BMS COLLEGE OF ENGINEERING, BANGALORE-560 019
(Autonomous College under VTU)

DEPARTMENT OF CIVIL ENGINEERING

Semester: III (2015 onwards)

Code	Course Title	Teaching Dept.	Credits				Total Credits	Contact Hours	CIE MARKS	SEE MARKS	TOTAL MARKS
			L	T	P	S					
15MA3GCMAT	Engineering Maths –III (BS)	MATHS	3	-	-	-	3	3	50	50	100
15CV3DCBMC	Building Materials & Construction (ES)	CIVIL	3	-	-	-	3	3	50	50	100
15CV3DCGEO	Engineering Geology (BS)	CIVIL	2	-	1	2	5	4	50	50	100
15CV3DCBSY	Basic Surveying (ES)	CIVIL	2	-	1	2	5	4	50	50	100
15CV3DCMOF	Mechanics of Fluids (ES)	CIVIL	3	1	-	-	4	5	50	50	100
15CV3DCSOM	Strength of Materials (ES)	CIVIL	3	1	1	-	5	7	50	50	100
			Total				**25**	26			**600**

L- Lecture Hours/Week, T- Tutorial -2Hour/week, P- Practical- 2 Hours/week. S- Self Study

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III SEMESTER CIVIL ENGINEERING

Course Name	**Engineering Maths –III**	Course Code	**15MA3GCMAT**	SEE Duration	SEE+CIE
Credits	**03**	L-T-P-S	**3-0-0-0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

The purpose of the course is to make the students well conversant with Fourier- Series, Fourier Transforms, formulate physical problems in terms of Partial Differential Equations, find insight into the physical behaviour of systems from mathematical solution and develop computational skills using efficient numerical methods for problems in science and engineering.

COURSE OUTCOMES:

CO 1: Express given functions to form Fourier series.

CO 2: Demonstrate an understanding of Fourier transforms techniques.

CO 3: Employ analytical techniques to solve partial differential equations with appropriate boundary conditions.

CO 4: Compute the solution of a system of algebraic equations

CO 5: Use calculus of variations to find the extremal of a functional

MATRICES:

Introduction: Elementary row transformations, Echelon form of a matrix, rank of a matrix by elementary row transformations.

Consistency of system of linear equations and solution. Solution of a system of non-homogenous equations: Gauss elimination method, LU decomposition method, Gauss-Seidel method. Eigenvalues and eigenvectors of matrices.

Applications: Stability of a system of differential equations- an eigenvalue problem.

Suggested Reading: Inverse of a matrix using Gauss-Jordon method. Eigen value and corresponding eigenvector using Rayleigh power method, reduction of matrix to diagonal form.

7 Hours

FOURIER SERIES:

Introduction: Periodic function, Dirichlet's conditions, statement of Fourier Theorem, Fourier series of periodic function of period 2π and arbitrary period, practical harmonic analysis.

Applications: Fourier series of typical waveforms used in communication engineering-saw toothed waveform, triangular waveform, square waveform, half-wave rectifier, full wave rectifier and modified saw tooth waveform.

Suggested Reading: Half range Fourier series, Fourier series of discrete functions, Complex Fourier series.

7 Hours

FOURIER TRANSFORMS:

Infinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms,

Suggested Reading: Convolution theorem, Fourier transforms of the derivatives of a function, Parseval's identities and physical significance of Parseval's identities.

7 Hours

PARTIAL DIFFERENTIAL EQUATIONS:

Formation of Partial differential equations-elimination of arbitrary constants, elimination of arbitrary functions. Equations of first order- The linear equation $P\,p + Q\,q = R$ **(**Lagrange's partial differential equation).

Applications: One-dimensional heat equation and wave equation (without proof), various possible solutions of these by the method of separation of variables.

Suggested Reading: Direct integration method, method of separation of variables, D'Alembert's solution of wave equation. **8 Hours**

CALCULUS OF VARIATIONS:

Variation of function and functional, Euler's equation, variational problem, isoperimetric problems

Applications: Geodesics of a right circular cylinder, minimal surface of revolution, hanging cable. Brachistochrone problem.

Suggested Reading: Minimal surface of revolution, Geodesics of a right circular cone and sphere **7 Hours**.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, 40th edition, 2007, Khanna Publishers.
2. Advanced Engineering Mathematics, 5th edition by Dennis G. Zill and Cullen, Jones and Bartlett India Pvt. Ltd.

REFERENCE BOOKS:

1. Advanced Modern Engineering Mathematics, Glyn James, 3rd edition, 2004, Pearson Education.
2. Higher Engineering Mathematics, B.V. Ramana, 2007, Tata Mc. Graw Hill.
3. Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.
4. Advanced Engineering Mathematics, Erwin Kreyszig, 10th edition Vol.1 and Vol.2, 2014, Wiley-India.

EXPERIMENTS/EXERCISES:

- Solution of system of algebraic equations using Gauss Seidel method
- LU decomposition of matrices.
- Eigenvalues and eigenvectors of matrices-stability of a system of differential equation-Eigenvalue problem.
- Largest eigenvalue and corresponding eigenvector of a matrix.
- Diagonalisation of matrices

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III SEMESTER CIVIL ENGINEERING

Course Name	**Building Materials and Construction**	Course Code	**15CV3DCBMC**	SEE Duration	SEE+CIE
Credits	**03**	L-T-P-S	**3-0-0-0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

To enable students to gain knowledge on various materials and processes involved in building construction. This will enable the students to apply the knowledge for building planning and drawing.

COURSE OUTCOMES:

CO1: Describe the physical and mechanical properties of a variety of construction materials.

CO2: Describe the functional components of a building.

CO3: Describe the construction process of various components of a building.

INTRODUCTION TO BUILDING MATERIALS

Physical and mechanical properties, parameters to define strength, durability and performance for the following materials.

STRUCTURAL CLAY PRODUCTS: Bricks, types of bricks, manufacturing process of bricks.

NATURAL STONE: Types, qualities of good stone for construction.

TIMBER: Natural Timber, properties, Timber products.

LIME AND CEMENT: Properties and manufacturing process.

OTHER BUILDING MATERIALS: Iron and Steel, Paints and enamels, water proofing materials

12 hours

INTRODUCTION TO BUILDING CONSTRUCTION:

Building components viz. foundations, walls, lintels roofs, openings, framed structures and masonry structures.

FOUNDATION

Function and requirements of a good foundation, Types of foundations, Preliminary investigation of soil, Safe Bearing Capacity of Soil, Introduction to spread, combined, strap, mat and pile foundations.

3 hours

MASONRY

Definition of terms used in Masonry, Classification of Masonry, Bonds in Brick work, Reinforced Brick Masonry, Joints in stone masonry, Introduction to load bearing, cavity and partition walls.

4 hours

DAMP PROOFING, WATER PROOFING AND ANTITERMITE TREATMENT

Definition of technical terms, Defects, causes and sources of dampness, damp proofing and terrace water proofing methods, Pre and post constructional antitermite treatment.

3 hours

DOORS AND WINDOWS

Definition of technical terms, Location of doors and windows, Types of Doors, Types of windows.

3 hours

ARCHES, LINTEL AND BALCONY

Elements of an arch, Classification of arches, Definition and classification of Lintels, Definition and functions of Chejja, Canopy & Balcony

3 hours

ROOFS AND FLOORS

Types of Roofs & Roofing materials, Types of flooring, Factors affecting selection of flooring materials, Flat roof (RCC), Types of pitched roofs.

5 hours

STAIRS

Definition of technical terms, Requirements of good stair, Types of Stairs, Geometrical design of RCC Dog legged (Plan and sectional elevation).

3 hours

PLASTERING AND PAINTING

Purpose of plastering, Materials of plastering, Methods of plastering, Defects in plastering, Introduction to Paintings, Purpose of Painting and Defects in Painting.

3 hours

TEXT BOOKS:

1. **A Text Book Building Materials**, by P.G. Varghese, Prentice-Hall of India Pvt. Ltd., Publication., 2nd Edition,.2015

2. **Building Construction,** Sushil Kumar, Standard Publication and Distributors, New Delhi, 19th Edition, 2001.

REFERENCE BOOKS:

1. **Advances in Building Materials and Construction** by Mohan Rai and M.P. Jain Singh – publication by CBRI, Roorkee.
2. **Building Materials (3rd revised edition)**, S.K. Duggal, New Age International publishers, India.
3. **Building Construction**, by Dr. B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain,Laxmi Publications Pvt Ltd.

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III SEMESTER CIVIL ENGINEERING

Course Name	**Engineering Geology**	Course Code	**15CV3DCGEO**	SEE Duration	SEE+CIE
Credits	**05**	L-T-P-S	**2-0-1-2**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

1. Study of internal structure of the earth.
2. Identification and description of Minerals and Rocks based on their index properties.
3. Study of structural features (Folds, Faults, and Joints etc) of the rocks and earth and their engineering consideration.
4. Study of various Geological Maps.
5. The study of Geotechnical and groundwater potential Zones using various Techniques.
6. The study and select good building stones, sites for construction of dam, reservoir, wells and tunnels.

COURSE OUTCOMES

CO1: Explain the structural features of the earth. Identify and classify minerals and rocks.

CO2: Provide decision support on Lithological characters and related groundwater conditions.

CO3: Describe various geological maps and interpretation of geological data for tunneling, mining and mineral excavations.

CO4: Identify the suitable site for the Civil Engineering project by providing remedial measures in the structurally disturbed areas with the help of Geological investigation.

INTRODUCTION:

Introduction to Geology and its importance in Civil Engineering practices. Internal structure and composition of the earth.

MINERALOGY:

Study of rock forming and economically important minerals. Physical properties, chemical composition, uses and contribution of the following minerals in preparation of construction materials - : Quartz and its varieties: Feldspar group: Mica Group: Carbonate group: Calcite, Asbestos, Kaolin and Garnet. Ore minerals: Hematite, Magnetite, Limonite, Pyrite, Chalcopyrite, Pyrolusite, Chromite, Galena and Bauxite.

5 Hours

PETROLOGY:

Introduction, Rock cycle and study of the following Rocks.

IGNEOUS ROCKS:

Definition, origin, classification, and forms of Igneous Rocks. Texture structure, Petrological description and Engineering importance of the following rocks: Granite Diorite, Gabbro, Dunite, Porphyries, Pegmatite, Dolerite and Basalt.

SEDIMENTARY ROCKS:

Definition, origin, classification of Sedimentary rocks. Primary structures Petrological description and engineering importance of the following Rocks. Conglomerate Breccia, Sand Stone, Shale, Limestone and Laterite.

METAMORPHIC ROCKS:

Definition, types of Metamorphism, Metamorphic structures. Petrological, description and Engineering importance of the following rocks. Slate, Schist, Gneiss, Quartzite, and Marble.Weathering and deterioration of rocks. Types and agents of weathering.

6 Hours

APPLIED GEOLOGY:

Selection of rocks for foundation, construction, cladding, flooring, concrete aggregate, road metal, and railway ballast with examples, Site selection for Dams, Reservoirs, and Tunnels. Silting up of reservoir and remedial measures.

GEODYNAMICS:

Dynamic activities of the Earth, Plate tectonics. Geological and Engineering considerations of Land slide, (mass movements) Avalanches causes and precautions. Earthquakes - seismic waves, seismic zones, causes and effects.

10 Hours

STRUCTURAL GEOLOGY (ROCK MECHANICS):

Introduction, Stress and Strain in rocks, Outcrop, Dip and Strike, and Compass clinometers. Study of structural features of rocks. Description of Folds, Faults and Joints, their identification in the field. Importance in various Civil Engineering projects.

5 Hours

HYDROGEOLOGY:

Introduction, Study of Groundwater and its importance, Occurrence of groundwater in different Geological rock formation, Water table, Water level fluctuation. Types of Aquifers- Confined and unconfined Aquifers, Artificial recharge of ground water. Selection of well sites, Geological and Geophysical Methods of Groundwater exploration and Applications of Electric resistivity method.

6 Hours

Lab components must comprise of experiments that reinforce the theoretical understanding of the corresponding theory subject. Outlines of the laboratory components should be mentioned by the respective staff members well before the commencement of the course.

TEXT BOOKS:

1. A Text of Engineering and General Geology, By Parbin Singh, 2009
2. A Text of Geology, by P.K. Mukherjee, 2006

REFERENCES:

1. A Text of Engineering and Geology, by B.S. Sathyanarayanaswamy
2. Physical Geology, By Arthur Homes
3. Principle of Engineering Geology, by KVGK Gokhale
4. Principle of Engineering Geology, by K.M. Bangar
5. Physical and Engineering Geology, by S.K. Garg
6. Geology for Engineers, By D.S. Arora
7. Engg Geology by S K, Duggalet. Al
8. Engineering Geology by D.Venkatareddy
9. Ground water Geology by Todd D.K. Jhon Willey and Sons, New York

LEARNING RESOURCES:

1. www.geoscienceworld.org
2. www.springer.com
3. http://en.wikipedia.org
4. www.gle.wisc.edu
5. www.geoexpro.com
6. http://freevideolectures.com/Course/87/Engineering-Geology

EXPERIMENTS/EXERCISES:

1. **MINEROLOGY: Study of Physical Properties of the mineral and their contribution in preparation of construction materials**
   - **Practical no. 1: Study of the Physical Properties of the following minerals**.
   - **Quartz group of Minerals:-** Rock crystal, Rose Quartz, Jasper banded Agate/Jasper, Smoky Quartz
   - **Feldspar Group:** Orthoclase, Plagioclase, Microcline.
   - **Mica Group:** Biotite Mica, Muscovite mica.
   - **Practical no. 2: Study of the Physical Properties of the following minerals.**
   - **Carbonate Group:** Calcite, Magnesite, Dolomite.
   - **Ferro-Magnesium Minerals:** Hornblende, Augite, Olivine, Asbestos, Talc, Garnet, Gypsum
   - **Practical no.3: Study of the Physical Properties of the following minerals**
   - **Ore Minerals:** Hematite, Magnetite, Limonite, Iron Pyrite, Chalcopyrite, Pyrolusite, Chromite, Galena, Bauxite.

2. **PETROLOGY: Identification of Rocks Based on their Index Properties**
   - **Practical no.4: Igneous Rocks:** Granite, Diorite, Gabbro, Dunite, Porphyries, Pegmatite, Dolerite and Basalt.
   - **Practical no. 5: Sedimentary Rocks:** Conglomerate, Breccia, Sandstone, Shale, Limestone and Laterite.
   - **Practical no. 6: Metamorphic Rocks:** Slate, Schist, Gneiss, Quartzite, and Marble.

3. **STRUCTURAL GEOLOGY (ROCK MECHANICS):**
   - **Practical no. 7:** Analysis and understanding of the Lithological Character of sub surface by Vertical Electrical Sounding (VES) resistivity method.
   - **Practical no. 8:** Dip and Strike Problems (two types).
   - **Practical no. 9:** Borewell Problems on level Ground (two types).
   - **Practical no. 10:** Study and Interpretation of Standard Structural Geological Maps.

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III SEMESTER CIVIL ENGINEERING

Course Name	**Basic Surveying**	Course Code	**15CV3DCBSY**	SEE Duration	SEE+CIE
Credits	**05**	L-T-P-S	**2-0-1-2**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

To enable the students to gain knowledge in the basics of surveying and instrumentation connected with it. This enables for the understanding of the infrastructure projects.

COURSE OUTCOMES

CO1: Explain the importance and principle of surveying, different types of surveys and techniques used in surveying.

CO2: Apply different methods used for linear and angular measurements, and calculate the elevation of objects.

CO3: Explain working principle and usage of different types of modern surveying instruments.

INTRODUCTION

Definition of surveying. Historical perspective of surveying. Comparison between geometry and surveying. Necessity of surveying. Plan and maps. Classification of surveying. Basic geometrical relations used for understanding surveying. Basic measurements. Control surveys –Horizontal and vertical. Cardinal principles of surveying. Error, Accuracy and precision. Numerical problems on precision and accuracy. Map & Classification. Survey of India topographical Maps and their numbering.

5 Hours

THEODOLITE SURVEYING

Essentials of transit Theodolite, Definitions and terms, Temporary and permanent adjustments, Measurement of horizontal and vertical angles, Fundamental lines and desired relations, Sources of error in Theodolite.

5 Hours

TRIGONOMETRIC LEVELLING

Introduction, Base of the object accessible, Base of the object inaccessible: instruments stations in same and different vertical plane, Determination of height of an elevated object, Determination of height of an elevated object from three different stations, Numerical problems.

5 Hours

TACHEOMETRIC SURVEYING

Different types, Principles, Distance and elevation formulae for different conditions, Horizontal base substense measurements, Special instruments, Errors in stadia surveying, Numerical problems.

4 Hours

LEVELLING

Concepts of levelling, instruments used. Terms and definitions. Reductions of level, Booking of levels, Classification of levelling. Curvature and refraction effects, Reciprocal levelling, Errors. Numerical examples on booking and reduction of levels, calculation of gradients, correction for curvature and refraction, true difference in height using reciprocal observations. Contouring, characteristics and applications.

5 Hours

INSTRUMENTATION IN SURVEYING

Electronic Theodolites, Autolevel, Geodimeter, Tellurometer, Distomats, Total Station.

2 Hours

TEXT BOOKS:

1. Punmia. B.C., Ashok. K. Jain and Arun .K. Jain 'Surveying Vol1, Lakshmi Publications, 2014.
2. Roy. S.K., Fundamentals of Surveying' Prentice Hall of India, 1999, New Delhi.
3. Duggal. S.K, 'Surveying' Volume 1, Tata McGraw Hill, 1996, New Delhi.

REFERENCE BOOKS:

1. Kavanagh, Barry F. Surveying: Principles and Applications, 8th Edition, 2009, Prentice Hall.
2. Arthur Bannister, Stanley Raymond and Raymond Baker. Surveying, 7th Edition, Pearson Education

EXPERIMENTS/EXERCISES

1. Study of various instruments used for surveying, namely chain, tape, Compass, Dumpy level, Autolevel, Theodolite, Tacheometer, Total station and GPS
2. Study of topographic maps and preparation of a chart of conventional symbols used in toposheets.
3. To set regular geometric figures using linear measuring instruments and accessories
4. Study of prismatic compass and finding the fore bearing and back bearing of a given survey line.
5. To set regular geometric figures using prismatic compass, given the bearing of one line.
6. To find the distance between two inaccessible points using prismatic compass, chain, tape and other accessories.
7. Study of use of Dumpy level. To determine the reduced level of various points using Dumpy level.
8. To find the true difference in elevation between two points situated far apart by using reciprocal leveling.
9. To conduct profile leveling & cross-sectioning and to plot the details.
10. Leveling exercises by using Total-stations.

III SEMESTER CIVIL ENGINEERING

Course Name	**Mechanics of Fluids**	Course Code	**15CV3DCMOF**	SEE Duration	SEE+CIE
Credits	**04**	L-T-P-S	**3-1-0-0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

- To introduce the basic concepts of fluid mechanics
- To introduce the pressure concepts, types, its determination.
- To introduce the basic concepts of fluid kinematics and fluid kinetics, their applications to civil engineering problems.
- To introduce the basic laws of fluid dynamics and their applications.

COURSE OUTCOMES:

CO1: Explain the mechanics of fluids at rest and in motion by describing and observing the fluid phenomena

CO2: Analyse fluid interactions with natural and constructed systems using the principles and laws of fluid mechanics

CO3: Apply knowledge for subsequent courses involving the analysis & design of flow related systems

INTRODUCTION:

Definition of fluid, Distinction between Solid, fluid & gases, Concept of Fluid Continuum

Fluid Properties: Mass Density, Specific Volume, Specific Weight, Specific Gravity- Definitions, Units and Dimensions, Viscosity, Newton's Law of Viscosity, Newtonian & Non-Newtonian Fluids, Ideal & Real Fluids, Compressibility, Vapor Pressure, Surface Tension, and Capillary.

4 Hours

FLUID PRESSURE & ITS MEASUREMENT:

Definition of Pressure, Pressure at a point in a static fluid, Hydrostatic pressure law, Types of Pressures, Measurement of Pressure- Simple & Differential Manometers and Mechanical Gauge.

7 Hours

HYDROSTATICS:

Definition of Total Pressure, centre of pressure, Total pressure & centre of pressure on Vertical plane surface, Inclined & curved plane surfaces. Pressure Diagram. Practical applications- Dams & Gates.

10 Hours

KINEMATICS OF FLUID:

Description, Continuity Equation in differential form, Velocity Potential, Stream Potential, Equipotential line, Line of constant stream line, Flow net.

Classification of fluid flow, Stream line, Streak Line, Path Line, Stream tube, Acceleration of Flow in one dimensional flow, types of accelerations. **10 Hours**

DYNAMICS OF FLUID FLOW:

Concept of Inertia force and other forces causing Motion, Derivation of Euler's & Bernoulli's Equation (Both for Ideal & Real Fluids),

Applications of Bernoulli's Equation- Venturi Meter, orifice Meter & Pitot Tube Theory. Flow through Orifices and mouth pieces, Flow over Notches and weirs. **10 Hours**

PIPE FLOW SYSTEMS:

Energy losses in pipes- introduction, Darcy- Weisbach equation, Moody diagram, Energy losses in pipe lines- minor losses, multiple pipe systems. Water Hammer in Pipes: Definition, Equation for pressure rise due to gradual closure of valve, sudden closure in rigid & plastic pipes, problems, surge tanks, types & functions **5 Hours**

Boundary layer theory and applications- concept of boundary layer and its growth.

Dimensional Analysis Introduction, Dimension, Dimensional homogeneity, Methods- Rayleigh method, Buckingham Pi method, Similitude- Geometric, Kinematic & Dynamic Similarity

6 Hours

TEXT BOOKS:

1. Fluid Mechanics including Fluid Machines– P.N.Modi & S.M.Seth, Standard Book House, New Delhi, 20th Edition, 2015

REFERENCE BOOKS:

1. Fluid Mechanics- Victor L Streeter & E. Benjamin Wylie, McGraw Hill Publications.
2. Fluid Mechanics- Frank M White, Sixth Edition, the McGraw Hill Companies.
3. Fundamentals of Fluid Mechanics- Bruce R Munson & Donald F Young, John Wiley & Sons, Inc.
4. Fluid Mechanics- K.L. Kumar, S. Chand & Company Ltd, New Delhi.
5. Fluid Mechanics & machinery – C.S.P. Ojha, R. Berndtsson & P.N. Chandramouli, Oxford University Press.
6. Fluid Mechanics- R.K. Bansal, Laxmi Publications, New Delhi.

E-Books / Resources

http://nptel.ac.in/courses/105101082/
http://elearning.vtu.ac.in/10CV35.html

Course Name	**Strength of Materials**	Course Code	**15CV3DCSOM**	SEE Duration	SEE+CIE
Credits	**05**	L-T-P-S	**3-1-1-0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

After having learnt the mechanism of force transference, it is essential to know the response of the material/structure under different configuration of loading. The objectives of the course are to enable students to identify different materials and their response to loadings in terms of stresses, strains, bending moment and shear force.

COURSE OUTCOMES:

CO1: Explain stress and strain at a point and their relations in a deformable material

CO2: Apply the force equilibrium conditions and the concept of free body diagrams to determine structural responses

SIMPLE STRESSES AND STRAINS:

Introduction, Properties of Materials, Stress, Strain, Hooke's law, St. Venant`s principle, Stress–Strain Diagram for structural steel and nonferrous materials, Principles of superposition, Deformation of uniform bars, bars of varying cross ections,taperingbarsofcircularandrectangularcrosssections.Deformationduetoself–weight.

8 Hours

ELASTIC CONSTANTS:

Relationship among elastic constants, volumetric strain, Stresses in composite sections Thermal stresses (including thermal stresses in compound bars).

TRANSFORMATION OF STRESSES: Introduction, Resolution of stresses on inclined planes, General two dimensional stress system, Principal planes and Principle stresses, Plane stress and plane strain conditions, Mohr's circle of stresses

8 Hours

BENDING MOMENT AND SHEAR FORCE IN BEAMS:

Introduction, Definitions-Bending moment and Shearing force in beam, Sign convention, Relationship between loading, shear force and bending moment, SFD and BMD with salient values for statically determinate beams(cantilever Beams, simply supported beams and overhanging beams) subjected to point loads, UDL, UVL and Couple.

BENDING STRESS IN BEAMS: Introduction – Bending stress in beam, Assumptions in simple bending theory, Pure bending derivation of Bernoulli's equation, Modulus of rupture, section modulus, flexural rigidity, Variation of bending stresses across the cross section of the beams

SHEAR STRESS IN BEAMS: Expression for horizontal shear stress in beam, Shear stress diagram for rectangular, symmetrical 'I' and 'T' section (Flitched beams not included).

12 Hours

ELASTIC STABILITY OF COLUMNS: Introduction–Short and long columns, Assumptions, Euler's theory on columns, Derivation of Euler's buckling load for a column with both ends hinged Effective length slenderness ratio, radius of gyration., Limitations of Euler's theory, Rankine's formula and problems.

12 Hours

TORSION OF CIRCULAR SHAFTS:

Pure torsion, torsion equation of circular shafts, Strength and stiffness, Torsional Rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections.

THIN AND THICK CYLINDERS: Stresses in thin cylinder subjected to pressure, hoop, longitudinal and volumetric strains, Thick cylinders-Lame's equations, radial and hoop stresses (excluding compound cylinders).

6 Hours

TEXT BOOKS:

1. Mechanics of Materials by Ferdinand P. Beer and E. Russel Johnston(jr)Publisher, 6th Edition, 2013
2. Strength of materials by L.S.Srinath, Prakash Desai and Ananth Ramu Publisher, 2nd Edition, 2009

REFERENCE BOOKS:

1. Elements of Strength of Materials, Timoshenko and Young, Affliated East-West Press.
2. Mechanics of Materials, James M. Gere (5thEdition),Thomson Learning.
3. Strength of materials By I.B.Prasad, Khanna Publisher

LEARNING RESOURCES: NPTEL

EXPERIMENTS/EXERCISES:

1. Physical properties of Bricks and Blocks – Dimensionality, water absorption, density and Compressive strength
2. Impact test on Mild Steel (Charpy & Izod)
3. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's
4. Tension test on Mild steel and HYSD bars.
5. Compression test of Mild Steel, Cast iron and Wood
6. Torsion test on Mild Steel circular sections
7. Bending Test on Wood and Mild steel
8. Shear Test on Mild steel

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DEPARTMENT OF CIVIL ENGINEERING

Semester: IV (2015 onwards)

Course Code	Course Title	Teaching Dept.	Credits				Total Credits	Contact Hours	CIE MARKS	SEE MARKS	TOTAL MARKS
			L	T	P	S					
15MA4GCMAT	Maths (BS)	MATHS	3		-	-	3	3	50	50	100
15CV4DCSTA	Structural Analysis (ES)	CIVIL	3	1	-	-	4	5	50	50	100
15CV4DCCON	Concrete Technology (ES)	CIVIL	2	-	1	2	5	4	50	50	100
15CV4DCASY	Advanced Surveying (ES)	CIVIL	2	-	1	-	3	4	50	50	100
15CV4DCSME	Soil Mechanics (ES)	CIVIL	2	1	-	-	3	4	50	50	100
15CV4DCHYM	Hydraulics & Hydraulic Machines (ES)	CIVIL	2	-	1	-	3	4	50	50	100
15CV4DCBPD	Building Planning & Drawing (ES)	CIVIL	1	-	1	2	4	4	50	50	100
			Total Credits			4	**25**	28			**700**

L- Lecture Hours/Week, Tutorial -2 Hour/week, P- Practical-2 Hours/week, S-Self Study

Course Name	**Engineering Maths-IV**	Course Code	**15MA4GCMAT**	SEE Duration	SEE+CIE
Credits	**03**	L-T-P-S	**3-0-0-0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

To prepare students with adequate knowledge in Probability and Statistics, Complex Analysis

COURSE OUTCOMES:

CO1: Calculate solutions of algebraic and transcendental equations, ordinary differential equations numerically

CO2: Compute solution of one dimensional heat and wave equation using finite difference techniques.

CO3: Construct analytic functions and evaluate real and complex integrals.

CO5: Estimate the relation between two variables and perform regression analysis.

CO6: Apply the basic principles of probability and probability distributions.

NUMERICAL METHODS:

Solution of algebraic and transcendental equations: Newton-Raphson method. Finite Differences and interpolation: Forward differences, backward differences. Newton-Gregory forward interpolation formula, Newton-Gregory backward interpolation formula, Lagrange's interpolation formula, Lagrange's inverse interpolation.

Numerical integration: Simpson's $1/3^{rd}$, $3/8^{th}$ rule, Weddle's rule.

Numerical solution of ordinary differential equations: Euler's modified method, Runge-Kutta method of fourth order**.**

Suggested Reading: Solution of simultaneous differential equations by Picard's method, Milne's method to solve ordinary differential equations

7 Hours

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS:

Finite-Difference formulas to partial derivatives.

Applications: Solution of one-dimensional heat equation using 2-level formula and Schmidt explicit formula and Crank-Nicolson two-level implicit formula Solution of one-dimensional wave equation using explicit three level formula.

8 Hours

COMPLEX ANALYSIS-1:

Function of a complex variable, limits, continuity and differentiability of a complex valued function, Analytic functions, properties of analytic functions, Cauchy-Riemann equations in cartesian and polar form, construction of analytic functions by Milne-Thomson method, Conformal mapping-Transformations- $w = z^2$ and $w = z + \frac{a^2}{z} \quad z \neq 0$, Bilinear transformations.

Suggested Reading: Standard transformations $w = c + z$, $w = cz$, $w = 1/z$, properties of bilinear transformations

7 Hours

COMPLEX ANALYSIS-2:

Line integral, Problems on line integral, Cauchy's theorem, Cauchy's integral formula.

Taylor's, Maclaurin's and Laurent's series (without proof).Poles, Residues, Residue theorem (without proof).Evaluation of real definite integrals using residues - Integration around a unit circle and semicircle

Suggested Reading: Removable and essential singularities, improper real integrals with singular points on real axis.

7 Hours

STATISTICS AND PROBABILITY:

Curve fitting – Principle of least squares, fitting a straight line, fitting of a parabola, fitting of exponential curves of the form $y = a\ b^x$, $y = ae^{bx}$. Correlation and regression.

Probability distributions: Discrete distribution - Poisson distribution. Continuous distribution-normal distribution.

Suggested Reading: Fitting the curve $y = a\ x^b$, exponential distribution and uniform distribution

7 Hours

TEXT BOOKS

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th edition, 2007, Wiley-India
2. Higher Engineering Mathematics, B.S. Grewal, 40th edition, 2007, Khanna Publishers.

REFERENCE BOOKS:

1. Advanced Modern Engineering Mathematics, Glyn James, 3rd edition, 2004, Pearson Education.
2. Higher Engineering Mathematics, B.V. Ramana, 2007, Tata Mc. Graw Hill.
3. Advanced Engineering Mathematics, P. V. O' Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.
4. Introductory methods of Numerical Analysis, S. S. Sastry, 3rd edition, 1999, Prentice-Hall of India.

IV SEMESTER CIVIL ENGINEERING

Course Name	**Structural Analysis**	Course Code	**15CV4DCSTA**	SEE Duration	SEE+CIE
Credits	**04**	L-T-P-S	**3:1:0:0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

To enable the students to gain knowledge on the fundamentals of structural analysis by applying the knowledge gained through Engineering Mechanics and Strength of Materials. It enables to get the prerequisite for advanced analysis and design of structures.

COURSE OUTCOMES:

CO1: Identify forms of structures and the associated indeterminacies

CO2: Apply the force equilibrium conditions and compatibility conditions to analyze simple structures like arches, cables and evaluate structural resultants.

CO3: Apply energy principles to analyze and evaluate simple determinate structures.

Introduction to Structural Systems-Classification of structures, Structural forms, Loads, Conditions of equilibrium, Compatibility conditions, Statically determinate and indeterminate structures, degree of Static and Kinematic indeterminacy.

Analysis of Cables and Three Hinged Arches - Types of Arches, Analysis of Three hinged arches (Parabolic and Circular) with supports both at same and at different levels. Analysis of cables under point loads and UDL (supports at same level and different level)

12 Hours

Deflection of Beams- Macaulay's double integration method, Conjugate beam method and moment area method.

Consistent Deformation method; Analysis of Propped cantilever and fixed beams.

Analysis of Continuous beams: Clapeyron's theorem of three moments.

20 Hours

Strain Energy Principle-Strain energy and complimentary strain energy. Strain energy due to axial load, bending moment and shear force. Theorem of minimum potential energy, principle of virtual work. Castigliano's theorems and their applications in the analysis of beams and trusses. Maxwell – Betti theorem of reciprocal deflection.

6 Hours

Deflection of beams and trusses by Unit load method. Redundant Trusses- Analysis by unit load method. **10 Hours**

TEXT BOOKS:

1. Theory of Structures Vol-1 by Pandit and Gupta, Tata McGraw Hill, New Delhi, 1st Edition
2. Basic Structural Analysis by C S Reddy, Tata McGraw Hill, New Delhi, 3rd Edition

REFERENCE BOOKS:

1. Elementary Structural analysis, Norris and Wilbur, International student edition, Tata McGraw Hill book Co, New York.
2. Structural Analysis by R C Hibler, 5th edition, Pearson Education Inc.

Learning Resources: NPTEL

Course Name	**CONCRETE TECHNOLOGY**	Course Code	**15CV4DCCON**	SEE Duration	SEE+CIE
Credits	**05**	L-T-P-S	**2-0-1-2**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

To enable students to have the knowledge on the ingredients for concrete preparation, properties of concrete and the testing of concrete properties in accordance with the IS codes.

COURSE OUTCOMES:

CO1: Apply the fundamental principles and procedures in making concrete

CO2: Apply basic requirements of the IS design specifications for designing concrete mixes

CO3: Assess the deterioration of concrete and test methods

CO4: Recognize the characteristics of special types of concrete

CONCRETE INGREDIENTS:

Hydraulic Cements: Manufacturing process, Chemical composition, types of cement, hydration of cement, micro structural development of Portland cement, testing of cement

Aggregates: Properties, types of aggregates, classification of aggregates, importance of grading, specific gravity, bulking, moisture content, deleterious materials, testing of aggregates, interfacial transition zone, recycled aggregates.

Water: qualities of water, use of sea water Chemical admixtures: water reducers, accelerators retarders and air entraining admixture Mineral additives; fly ash, slag, silica fume, rice husk ash, metakaolin and limestone powder

FRESH CONCRETE AND CONCRETE PRODUCTION:

Properties of fresh concrete; Workability, Factor affecting workability, measurement of workability, slump, compacting factor, Vee-Bee consistometer and flow tests, Segregation and bleeding, shrinkage, Rheology of fresh concrete, its importance and Bingham parameters Process of manufacture of concrete: Batching, mixing, transportation, placing and compaction and curing by different methods

MIX PROPORTIONING OF CONCRETE:

Concrete mix design: Concept of mix design, role of water to cement ratio, water content, other variables and exposure conditions, IS method, ACI method, numerical problems, concept of particle packing and rheology based method of mix design

HARDENED PROPERTIES AND DURABILITY OF CONCRETE:

Engineering properties of concrete; Compressive strength and the factors affecting the strength, tensile strength, bond strength, modulus of rupture, Elasticity, factors affecting modulus of elasticity, poisons ratio, creep, provisions of IS 456 in quality control

Durability: Significance of durability, mass transport in concrete, carbonation, chloride ingress Sulphate attack, freezing and thawing

IN-SITU TESTING AND SPECIAL CONCRETES:

Non–destructive testing; rebound hammer, ultrasonic pulse velocity, penetration and pull out test, principle, applications and limitations, core extraction

Special concretes; Introduction to fibre reinforced concrete, high strength concrete, self-compacting concrete, geo polymer concrete and ready mix concrete,

TEXT BOOK:

- Properties of Concrete - A M Neville (Pearson Education Asia Pvt ltd,), Four Edition

REFERENCE BOOKS:

- Concrete –microstructure,properties and materials –PK Mehta and paulo JM Monteiro (ICI)
- Concrete Technology - A R Santhakumar (Oxford –New Delhi)
- Concrete Technology - Gambhir ML(Tata McGrawHill)
- Concrete Mix Design - N Krishna raju
- Concrete Technology Theory and Practice - MS Shetty(S Chand and company)
- Relevant codes
- Current literature

EXPERIMENTS/ EXERCISES

Tests on Fine Aggregate:

1. Specific Gravity Test
2. Sieve analysis
3. Bulking of fine aggregate
4. Unit weight % Voids

Tests on Coarse Aggregate:

1. Specific Gravity & Water absorption test
2. Sieve analysis
3. Unit weight

Tests on Cement:

1. Consistency test on cement
2. Setting time test on cermet
3. Specific gravity test
4. Fineness of cement
5. Compressive strength of cement

Tests on fresh concrete:

1. Slump test
2. Compaction factor test
3. Vee-Bee Consistometer test
4. Flow table test

Tests on hardened concrete

1. Compressive strength of concrete cube
2. Compressive strength of Cylinder
3. Split tensile strength
4. Flexural strength of concrete beam

NDT tests

1. Pulse ultrasonic test
2. Rebound Hammer test.

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(Autonomous College under VTU)

IV SEMESTER CIVIL ENGINEERING

Course Name	**Advanced Surveying**	Course Code	**15CV4DCASY**	SEE Duration	SEE+CIE
Credits	**03**	L-T-P-S	**2:0:1:0**	**3Hours**	**50+50**

OBJECTIVES:

To enable the students to gain knowledge in the advancements of Surveying, which enables the student in a faster decision making process

COURSE OUTCOMES:

CO1: Apply fundamental principles and procedures for curve setting.

CO2: Recognize the characteristics of Triangulation.

CO3: Describe the functional components of field astronomy.

CO4: Recognize the basics of Photogrammetry Remote sensing and GIS

CURVE SETTING:

Simple Circular Curves, Elements, Setting out two theodolite method; Compound and Reverse curve, Elements, Relationship between various parts of reverse curve; Transition curve, elements, computation and setting out; Vertical curves computation and setting out.

6 Hours

TRIANGULATION:

Geodesic Surveying, Classification, Signals and towers, Base line masurement, Computations.

4 Hours

FIELD ASTRONOMY:

Definitions, Co-ordinate system, Astronomical triangle, Units of time, Determination of co-ordinates, Observations for time, Determination of Azimuth, Determination of Latitude and Longitude.

4 Hours

PHOTOGRAMMETRY:

Introduction – Basic Principles- Photo theodolites - Definitions – Horizontal and Vertical angle from teerestial photography – Horizontal position of a point from photo graphicmeasurement from camera horizontal axis - Elevation of point by photographic measurement – Focal length, Basics of Aerial Surveying.

4 Hours

REMOTE SENSING:

Introduction – Historical sketch of Remote Sensing - Idealized remote sensing – Basic principles of remote sensing – Electromagnetic energy electromagnetic spectrum – Wave length regions and their application in remote sensing – characteristics of solar radiation – Basic radiation law – EM radiation and atmosphere –Interaction of EM radiation with earth surface –remote sensing observation platform – sensors – applications.

4 Hours

GEOGRAPHIC INFORMATION SYSTEMS (GIS):

Definitions: The four M's concept – contributing disciplines for GIS, GIS objectives – components of a GIS –Topology –Data structures –Data base management –Errors in GIS –GIS software package –Linkage of GIS to remote sensing –application areas of GIS and Remote sensing; GIS concepts and spatial models; Spatial information, temporal information, conceptual models of spatial information, representation of geographic information, Data management.

4 Hours

TEXT BOOKS:

1. Kavanagh, Barry F. Surveying: Principles and Applications, Vol-2, 8th Edition, 2009, Prentice Hall.
2. Remote Sensing and Image Interpretation – Lille Sand, John Wiley and Sons, 7th Edition, 2015
3. Elements of Photogrammetry – Paul R Wolf, McGraw International, 4th Edition, 2014

REFERENCES BOOKS:

1. Principles of GIS –Peter A Burrough, Oxford Publications
2. GIS and Computer Cartography –Christopher Jones, Longman Publications
3. GIS –Bemhardsen, Wiley Publications.
4. Surveying- Vol. II – B.C. Punmia, Ashok K. Jain, Laxmi Publications.
5. Remote Sensing and GIS – M Anji Reddy.
6. Arthur Bannister, Stanley Raymond and Raymond Baker. Surveying, Vol.2, 7th Edition, Pearson Education.

EXPERIMENTS/EXERCISES:

1. Setting out a Simple Curve.
2. Setting out a Compound curve.
3. Setting out a Reverse Curve.
4. Setting out a Transition curve.
5. Setting out Bernoulli's lemniscate curve.
6. Triangulation: Baseline measurement.
7. Tracing contours.
8. Satellite stations reduction to centre.
9. GPS Survey.
10. Field Astronomy: Determination of latitude and longitude.
11. Remote Sensing: Digitization of an image.
12. GIS – Basics of data storage.

Course Name	**Soil Mechanics**	Course Code	**15CV4DCSME**	SEE Duration	SEE+CIE
Credits	**03**	L-T-P-S	**2:1:0:0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

To provide the basic principles and to understand the engineering behaviour of soil to address practical problems in soil mechanics.

COURSE OUTCOME:

CO1: Evaluate index properties of soils, analyze and interpret the experimental data to classify and identify soil.

CO2: Describe structure of soils, soil water systems and evaluate effective stresses in soils.

CO3: Explain the concepts and evaluate permeability, compaction characteristics and shear parameters of soil.

INTRODUCTION:

Definition, origin and formation of soil. Agents causing formation of soils. List of different soil types. Definition of mass, weight. Relation between mass and weight. Units of mass and weight in SI units. Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Moisture content, Specific gravity, Bulk density, Dry density, Saturated density, Submerged density and their interrelationships , Numerical problems

8 Hours

INDEX PROPERTIES OF SOILS AND THEIR DETERMINATION:

Index Properties of soils and their significance. Various index properties and their Laboratory determination, -Water content, Specific Gravity, Particle size distribution (Sieve analysis and Hydrometer analysis), Relative density, Consistency limits and their indices, in-situ density, Activity of Clay, Thixotropy of clay, IS classification; - Plasticity chart and its importance, Field identification of soils. Numerical problems

10 Hours

CLAY MINERALOGY AND SOIL STRUCTURE:

Single grained honey-combed, flocculent and dispersed structures, Types of soil-Water, base-exchange capacity, Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite.

Effective Stress: Effective stress concept-Total pressure and Porepressure, effect of water table, Numerical problems

6 Hours

FLOW OF WATER THROUGH SOILS-I:

Darcy's law- Assumption and validity, coefficient of permeability and its Laboratory determination, factors affecting permeability, permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation, Numerical problems

Compaction of soils: Definition, Principle of compaction. Standard and Modified Proctor's tests and their compactive energy. Factors affecting compaction, Field compaction control, Numerical problems

8 Hours

SHEAR STRENGTH OF SOILS:

Concept of shear strength, Mohr's strength theory, Mohr-coulomb theory, factors affecting shear strength of soils, conventional failure envelope. Total and effective shear strength parameters, Sensitivity of clay. Measurement of shear parameters-Direct shear test, unconfined compression test, and, Tri-axial shear test., Types of drainage conditions,

8 Hours

TEXT BOOKS

1. Bowles J.E. (1988), "Engineering Properties of Soil and Their Measurements", McGraw Hill Book Co. New York.
2. Lambe T.W., "Soil Testing for Engineers", Wiley Eastern Ltd., New Delhi,

REFERENCE BOOKS:

1. Punmia B.C. (2005), "Soil Mechanics and Foundation Engg.", 16th Edition, Laxmi Publications Co. , New Delhi.
2. Head K.H., (1986), "Manual of Soil Laboratory Testing", Vol. I, II, III, Princeton Press, London.

3. Braja, M. Das (2002), "Principles of Geotechnical Engineering", Fifth Edition, Thomson Asia Pte Ltd.,
4. Craig R.F. (2004), "Soil Mechanics", 7th edition, Spon press, New York.
5. GopalRanjan and Rao A.S.R. (2000), "Basic and Applied Soil Mechanics", New Age International (P) Ltd., New Delhi.
6. Lambe and Whitman (1979), "Soil Mechanics" John Wiley & Sons, New York
7. Terzaghi. K., and Peck. R.B. (1967) "Soil mechanics in Engineering practice", 2nd Edition, John Wiley and Sons, New York.
8. Relevant B.I.S codes

E-BOOKS

1. http://www.myopencourses.com/subject/e-book-on-concepts-and-techniques-in-geotechnical-and-foundation-engineering
2. http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv104-Page1.htm
3. nptel.ac.in/courses/105101084/
4. https://ay14-15.moodle.wisc.edu/prod/course/view.php?id=499

Course Name	**Hydraulics & Hydraulics Mechanics**	Course Code	**15CV4DCHYM**	SEE Duration	SEE+CIE
Credits	**03**	L-T-P-S	**2:0:1:0**	**3 Hours**	**50+50**

COURSE OBJECTIVES:

To enable the students to gain knowledge in understanding the fundamentals of hydraulics and functioning of hydraulic machine. Expose the students to experimental techniques in hydraulics and evaluations of hydraulic machines.

COURSE OUTCOME:

CO1: Understand and analyse the Uniform & Non Uniform Flows in open channels.

CO2: Understand Impulse Momentum Equation and its applications & carry out computations on impact of jet on fixed, moving plates.

CO3: Understand the working of pumps and turbines and study the performance of these machines.

CO4: Understand the dimensional analysis and apply it in the design of prototypes.

FLOW IN OPEN CHANNELS: Definition of channel, difference between pipe and open channel flow, classification, types of flows, geometric properties of open channels.

2 Hours

Uniform flow in open channels, Chezy's & Manning's formula, Most economical open sections- rectangular, trapezoidal, circular sections- derivations. Specific Energy, definitions, Specific Energy curve, condition for Maximum discharge & Minimum specific energy, critical flow in rectangular sections.

4 Hours

FLOW IN OPEN CHANNELS (NON-UNIFORM FLOW): Definition, Types of Non- Uniform flows, Gradually Varied flow- derivation & Problems, Classification of channel bottom slopes, hydraulic jump, hydraulic jump in a rectangular channel, types & applications.

5 Hours

IMPACT OF JET ON VANES: Introduction to impulse momentum equation, Force exerted by a jet of water on fixed and moving plates- Vertical, inclined, symmetrical and unsymmetrical curved plates, series of curved vanes, velocity triangles, work done & efficiency

5 Hours

TURBINES: Definition, classification, Pelton turbine, theory, equation for work done and efficiency, problems, Francis turbine, Kaplan turbine, theory, equation for work done and efficiency, Specific speed, unit quantities, characteristic curves.

5 Hours

PUMPS: Definition, classification general principle, priming, work done, minimum starting speed

5 Hours

TEXT BOOKS:

1. Hydraulics & Fluid Mechanics – P.N. Modi & S.M. Seth, Standard Book House, New Delhi, 20th Edition, 2015

REFERENCE BOOKS:

1. Experimental Fluid Mechanics - Asawa,G.L., Vol.1, Nem Chand and Bros.,
2. Flow through Open Channels , Subramanya K, TMH Publications
3. Fluid Mechanics- R.K. Bansal, Laxmi Publications, New Delhi.
4. Fluid Mechanics- K.L. Kumar, S. Chand & Company Ltd, New Delhi.
5. Fluid Mechanics through Problems- Garde,R.J., New Age International Publications, New Delhi.
6. Flow through open channels- Ranga Raju, K.G., T.M.H. 2nd edition
7. Open Channel Hydraulics- V.T. Chow, Mc-Graw Hill Publications.

E-Books

http://nptel.ac.in/courses/105103096

http://nptel.ac.in/courses/105107059/

http://elearning.vtu.ac.in/P6/enotes/CV44/Flw_OpenCh-NB.pdf

EXPERIMENTS/EXERCISES:

1. Hydrostatic Bench
2. Reynold's Apparatus
3. Heale Shaw Apparatus
4. Pressure drop in a Venturi meter
5. Friction in pipes
6. Coefficient of discharge of an Orifice & Mouth Piece
7. Coefficient of discharge of a V- Notch
8. Coefficient of discharge of an oghee weir & a Rectangular notch
9. Coefficient of discharge of a Venturimeter
10. Study the impact of jets on vanes
11. Study on hydraulic jump
12. Centrifugal pump and turbines

Course Name	**Building Planning & Drawing**	Course Code	**15CV4DCBPD**	SEE Duration	SEE+CIE
Credits	**04**	L-T-P-S	**1:0:1:2**	**4 Hours**	**50+50**

COURSE OBJECTIVES:

To enable students to gain drafting skills and visualize the various components of a building. This will enable students to design the buildings based on the given functional requirements.

COURSE OUTCOMES:

CO1: Prepare drawings of components of a building.

CO2: Design and prepare functional drawings for buildings as per norms.

CO3: Develop drawings showing the interconnectivity of functional components of buildings along with service layouts.

Guidelines for building drawings, Scales, definition of terms used in building drawings. To prepare geometrical drawing of component of buildings i) Stepped wall footing and isolated RCC column footing, ii) RCC dog legged stairs, iii) Doors & windows (Fully paneled door & glazed window), iv) Truss (Wooden & steel)

15 Hours

Specification for residential and public building, bye laws, setback distances and calculation of carpet area, plinth area and floor area ratio.

Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram of public buildings (Primary Health Centre, office building, school building).

12 Hours

For a given single line diagram, preparation of water supply, sanitary and electrical layouts,

6 Hours

Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Two bed room single storey building, ii) Two storeyed building (Only for Practice)

15 Hours

Text Books:

1. **"Building Drawing"**, by Shah M. H. And Kale C. M., Tata McGraw Hill Publishing Co. 2002

REFERENCE BOOKS:

2. **"A Course in Civil Engineering Drawing"**, by V. B. Sikka, S. K.Kataria & Sons.
3. **"Building Construction"**, Gurucharan Sing, Standard publication
4. **IS:962-** Code of practice for architecture and building drawing National Building code, BIS, New Delhi