizontal and vertical plane, Pressure bulb and its significance. Westergaard’s theory, equivalent point load method, Approximate stress distribution method</p>	08
<p>Unit – V :</p>	
<p>Shear Strength: Introduction- Shear strength an Engineering Property. Mohr’s stress circle, Mohr-Coulomb failure theory. Measurement of Shear Strength- Direct Shear test, Triaxial Compression test, Unconfined Compression test, Vane Shear test. Their suitability for different types of soils, advantages and disadvantages. Different drainage conditions for shear tests. Sensitivity and thixotropy of cohesive soils.</p>	09

Unit – VI :	
<p>Earth Pressure- Introduction, Rankine’s state of Plastic Equilibrium in soils- Active and Passive states due to wall movement, Earth Pressure at rest. Rankine’s Theory- Earth pressure on Retaining wall due to submerged backfill, Backfill with uniform surcharge, backfill with sloping surface, layered backfill. Coulomb’s Wedge theory. Rebhann’s and Culmann’s graphical method of determination of earth pressure.</p> <p>Stability of Slopes- Classification of slopes and their modes of failure, Taylor’s stability number, Infinite Slopes in cohesive and cohesion less soil, Landslides- Causes and remedial measures.</p>	09
Text Books:	
<ol style="list-style-type: none"> 1. Soil Mechanics and Foundation Engineering by Dr. B. C. Punmia, Laxmi Publications 2. Geotechnical Engineering by Shashi K. Gulati & Manoj Datta, Tata McGraw Hill 	
Reference Books:	
<ol style="list-style-type: none"> 1. Principles of Geotechnical Engineering—BrajM.Das—Cengage Learning 2. Geotechnical Engineering – Principles & Practices by Donald. P. Coduto, Pearson Education 3. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R.Rao, Newage International 4. Physical and Geotechnical Properties of Soils by Joseph.E.Bowles, International Students Edition 	

BCVP (203) : GEOTECHNICAL ENGINEERING I	
I.	The term work shall consist of a journal giving details of at least 10 out of 12 of the following experiments
1.	Determination of Moisture content of given soil sample.
2.	Determination of Specific gravity of soil
3.	Grain size Analysis. (Sieve Analysis)
4.	Determination of Liquid Limits, Plastic Limit and Shrinkage Limit of given soil sample
5.	Determination of permeability by constant and falling head method
6.	Standard Proctors test/ Modified Proctors test
7.	Determination of Field Density by a) Core Cutter and b) Sand replacement method
8.	Unconfined compression test
9.	Direct shear test.
10.	Laboratory Vane Shear Test
11.	Triaxial test
12.	Open Ended Experiment
II.	Collection of soil sample from any construction project and write report about interpretation of index properties of soil.

BCVL204 Fluid Mechanics- I		
Teaching Scheme: Lectures: 4 Hrs/Week Tutorial: 1 Hrs/Week Practical:4Hrs/Week	Examination Scheme (Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme(Laboratory) Cont. Ass : NIL External(OR):50Marks External(PR):NIL
Credit	4	1
Prerequisite (If any):		
1. Engg Mechanics		
Course Objective:		
1. To study the basic behavior of fluids and fluid system and the laws governing this behavior		
2. To understand and apply the basic concepts Mechanics to carry out professional engineering activities in the field of fluids.		
3. To apply scientific strategies to analyze qualitatively and quantitatively the problems and give solutions.		
Course Outcome: Student shall be able to		
1. Understand various properties of fluid and its behavior.		
2. Apply concept of fluid. Mechanics in real world problems.		
3. Study the concept of fluid static		
4. Understand the fluid dynamics		
5. Student will get knowledge of Dimensional Analysis		
6. Analysis of laminar and turbulent flow		
Course Contents		Hrs
Unit – I :		8
Properties of Fluids Introduction: Definition of Fluid, diff between fluid, Liquid and Gas, Physical properties of fluids, Rheology of liquids.		
Unit – II :		10
Kinematics of Fluid flow, Types of fluid flows: Velocity, acceleration of fluid and their components and different coordinate system, Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flow compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical		

and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential, source, sink, doublet and half-body.)	
Unit – III :	8
Fluid Static Hydrostatic basic equation, Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.	
Unit – IV :	8
Dynamics of Fluid Flow : Euler’s equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer, notches and weirs, momentum equation and its application to pipe bend.	
Unit – V :	10
Dimensional Analysis and Hydraulic Dimensional analysis buckingum Pi theorem important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies	
Unit – VI :	10
Laminar and Turbulent Flow: Equation of motion for laminar flow through pipes stokes law transition from laminar to turbulent flow types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement to turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks.(Hardy-cross only)	
Text Books: (Book Title, Name of the author, name of the Publisher, edition, year of publication)	
1. Hydraulics and Fluid Mechanics, Modi, P.N. and S.M. Seth, Standard Book House, Delhi	
2. Fluid Mechanics and Hydraulic Machine, R K Bansal, Lakshmi Publication, Delhi	
Reference Books:	
1. Introduction of in id mechanics & Fluid Machines, Som S.K. & Biswas G, , 2nd Edition, TMH, 2000	

2. Fluid Mechanics through Problems, Garde, R.J, , 2nd Edition, New Age International Pvt. Ltd, New Delhi, 2005

BCVP (204) : Fluid Mechanics- I

List of Practical (Any 10 may be performed)

1. To verify Bernoulli's theorem
2. To determine coefficient of discharge of Venturimeter.
3. To determine coefficient of discharge of Orifice meter
4. To determine coefficient of discharge of Rectangular Notch
5. To determine coefficient of discharge of Triangular Notch
6. To determine coefficient of discharge, contraction & velocity of an orifice
7. To verify momentum equation using the experimental set-up on diffusion of submerged air jet
8. To determine friction factor for pipes of different size.
9. To find a critical Reynolds number for a pipe flow.
10. To determine the Metacentric height of a floating body.
11. To determine flow rate using Rotameter.
12. To determine pressure head of water in pipe line by use of piezometer tube.
13. To determine pressure head of water in pipe line by use of U tube.

BCVL205: Water Resources Engineering -I		
Teaching Scheme: Lectures: 3Hrs/Week Tutorials: 1Hr/Week Practical: NIL	Examination Scheme (Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme(Laboratory) Internal(TW): NIL External(OR): NIL External(PR) : NIL
Credit	3	1
Prerequisite(If any):		
Course Objective:		
1. To study the different hydrological parameters.		
2. To understand hydrological statistics and design.		
3. To characterize and mitigate natural and man-made hazards		
Course Outcome: Student shall be able to		
1. Understand different terminology of hydrology.		
2. Student should get the knowledge Infiltration, Evaporation, Transpiration		
3. Understand different terminology runoff, discharge and hydrograph		
4. Student should get the knowledge analyzing the hydrological data		
5. To understand the concepts of geohydrology		
6. Student should learn about ground water hydrology		
Course Contents		Hrs
Unit – I :		07
Introduction. Introduction to Hydrology, Computation of Mean Rainfall by Different methods. Importance of temperature, wind and humidity in hydrology. Earth and its atmosphere and importance.		
Precipitation: Definition and classifications. Selection of site, density and Adequacy of rain-gauge station.		
Unit – II :		07
Infiltration: Definition, mechanism, factors affecting, numerical.		
Evaporation: Definition, mechanism, factors affecting, methods of measurement, numerical.		
Transpiration: Definition, mechanism, factors affecting.numerical.		
Unit – III :		07
Run off: Source components of runoff, classification of streams, factors affecting.		

Estimation of discharge and Measurement methods, numerical, River Gauging – Various methods Hydro graphs: Introduction: unit hydrographs. Base flow and base flow separation, S-Curve theories Numerical	
Unit – IV	07
Statistical methods: Statistics in hydrological analysis. Probability and probability distribution. Analysis of time series, frequency analysis, numerical. Floods: Causes and effects, factors affecting Flood routing and flood forecasting, numerical	
Unit – V	07
Geohydrology: Introduction: occurrence and distribution, Ground water exploration techniques, Introduction to hydraulics of well, Numerical. Ground water quality, geomorphic and geologic control, Ground water province of India	
Unit VI	07
Ground water recharge: Introduction. Recharging methods, spreading methods. Recharge through rain water harvesting. Project planning for water resources Introduction: Water resource planning	
Text Books:	
1. Text book of hydrology , Dr. P. Jaya and Rami Reddy, , 3 rd Edition, Laxmi Publication, 2007	
2. Irrigation, Water Resources and water power engineering- P. N. Modi , Standard Book House.	
3. Engineering hydrology – K. Subramanyam Tata McGraw Hill.	
Reference Books:	
1. K. Subramanya, Engineering hydrology, 3 rd Edition, McGraw Hill, 2008	
2. R. K. Sharma and T. K. Sharma, Text book of hydrology and water resource engineering, 5 th Edition, Dhanpat Rai Publications, 2007	

Semester-IV

BCVL206:Concrete Technology		
Teaching Scheme: Lectures: 03Hr/Week Tutorials: -NIL Practical: 02 Hr/Week	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme(Laboratory) Cont Ass.(TW): -NIL External(OR):-25 Marks External(PR):NIL
Credit	3	1
Prerequisite(If any):		
Course Objective:		
1. To understand the properties of concrete ingredients.		
2. To study the compressive, flexural, split strengths etc and other non-destructive tests.		
Course Outcome: Student shall be able to		
1. Use the knowledge of various constituents of cement and manufacturing process of cement.		
2. To study behavior of concrete at its fresh state & types of concrete mixes		
3. To study the compressive, flexural, split strengths etc. & other non-destructive tests		
4. Study various types of concrete admixtures		
5. To know properties of various ingredients of concrete & concept of mix design		
6. To explain deterioration of concrete & study methods of repair		
Course Contents		Hrs
Unit – I :		07
<p>Cement: Main constituents of cements, Hydration of cement. Water required Physical properties and testing of cement. Effect of fineness, Initial final and false setting of cement, Soundness test. Hardening and compressive strength, Grades and different types of cement, G.G. Blast furnace slag cement, Low heat Portland cement, Portland pozzolans cement, Portland flyash cement, Sulphate resisting cement.</p> <p>Aggregates: Sources of aggregates, classification and nomenclature, Coarse and fine aggregate, normal weight (light and heavy weight aggregates). Aggregate characteristics and their significance in strength, workability, placement and compaction of concrete. Sampling, Particle shape and texture, Bond of aggregate, size & grading of aggregate strength of aggregate. Mechanical properties and tests – Specific gravity, bulk density, porosity, absorption of aggregate, moisture content of aggregate, bulking of sand abrasion test, impact value. Deleterious substances in aggregate, organic impurities clay and other fine soundness of aggregate, Crushed</p>		

<p>sand. Alkali aggregate reaction. Introduction of IS: 383, water quality for mixing and curing, Acceptable water, pH value, Seawater chlorides content. Provisions in IS: 456-2000 material etc.</p>	
<p>Unit – II :</p>	07
<p>Fresh Concrete: Batching, Mechanical mixers, automatic batching and mixing plants. Efficiency of mixing, Workability Measurement - Slump cone test, compacting factor test, flow table, Vee-Bee consistometer. Factor affecting workability, setting time, Significance of w/c ratio, Segregation, bleeding, voids, and permeability. Hot weather concreting, Conveyance of concrete, placing of concrete, compaction, vibrators, curing of concrete, significance, methods of curing, temperature effects on curing and strength gain. IS code on curing, Maturity of concrete, Framework for concrete- IS code.</p>	
<p>Unit – III :</p>	
<p>Strength of concrete- Gain of strength, w/c ratio. Factors affecting compressive strength, w/c ratio, type of cement, air entrainment, aggregate, mixing water, admixtures, curing conditions. Tensile and flexural strengths, relation between compressive and tensile strength. Failure modes in concrete, cracking in compression. Impact strength, fatigue strength, shear, elasticity, poisson's ratio.</p> <p>Testing of hardened concrete. Compression test cubes, strength and cylinder strength and their relation, effect of aspect ratio on strength. Flexural strength of concrete, determination of tensile strength, indirect tension test, splitting test, abrasion resistance, accelerated curing test.</p> <p>Non Destructive test- significance, rebound hammer, ultra sonic pulse velocity test.</p>	07
<p>Unit – IV :</p>	
<p>Additives and admixtures- Types of admixtures, natural products, diatomaceous earth, calcined clays of shale's, volcanic glasses, byproducts – pozzolans, fly ash, silica fume, rice husk ash, metakaoline, G.G. blast furnace slag, admixtures- air entraining, water reducing, accelerators, retarders, plasticizers and superplasticizers, permeability reducing, grouting agents, surface hardeners.</p> <p>Shrinkage- early volume changes, drying shrinkage, mechanism of shrinkage, factors affecting shrinkage, influence of curing and strong conditions, differential shrinkage, carbonation, creep- factors influencing, relation between creep and time, nature of</p>	07

creep, effect of creep.	
Unit – V :	07
Mix Design- Process, statistical relation between mean and characteristic strength, variance, standard deviation, factors affecting mix properties, grading of aggregates, aggregate/cement ratio etc. Degree of quality control, design of mix by Road Note No. [04] (BS), ACI method.	
Unit – VI :	07
Durability of concrete- Significance, water as an agent of deterioration, permeability of concrete, air sulphate attack and control, sea water attack, acid attack, efflorescence, resistance of corrosion, abrasion and cavitation, process of rusting of steel.	
Text Books: (Book Title, Name of the author, name of the Publisher, edition, year of publication)	
1. Properties of concrete. By A. M. Neville, E. L .B. S. London	
2. Concrete Technology by M.S. Shetty. Published by S. Chand, Faridabad	
Reference Books:	
1. Concrete Technology (Theory and practice) by M L Gambhir, McGraw Hill publications, Fifth edition.	
2. Concrete Technology by Santha kumar, Oxford publication ,New Delhi	
3. Reinforce concrete design by Pillaiand Menon, McGraw Hill	

BCVP (206) : Concrete Technology
List of Practical
Minimum Ten Experiment from following List
1. To determine Fineness Modulus (FM) of coarse Aggregate
2. To determine the Specific Gravity of aggregate by pycnometer method
3. To determine Impact value of Aggregate
4. To determine Crushing Strength of Aggregate
5. To determine flakiness Index and elongation Index of Aggregate
6. To determine Abrasion Value of Aggregate

7. To determine Bulking of Sand
8. To determine silt content in sand
9. To determine fineness of cement
10. To determine the Consistency of Cement by Vicat's Apparatus
11. To determine initial and Final Setting time of given cement by Vicat's Apparatus
12. To determine compressive strength of cement
13. To determine Soundness cement
14. To determine the Workability of Concrete by Slump Test
15. To determine the Workability of Concrete by Compaction Factor Test
16. To determine Compressive Strength of Concrete
17. To determine compressive strength by rebound hammer test
18. To determine modulus of rigidity by ultrasonic pulse velocity test
19. Concrete Mix Design (Any one of the method)

BCVL207:SURVEYING -I

Teaching Scheme: Lectures: 03Hr/Week Tutorials: 01Hr/Week Practical: 02 Hr/Week	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme(Laboratory) Cont Ass.(TW): -NIL External(OR):-NIL External(PR):50 Marks
Credit	4	1
Prerequisite (If any):		
1. Applied Mathematics -I		
2. Surveying - I (PR)		
Course Objective:		
1. To understand the basic principles of surveying.		
3. To study the coordinate systems and measuring techniques.		
4. To study different types of survey and instruments used.		
Course Outcome: Student shall be able to		
1. Use basic principles of survey.		
2. Measure angle, distances and elevations.		
3. Use the surveying instruments in surveying work.		
4. The student develop basic drawing skills, including the ability to perceive and express visual relationships, organize a two-dimensional composition, and depict and manipulate form, space, and light.		
5. Utilize sketching and other techniques to design building to meet a project.		
6. Apply different architectural drawing types to elementary design situations for communication with clients.		

Course Contents	Hrs
Unit – I :	
<p>Introduction Surveying-Necessity & purpose, Geodetic & Plane Surveying, Classification of survey, Principles of Surveying, Division of Survey. Instruments and Measurement: -Linear measurements, Corrections to field measurements, ranging out, Direct & Indirect ranging. Use of Distomat,</p> <p>Chain surveying: -Basic definition, Principle of Chain Surveying, Survey station, Cross Staff Survey, Chain Traversing, Optical Square, Line Ranger, Prism Square, Obstacles in Chaining, Plotting of Chain Survey Work, Errors – Sources & Types.</p>	10
Unit – II :	
<p>Instruments for measurement of angles: -Prismatic compass, Surveyor's compass, their use & adjustment.</p> <p>Compass Traversing: Reference meridians, Bearings & azimuths. Local attraction, magnetic declination & its variation. Open & closed traverses. Adjustment of closed traverse. Bowditch's Graphical method.</p>	09
Unit – III :	
<p>Instruments for measurement of elevation: Dumpy level, Tilting level & Automatic level. Details of their construction.</p> <p>Adjustments of Levels: Temporary & Permanent adjustments of Dumpy & Tilting levels. Principle axes of Dumpy level, Relationship, Testing and adjustment of bubble axis and line of collimation.</p>	08
Unit – IV :	
<p>Leveling: Definition of terms, Principle of leveling, Reduction of levels, Classification of leveling, Profile leveling, Longitudinal sectioning, Cross Sectioning, Reciprocal leveling, Distance to vertical horizon, leveling methods, Leveling staves, Booking & reduction of field notes, curvature & refraction. Sensitivity of bubble tube. Errors in leveling.</p> <p>Contouring: Definition, Characteristics & uses of contour maps, methods of contouring. Interpolation of Contours, Computation of area and volume – Trapezoidal and Simpson's Rule, Planimeter, use theory, Zero Circle.</p>	10
Unit – V :	09

<p>Theodolite: Introduction, Type of Theodolite, Temporary & Permanent adjustment, Measurement of Horizontal & Vertical angles, Magnetic Bearing, Prolonging a line, Lining in. Other uses of Theodolite</p> <p>Theodolite traverse: Consecutive & Independent Coordinates, Adjustment of Closed traverse, latitude & departure, Gale's traverse table, area calculation by coordinates.</p>	
<p>Unit – VI :</p> <p>Plane table Surveying: Equipment's, methods two point & three point problems, Advantages & disadvantages of plane tabling. Lehman's rules.</p> <p>Construction & use of Major & Minor instruments like EDM, Total Station, Abney level, Box sextant Planimeter Tangent Clinometers, Ghat Tracer</p>	08
<p>Text Books</p>	
<p>1. Surveying by Dr. B. C. Punmia, Ashok K. Jain, Arun K. Jain, Vol. I & II Laxmi Publications</p>	
<p>2. Surveying and Levelling by T. P. Kanetkar and S.V.Kulkarni, Vol. I and Vol. II Pune Vidyarthi Griha Prakashan</p>	
<p>Reference Books:</p>	
<p>1. Surveying & Leveling, N. Basak 2nd Edition, Mc- Graw Hills Publication, 2014</p>	
<p>2. Surveying S.K. Duggal, Vol. – I 4th Edition, Mc- Graw Hills Publication, 2013</p>	
<p>3. Surveying: Theory and Practice by James M. Anderson, Edward M. Mikhail, Tata McGraw Hill.</p>	
<p>Web Links</p>	
<p>3. http://nptel.ac.in/course.php</p>	

<p>BCVP (207) : SURVEYING LAB</p>
<p>List of Practical's</p>
<p>1. Use of major Equipment's. (Cross Staff, Prismatic Compass & Surveyors Compass, Dumpy Level, Transit Theodolite)</p>
<p>2. Measurement of bearings of sides of traverse with Prismatic Compass and computation of correct included angle.</p>

3. Determination of elevation of various points with dumpy level by Collimation Plane Method and Rise & Fall Method.
4. One full size drawing sheet on L – section and C – section of Road.
5. One full size drawing sheet Contour Plan of given
6. Plane Table Survey. i) One full size drawing sheet locating given building (traverse) by Radiation Method ii) One full size drawing sheet locating given building (traverse) by Intersection Method by Plane Table Traversing.
7. Theodolite Traverse. I. Measurement of horizontal angles with Theodolite by means of Repetition Method. II. Measurement of vertical angles using Theodolite. III. One full size drawing sheet locating given building (traverse) by Theodolite traversing.
8. Measurement of area of irregular figure by using Planimeter.
9. Survey Camp (on Any of Following Topics) 1) Road Project 2) Contour Project

BCVL208 : COMPUTER APPLICATION IN CIVIL ENGINEERING		
Teaching Scheme: Lectures: 01Hr/Week Tutorials:- 01Hr/Week Practical:- 02Hr/Week	Examination Scheme(Theory) TAE : 10 Marks CAE : 10 Marks ESE : 30 Marks	Examination Scheme(Laboratory) Cont Ass.(TW): 25 Marks External(OR):-NIL External(PR):NIL
Credit	2	
Prerequisite(If any): Basics of the Computing		
Course Objective:		
1. To understand the concept and terminologies used in computer programming		
2. To use programming language for solving Civil Engineering problems.		
3. To determine optimistic solution to design		
Course Outcome: Students shall able to		
1. Apply knowledge of programming Language.		
2. Develop various computer programs.		
3. Use variables, constants etc in developing programs for solving the civil engineering problems.		
Course Contents		Hrs
Unit – I :		05
C-Fundamentals: CHARACTER SET data type constant and variables, Declaration of constants & variables, Expression, Statements, Symbolic constants. Operator and Expression, Arithmetic operator, Unary operator, Relation and Logical operator, Assignment operators, the conditional operator, Library functions. Data input & output Interactive programming preparing & running a complete simple program.		
Unit – II :		05
Control statement: the WHILE statements, do-while, for nested loop, if –else, switch break, continue, goto statement, comma operator.		
Unit – III :		05
Functions: Storage class, Arrays, Pointers, structures and Unions, Data files, File Handling, Link list.		
Unit – IV :		05
Fundamental of Numerical Methods: Interpolation & extrapolation. Numerical Integration (Simpsons method , Trapezoidal method , Newtons Gauss Quadrature		

method) , Interactive Computer Program Development	
Unit – V:	05
Solution of Linear Algebraic Equations: Gauss quadrature method), solution errors. Interactive Computer Program Development	
Unit – VI :	05
Solution of non Linear Equations: (Newton Raphson Schemes) , Initial & Two point boundary value problem , Euler’s Runge-kutta Milnes etc, Interactive Computer Program Development	
Text Books:	
1. Yashwant Kanitkar, LET US C, 3rd Edition, BPB Publications, 2010	
Reference Books:	
1. Ward Cheney and David Kincaid, Numerical Mathematics and Computing, 7th Edition, Thomson Publications, 2013	
2. Rajiv Khanna, Computer Application for Engineering, 1st Edition, New Age International (P) Limited, 2007	
3. E. Balaguruswamy, Programming in Using C, 5th Edition, Tata Mc Graw Hill, 2010	

BCVP (208) : COMPUTER APPLICATION IN CIVIL ENGINEERING
List of Practical
1. Program for Sum of Three Integers.
2. Program for finding the average value of three Numbers.
3. Program for Interchanging Two Values.
4. Program for finding the Number is Even or Odd
5. Program for finding the Number is Positive or Negative
6. Program to decide Profit or Loss.
7. Program for finding the given year is Leap year or not
8. Program for finding the number is Perfect Square or Not
9. Program for Shear Force & Bending Moment for beam carrying UDL
10. Program for Shear Force & Bending Moment for beam carrying Point Load
11. Program for Bisection Method
12. Program to find the Root of an equation using Newton Rapson Method.
13. Program to Find Integral of given function by using Simpson’s 1/3rd Rule.

14. Program to Find Integral of given function by using Simpson's 3/8th Rule.

15. Program to solve equation by using Euler's Method.

16. Program to solve the system of Linear Equation Using Gauss Elimination Method.

17. Program to solve equation by using Second Order Runge-kutta Method.

18. Program to solve equation by using Fourth Order Runge-kutta Method.

BCVL209: Fluid Mechanics -II		
Teaching Scheme: Lectures: 03Hr/Week Tutorials: 01Hr/Week Practical: 02 Hr/Week	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme(Laboratory) Cont Ass.(TW): -25 Marks External(OR):-NIL External(PR):NIL
Credit	4	1
Prerequisite (If any):		
1. Fluid Mechanics -I		
Co-Requisites: (If any):		
5. Fluid Mechanics –II (PR)		
Course Objective:		
1. To understand the flow pattern in the open channels, pipes and immersed body.		
2. To understand hydraulic models.		
3. Study different types of pumps and turbines to know their characteristics.		
Course Outcome: Student shall be able to		
1. Solve the problems related to boundary layer, flow in pipe and channels.		
2. To study flow through pipes		
3. To study flow through open channels		
4. Student should get knowledge of gradually and rapidly varied flow		
5. Make hydraulic model and provide a conclusion.		
6. Calculate the efficiency of the pump and turbines.		

Course Contents	Hrs
UNIT I	
1. LAMINAR FLOW: Steady uniform laminar flow in circular pipes ; Velocity and shear stress distribution ; Hagen - Poiseuille equation.	
2. BOUNDARY LAYER THEORY: Nominal thickness, displacement thickness, momentum thickness of the boundary layer. Boundary layer along a long thin plate and it's characteristics; Laminar boundary layer; turbulent boundary layer, laminar sub layer : Separation of boundary layer on plane and curved surfaces.	10

<p>3. REAL, INCOMPRESSIBLE FLUID FLOW AROUND IMMERSED BODIES: In general definition of drag and lift; Flow past plates , cylinders and spheres ; darg on sphere ,cylinder and flat plate.</p>	
<p>UNIT II</p>	
<p>4.FLOW THROUGH PIPES : Hydraulically smooth and rough pipes ; Frictional resistance to flow of fluid in smooth and rough pipes ; Nikurade’s experiment ; Moody’s chart , Darcy Weisbach & Hazen William’s equation for frictional head loss ; Hydraulic gradient and energy gradient : Pipes in series and parallel; Branched pipes ; Siphon; transmission of power through pipes ; Hardy – Cross method of pipe networks; Water hammer pressure head due to sudden closure of valve.</p>	<p>09</p>
<p>Unit – III</p>	
<p>5.FLOW THROUGH OPEN CHANNEL: General types of channel and their geometrical properties; Types of flow in open channel</p> <p>UNIFORM FLOW : Chezy’s and Manning’s equations ; Hydraulically most efficient rectangular , triangular and trapezoidal sections ; Computations of normal depyh of flow , conveyance of channel , section factor for uniform flow , normal slope and normal discharge.</p> <p>CRITICAL FLOW : Specific energy and it’s diagram ;alternate depths ; Computations of critical depth section factor for critical flow , critical slope ; normal critical slope ; Specific force and it’s diagram ; Conditions of critical flow.</p>	<p>07</p>
<p>UNIT – IV :</p>	
<p>6. APPLICATIONS OF SPECIFIC ENERGY, GRADUAL TRANSITIONS OF CHANNELS:</p> <p>GRADUALLY VARIED FLOW: Dynamic equation for GVF ; Classification and characteristics of surface profile; Direct Step method of computing profile length.</p> <p>RAPIDLY VARIED FLOW: Definition of hydraulic jump ; Equation of hydraulic jump in horizontal rectangular Channel ; Length & height of jump ; Energy loss in jump ; Classifications of jump.</p>	<p>10</p>
<p>UNIT – V :</p>	
<p>7. HYDRAULIC MODELS: Difference between model and prototype; Similitude-type of similarities; Model laws Reynolds model law and Froude’s model law ; Types of model – distorted , undistorted ; Froude’s method of determining resistance to</p>	<p>08</p>

partially submerged objects like ship. Hydraulic Turbines: Introduction, Impulse and reaction turbine, pelton turbine, Francis turbine.	
8.FLUID MACHINERY: IMPACT OF JET : Impact of Jet on stationary and moving curved vanes TURBINES : Definition ; Gross and net heads; different efficiencies; Classification of turbines; component parts and working principles ; selection of turbines on the basis of head and specific speed.	
UNIT – VI :	09
9.CENTRIFUGAL AND RECIPROCATING PUMP:	
CENTRIFUGAL PUMP : Component parts; Working principle ; Static and manometric heads ; different efficiencies ; Specific speed; Theoretical aspect of multistage pump , pump in parallel ; Priming devices ; Trouble & remedies ; Main & operating characteristics curves. Selection on basis of operating characteristics.	
RECIPROCATING PUMPS: Components parts , Working principle , Work done of single & double acting pumps ; Negative slip , Air vessels – Working principle and necessity.	
Text Books	
1. Engineering Fluid Mechanics by Garde, Mirajgaonkar, Scitech	
2. Hydraulics and Fluid Mechanics by P. N. Modi & S. N. Seth Standard book house	
Reference Books:	
1. K. Subramanya, Flow In Open Channels, 3rd Edition, Tata Mc Graw Hill, 2009	
2. P. N. Chatterjee, Fluid Mechanics For Engineers, 3rd Edition, Macmillan Publishers India Limited, 2000	
3. Fluid Mechanics by Streeter, Wylie and Bedford – Tata McGraw Hill	

BCVP(209): Fluid Mechanics -II
List of Practical (Perform any 8 experiment)
1. To determine streamline patterns of streamline flow around immersed bodies.
2. To determine friction factor for given pipes and to verify Darcy-Weisbach equation.
3. To determine performance characteristics of Centrifugal Pump.

4. To determine performance characteristics of Reciprocating Pump.

5. To determine performance characteristics of Francis Turbine.

6. To determine performance characteristics of Pelton Turbine.

7. To determine Manning's or Chezy's constant for Open Channel.

8. To determine Froude's number by Hydraulic Jump in a horizontal rectangular channel.

9. To determine minor losses for flow through pipes.

10. To determine Gradually Varied Flow profiles.

11. To determine velocity distribution in a given pipeline and verify momentum equation.

12. To determine co-efficient of discharge of venturiflume.

BCVL210: GEOTECHNICAL ENGINEERING – II

Teaching Scheme: Lectures: 03Hr/Week Tutorials: -01Hr/Week Practical: -- 02 Hr/Week	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination scheme(Laboratory) ContAss.(TW):NIL External(OR):- 25 Marks External(PR):NIL
Credit	4	1

Prerequisite:

Geotechnical Engineering- I

Course Objective:

1. To learn soil exploration, planning and methods of exploration
2. To determine the bearing capacity of foundation
3. To learn ground improvement methods and soil stabilization techniques

Course Outcome: Student shall be able to

1. Plan and execute the soil exploration
2. Determine the bearing capacity shallow foundation
3. Determine the settlement of shallow foundation
4. Design the various types of foundation
5. Determine the bearing capacity and settlement of pile foundation
6. Use various appropriate ground improvement techniques.

Course Contents

Hrs

Unit – I :

Purpose and planning of subsurface exploration: Methods of Investigation: Trial

10

<p>pits, borings, depth & number of exploration holes, core recovery, RQD, Core Log.</p> <p>Geophysical methods: Seismic refraction and Electrical resistivity method. Disturbed and undisturbed sampling, types of samplers, degree of disturbance of a sampler. Field tests-- SPT, DCPT, SCPT and Pressure meter test, California Bearing Ratio</p>	
<p>Unit II:</p> <p>Types of foundation: Basic definitions, Modes of shear failure, Bearing capacity analysis- Terzaghi's, Hanson's, Meyerhof's, Skempton's and Vesics equations, IS code method - Rectangular and Circular Footings. Bearing Capacity evaluation- Plate Load Test and SPT, Housel's perimeter shear concept. Bearing capacity of layered soil. Effect of water table on bearing capacity. Effect of eccentricity.</p>	08
<p>Unit: III</p> <p>Settlement: Introduction, Causes of settlement. Pressure bulb, Contact pressure. Allowable settlement, Differential settlement - I.S. criteria, Types - Elastic settlement, consolidation settlement. Use of Plate load test and SPT in settlement analysis. Allowable soil pressure.</p> <p>Consolidation : Introduction, spring analogy, Terzaghi's consolidation theory, Laboratory consolidation test, Determination of coefficient of consolidation- Square root of time fitting method and logarithm of time fitting method. Time factor. Rate of settlement and its applications in shallow foundation. Introduction of Normal consolidation, Over consolidation and Preconsolidation pressure.</p>	08
<p>Unit IV:</p> <p>Well foundation: Component and their function, sinking of well, types of force system, and their computation, design criteria for various components of wells, tilting and shifting of wells, methods of correcting tilting and shifting. Bearing capacity of well foundation as per IS method. Cofferdam: Its purpose, various types, their suitability.</p> <p>Raft foundation: Its purpose, advantages, situation, classification of raft, criteria for rigid and flexible raft, design of raft foundation, concept of floating foundation.</p>	10
<p>Unit V:</p>	09

<p>Pile foundation: Classification of piles and their uses, static analysis, formula for determination of pile capacity for driven and bored pile in sand and in clay, dynamic pile formula, Negative skin friction, factor affecting it, piles in groups and their capacity, group efficiency, factors affecting group efficiency, settlement ratio, behaviour of group of pile in sandy and in clayey solids, pile load test, effect of pile cap. Criteria for spacing and depth of piles. IS design criterion for under-reamed pile in clay and sands, Total and differential settlement related to single pile and group of piles in sandy and in clays soils.</p>	
<p>Unit VI:</p>	
<p>Foundation on Black Cotton Soils: Characteristics of black cotton soil, swelling potential and its evaluation methods, Engineering problems, Swelling pressure measurement, Foundations on black cotton soil: design principles, Construction techniques in B.C soils, under reamed piles- Design principles and its construction Techniques. Stone columns, prefabricated vertical drains, preloading technique, and vibroflotation technique.</p> <p>Soil Reinforcement: Basic components and Mechanism of reinforced soil. Geosynthetics: type's, functional properties and requirements. Geosynthetic applications in Civil Engineering.</p>	09
<p>Text Books:</p>	
<p>1. Soil Mechanics and Foundation Engineering, Dr. K.R. Arora, Standard Publishers Distributors 5th Edition</p>	
<p>2. Foundation Engineering, Dr. B. J. Kasmalkar, Pune Vidyarthi Griha Prakashan, Pune</p>	
<p>Reference Books:</p>	
<p>1. Principles of Soil Mechanics and Foundation Engineering by V.N.S. Murthy, UBS Publishers</p>	
<p>2. Principal of Foundation Engineering, Das B. M., Thomson Brooks/Cole, 5th Edition, 2004</p>	
<p>3. Foundation Analysis and Design, Bowles J.E., McGraw Hill International, 5th Edition, 1996</p>	
<p>4. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. Rao, New Age International</p>	

Publishers, (2010)
5. Foundation Design Manual, N V Nayak, Dhanpat Rai Publication

BCVP (210): GEOTECHNICAL ENGINEERING – II
A. List of Practical (Any SEVEN from following list)
1. Auger boring and soil sampling
2. Standard Penetration Test
3. Dynamic Cone Penetration Test
4. Determination of Free swell index and swell potential
5. Determination of Swelling Pressure of given soil sample
6. Determination of California Bearing Ratio
7. Determination of Pore Water Pressure
8. Determination of In-situ Permeability Test
9. Open Ended Experiment
B. Planning and preparation of report on soil investigations for a real life problem.
C. Field Visit Report (soil exploration, shallow foundation and deep foundation)
D. Assignment on each unit

BCVL211: Structural Analysis-I		
Teaching Scheme: Lectures: 03Hr/Week Tutorials: 01Hr/Week Practical: - NIL	Examination Scheme(Theory) TAE : 20 Marks CAE : 20 Marks ESE : 60 Marks	Examination Scheme(Laboratory) Cont Ass.(TW): -NIL External(OR):-NIL External(PR):NIL
Credit	4	-
Prerequisite(If any):		
Strength of Materials		
Course Objective:		
1. To study basic concepts of analysis of structural components.		
2. To study the behavior of structural components under the various combination of loads.		
3. To study various methods for the analysis of in determinant structure.		
Course Outcome: Student shall be able to		
1. Understand basic analysis of beams under different loading conditions.		
2. Apply influence line diagrams for the analysis of structures under moving load.		
3. Understand concept of Strain Energy.		
4. Identify the behavior of structural components by various methods.		
5. Analyze two and three hinged arches and its application.		
6. Analyze beams structures and frames by slop deflection method.		
Course Contents		Hrs
Unit I		08
Static analysis : Static determinacy of structural Analysis of loads on simply supported beams with concentrated and uniformly distributed loads, maximum B.M. and S.F.		
Unit II:		10

<p>Influence Line Diagram: Basic concept, Muller: Braslau's principle, influence line diagram for reaction, shear and moment to simply supported and overhanging beams, application of influence line diagram to determine reaction, shear and moment in beams. Influence line diagram for axial force in trusses, application of influence line diagram to determine of axial forces in the members of plane determinate trusses under dead load and live load.</p>	
<p>Unit III:</p>	08
<p>Strain Energy: Strain energy method as applied to the analysis of redundant frames and redundant trusses up to two degrees. Determination of deflection of trusses. Willot Mohr diagram, Castiglianos theorems, Maxwell's reciprocal theorem. Batts theorem.</p>	
<p>Unit IV :</p>	08
<p>Buckling of Columns : beam columns, Euler's and Rankin's formula. Analysis of fixed and continuous beams by theorem of three moments effect of sinking of support</p>	
<p>Unit V:</p>	10
<p>Arches: Three hinged arches concepts, types of arches, analysis of parabolic arch with supports at same and different levels, semicircular arches with support at same level, determination of horizontal thrust, radial shear and normal thrust for parabolic and circular arch.</p> <p>Two hinged arches: analysis of parabolic and semicircular arches with supports at same level, determination of horizontal thrust, radial shear and normal thrust.</p>	
<p>Unit VI:</p>	09
<p>Slope deflection method as applied to indeterminate beams & continuous beams portal frames, frame with inclined legs up to 3 degrees of freedom</p>	
<p>Text Books</p>	
<p>1. Structural Analysis Vol-1, By S S Bhavikatti, Vikas, third edition, publishing House, PVT, LTD.</p>	

2. Analysis Structures: Strength and behavior by T. S. Thandavamoorthy, Oxford University Press.

Reference Books:

1. Wilbur J.B. & Norris C.H, Elementary Structural Analysis,3rd Edition, McGraw Hill, 2009

2. Mechanics of Structures Vol. II by S B Junnarkar and Dr. H J Shah, Twenty second edition, Charotar Publishing House Pvt. Ltd.

3. Structural Analysis by R. C. Hibbler, sixth edition, Pearson Education