

SCHEME OF INSTRUCTION & EXAMINATION
B.E. IV – Semester
(CIVIL ENGINEERING)

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/Drg	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	BS423MT	Numerical Methods	3	1	-	4	30	70	3	3
2	PC401CE	Strength of Materials-II	3	1	-	4	30	70	3	3
3	PC402CE	Fluid Mechanics-II	3	1	-	4	30	70	3	3
4	PC403CE	Surveying-II	3	1	-	4	30	70	3	3
5	PC404CE	Hydrology and Water Management	3	-	-	3	30	70	3	3
6	MC916CE	Environmental Sciences	3	-	-	3	30	70	3	3
7	HS401BM	Managerial Economics and Accountancy	3	-	-	3	30	70	3	3
Practical / Laboratory Courses										
8	PC451CE	Material Testing Lab	-	-	2	2	25	50	3	1
9	PC452CE	Fluid Mechanics-I lab	-	-	2	2	25	50	3	1
10	PC453CE	Surveying-II Lab	-	-	2	2	25	50	3	1
Total			21	4	06	31	285	640		24

Engineering Service Courses Offered to other Departments

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	Pr/Drg	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1.	MC916CE	Environmental Sciences (for ECE & AE)	3	-	-	3	30	70	3	3

BS: Basic Sciences ES: Engineering Sciences MC: Mandatory Course
PC: Professional Course HS: Humanities and Sciences
L: Lectures T: Tutorials Pr : Practicals Drg: Drawing
CIE: Continuous Internal Evaluation **SEE:** Semester End Examination (Univ. Exam)

Note: 1) Each contact hour is a Clock Hour
2) The practical class can be of two and half hour (clock hours) duration as per the requirement of a particular laboratory.

Course Code	Course Title					Core / Elective	
BS423MT	Numerical Methods					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	3	1	-	-	30	70	3
Course Objectives <ul style="list-style-type: none"> ➤ Introduction to few numerical methods to solve non linear equations and system of linear equations ➤ Basic concepts of numerical differentiation, numerical integration and differential equations ➤ Concepts of finite differences and their applications Course Outcomes <ul style="list-style-type: none"> ➤ Solution to non linear equations, system of linear equations, differential equations and eigenvalue problems numerically . ➤ Concepts of numerical differentiation and integration ➤ Application of finite differences to solve initial and boundary value problems 							

UNIT-I

Solution of linear and non linear equations: Solution of Algebraic and Transcendental equations-Bisection method, Newton-Raphson method, Solution of linear system of equations- Gauss elimination method, LU decomposition method, Gauss-Jacobi and Gauss-Seidel iteration methods.

UNIT-II

Eigenvalue problems and Interpolation: Eigenvalues and Eigenvectors-Jacobi method for symmetric matrices- Given's method for symmetric matrices, Interpolation, Lagrange's interpolation, Newton's divided difference interpolation, Newton's Forward and Backward difference interpolations.

UNIT-III

Numerical differentiation and Integration : Numerical differentiation, Interpolation approach, Numerical integration-Trapezoidal rule, Simpson's 1/3 rule, Romberg method, Two point and three point Gaussian quadrature formulae, Double integration-Trapezoidal rule, Simpson's 1/3 rule.

UNIT-IV

Numerical solutions of ordinary differential equations : Single step methods, Taylor's series method, Euler's method, Picard's method of successive approximations, Runge-Kutta method of 4th order, Multi step methods, Milne's and Adams-Bashforth Predictor-Corrector methods.

UNIT-V

Finite Differences and their applications: construction of finite difference approximations- Taylor series, forward, backward and central difference approximation,

finite difference approximation of boundary value and initial value problems, 1D and 2D problems- Explicit and implicit and Crank Nicolson schemes, convergence and stability.

Suggested Readings:

- 1) M.K.Jain,S.R.K.Iyengar and R.K.Jain, *Numerical methods for scientific and engineering computation* ,6th edition , New Age International Limited., 2012.
- 2) Richard L Burden, J. Douglas Faires , *Numerical Analysis* , 9th edition, Cengage Learning, 2013.
- 3) S.S.Sastry, *Introductory Methods of Numerical Analysis*, 5th edition, PHI Private Limited, 2012.
- 4) Dr.B.S.Grewal, *Numerical methods in Engineering and Science*, Khanna Publishers, 2014.
- 5) StevanC.Chopra, Raymond P.Canal, *Numerical Methods for Engineers* ,6th edition, McGraw-Hill company,2010.

Course Code	Course Title					Core / Elective	
PC401CE	Strength of Materials - II					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	3	1	-	-	30	70	3
Course Objectives							
<ul style="list-style-type: none"> ➤ Study the basic concept of deflections by using various methods and to predict the deformations of a member subjected to various loads and its combinations ➤ Differentiate statically determinate and indeterminate structures and to analyse members by applying the principles of equilibrium and compatibility in deformation. ➤ Understand the concepts of pure torsion, different types of spring and their practical applications ➤ Know about the concept of strain energy principle and its applications to beams for finding their deflection ➤ Students will be able to understand Euler's formula, secant and straight line formula and their application to long and short columns. 							
Course Outcomes							
<ul style="list-style-type: none"> ➤ To calculate the deflections of a member due to various loads and its combinations. ➤ Analyze statically indeterminate structural members ➤ Define pure torsion and derive torsional equation and know the advantage of hollow shafts in transmitting power. ➤ Distinguish the failures of columns by crushing and crippling and analyze with different end conditions by using different theories 							

UNIT-I

Deflection: Slope and deflection by double integration method for cantilever, simply supported beams and overhanging beams carrying one, two point loads, u.d.l. and uniformly varying load over entire span. Moment area and conjugate beam method.

UNIT-II

Propped cantilevers: Cantilever beams on elastic and rigid props for point loads and u.d.l. only. Calculation of reactions, B.M. and S.F. diagrams and deflections.

Fixed Beams: Determination of shear force, bending moment slope and deflection in fixed beams with and without sinking of supports for (i) point loads (ii) u.d.l. (iii) uniformly varying load over entire span.

Continuous Beams: Determination of moments in continuous beams with and without sinking of supports by theorem of three moments, S.F. and B.M. diagrams.

UNIT-III

Torsion: Theory of pure torsion in solid and hollow circular shafts, shear stress, angle of twist, strength and stiffness of shafts- Transmission of Power- Combined torsion and bending with and without end thrust- Determination of principal stresses and maximum shear stress- Equivalent bending moment, and equivalent twisting moment.

Springs: Close and open coiled helical springs under axial load and axial twist- Carriage springs.

UNIT-IV

Strain energy: Strain energy and resilience in statically determinate bars subjected to gradually applied, suddenly applied, impact and shock loads. Resilience of beams. Deflections from resilience. Castigliano Theorem - I and its application to beams- Reciprocal theorem. Static indeterminacy and kinematic indeterminacy of structures.

UNIT-V

Column analogy method: Application to fixed beams- analogous column- stiffness and carryover factors.

Columns and Struts: Euler's theory for long columns- different end conditions- equivalent length- Rankine's theory. Eccentrically loaded columns- Secant and Perry's formulae.

Suggested Reading:

- 1) D.S. PrakashRao, *Strength of Materials* - A practical Approach, Universities Press, 1999.
- 2) S.B. Junarkar, *Mechanics of Structures (Vol. 1 &2)*, Charotar Publishing House Anand, 1992.
- 3) R.K. Rajput, *Strength of Materials*, S. Chand & Co., 2003.
- 4) B.C. Punmia, *Strength of Materials and Theory of Structures*, Laxmi Publishers, Delhi, 2000.
- 5) G.H. Ryder, *Strength of Materials*, Third Edition in SI units, Macmillan Indian Limited, Delhi, 2002.
- 6) A.Pytel and F. L. Singer, *Strength of Materials*, Harper & Row, Fourth Edition, New York, 1987.
- 7) R.K. Bansal, *A Text book of Strength of materials*, Lakshmi Publications, New Delhi, 2010.
- 8) Dr. Sadhu singh, *Strength of Materials*, Khanna Publishers, Delhi, 2006.
- 9) S.M.A Kazimi, *Solid mechanics*, Tata Mc- raw-Hill Publications Ltd. New Delhi, 2009
- 10) B.C. Punmia, Ashok kumar Jain, Arunkumar Jain, *Theory of structures*, Lakshmi publications (P) Ltd, New Delhi, 2007.

Course Code	Course Title					Core / Elective	
PC402CE	Fluid Mechanics - II					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	3	1	-	-	30	70	3
Course Objectives <ul style="list-style-type: none"> ➤ Analysis of various flow characteristics in closed conduits ➤ Concepts of boundary layer theory, drag and lift ➤ Basics of open channel flows under different flow conditions Course Outcomes <ul style="list-style-type: none"> ➤ Knowledge of various flow characteristics in closed conduits ➤ Application of boundary layer theory concepts ➤ Design of open channels for different flow conditions 							

UNIT-I

Laminar and turbulent flow through pipes: Reynolds experiment, significance of Reynolds number, Hydraulic gradient, Laminar flow through circular pipes-(Hagen-Poiseuille equation), Turbulent flow through pipes – Darcy’s equation, Moody’s diagram, pipes in parallel and in series.

UNIT – II

Analysis of Pipe flows: Classification of pipes based on different pipe materials, factors influencing different pipe materials for networks. Types of Boosting arrangements, concepts of pipe leakages.

Unsteady flow in pipes: Water hammer phenomenon, pressure rise due to gradual and sudden valve closure, critical period of the pipe line.

UNIT – III

Boundary layer: Definition, laminar and turbulent boundary layers, boundary layer thickness, displacement thickness, momentum thickness, and energy thickness, hydrodynamically smooth and rough boundaries, and boundary layer separation
Drag and Lift: fundamental concepts of drag and lift forces, drag on a sphere, cylinder, flat plate, and aerofoil.

UNIT - IV

Steady uniform flow through open channels: Descriptions and definitions, difference between pipe flow and channel flow, velocity and pressure distributions in a channel cross-section, energy and momentum correction coefficients, friction to flow in open channels, uniform flow, Manning and Chezy formulae, most efficient channel sections, specific energy, concept and applications of critical depth.

UNIT-V

Gradually varied flow: Significance of Froude number, dynamic equation of gradually varied flow, classification of gradually varied flow profiles, computation of flow profiles, direct step method.

Hydraulic Jump: Momentum equation for a jump in horizontal rectangular channel, Surges in open channels, Elementary surge analysis.

Suggested Reading:

- 1) C.S.P. Ojha, R.Berndtsson, P.N. Chandramouli, '*Fluid Mechanics and Machinery*', Oxford University Press, New Delhi, 2010
- 2) Twort, A.C., F.M. Law, and F.W. Crowley, '*Water Supply*', Edward Arnold, London,1990.
- 3) VenTe Chow, '*Open channel hydraulics*', McGraw-Hill Book Company, New York,1959
- 4) HanifChaudhry, M, '*Open-channel flow*', Prentice-Hall of India Pvt. Ltd., New Delhi,1993
- 5) Subramanya, K, '*Flow through open channels*', Tata McGraw-Hill Publishing Company, New Delhi,1986

Course Code	Course Title					Core / Elective	
PC403CE	Surveying - II					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	3	1	-	-	30	70	3
Course Objectives <ul style="list-style-type: none"> ➤ Know the importance of theodolite, total station and their practical applications ➤ Study the basic concept of trigonometrical leveling, and field applications ➤ Analyze the horizontal and vertical curves for survey work related to Roads and Railways ➤ Know the principles of aerial photogrammetry and its applications ➤ Study the various applications of GPS, GIS and remote sensing for field work. Course Outcomes <ul style="list-style-type: none"> ➤ Understand the basic working principles of theodolite and total station ➤ Calculation of applicable corrections to the measured values ➤ Computation of omitted measurements areas ➤ Computation of setting out data for setting out of horizontal and vertical curves by various methods ➤ Understand and learn the basic concepts related to Photogrammetry, GIS and GPS ➤ Learn various applications of the Photogrammetry, GIS and GPS for land surveying 							

UNIT-I

Theodolite: Construction details of Vernier theodolite, definitions, temporary and permanent adjustments. Measurement of horizontal angle by repetition and reiteration methods-Measurement of (a) vertical angle, (b) direct angle, (c) deflection angle and (d) magnetic bearing- errors in theodolite survey. Introduction to Electromagnetic Distance Measurement (EDM) and Total station: Tacheometry, Basic definitions, Basic Principle of electronic distance measurement, Phase of the wave, types of waves, distance from measurement of transit time, measurement of distance from phase distance, carrier waves, Infrared EDM instruments and Microwave EDM instruments, Features of electronic Theodolites, Types and applications of Total Stations.

UNIT-II

Theodolite Traversing and Computations: Traversing by (i) included angles (ii) bearings- conditions of closed traverse- Gale's Traverse table, closing error and its adjustment by various methods, Coordinates, traverse and their computations.

Trigonometrical Levelling: Effect of curvature and refraction, axis signal correction, difference in elevation by single and reciprocal observations heights and distance problem for inaccessible points using a base line for same plane and different plane problems.

UNIT-III

Horizontal curves: Theory of simple curves, setting out simple curves by linear and instrumental methods. Obstructions in ranging of simple circular curve. Compound curve: simple compound curve, compound curve separated by a tangent, three centered compound curve. Elements of reverse curve. Transition curve: Computation of length of transition curve, elements of transition curve.

UNIT-IV

Vertical Curves: Types of vertical curves, length of vertical curves, sight distance on sag curve passing under an overhead structure, Elements of a summit and sag curves, analysis of sight distance on summit and sag curves, Computations of setting out data of summit and sag curves, setting out methods of vertical curves.

UNIT-V

Aerial Photogrammetry: Principles, definitions, types of photographs, stereoscopy, scale, relief displacement, format and lens angle, stereoscopy, flight planning by remote sensing, types of sensors.

Remote Sensing: Principle, components and classification, remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellite (IRS) and applications.

GPS Surveying: Introduction & components of GPS, space segment, control segment and user segment, elements of satellite based survey.

Geographic Information System (GIS): Definition, components, applications and advantages.

Suggested Readings:

- 1) B.C. Punmia, *Surveying, Vol. I and Vol. II*, Laxmi Publications, 1994.
- 2) Arora, K.R., *Surveying, Vol. I, II and III*, Standard Book House., 1995.
- 3) T.M. Lillesand and R.W. Kiefer, *Remote Sensing and Image Interpretation*, John Wiley & Sons, 1994.
- 4) R. Srinivasa Kumar, *A Text Book of Highway Engineering*, Universities Press, Hyderabad, 2011.
- 5) M. Chandra, *Advanced Surveying*, New Age International Publishers New Delhi, 2000.

Course Code	Course Title					Core / Elective	
PC404CE	Hydrology and Water Management					Core	
Prerequisite	Contact Hours per Week				CIE		
	L	T	D	P		Credits	
NIL	3	-	-	-	30	70	3
Course Objectives <ul style="list-style-type: none"> ➤ Understanding the importance of Hydrology and its applications ➤ Introduction to Hydrological processes and estimation of Design flood ➤ Basic concepts and assessment of groundwater flows ➤ Applications of statistical models in Hydrology ➤ Introduction and assessment of soil-water-plant relationship Course Outcomes <ul style="list-style-type: none"> ➤ Estimation of Design flood for Water Resources structures ➤ Computation of drawdown and yield in aquifers ➤ Development of Rainfall – Runoff relationship ➤ Determination of crop – water requirements 							

UNIT-I

General: Definition, relation to engineering design, hydrological cycle, importance of hydrology and its application in engineering.

Rainfall: Definition, types of rainfall, measurement of rain fall, types of raingauges, network design, presentation of precipitation data, mean aerial rainfall; thiessen polygon, isohyetal methods., depth- area- duration curve, dependable rainfall.

Infiltration: Evaporation, transpiration-definitions and processes.

UNIT – II

Runoff: Definition, runoff process, factors affecting runoff, determination of runoff, importance of stream gauging, runoff formulae and runoff tables, dependable yield of a basin.

Floods: Definition, causes, importance of flood studies, flood peak and flood hydrograph, methods of computing flood peak, empirical methods, rational formula, unit hydrograph method, flood frequency studies, Weibul's and Gumble's extreme value methods.

UNIT – III

Ground water: Types of aquifers, aquifer parameters, specific yield, storage coefficient, coefficients of permeability and transmissivity, Darcy's law, types of well, steady radial flow to wells in confined and unconfined aquifers, yield of open wells, safe yield, constant level pumping test and recuperation test.

UNIT-IV

Statistics in Hydrology: Introduction, Statistical parameters; central tendency parameters, dispersion characteristics, skewness., probability distribution; discrete and continuous distribution., frequency analysis; log pearson type III distribution., regression and correlation; standard forms of bivariate equations., multivariate linear regression and

correlation., analysis of time series., selection of a design return period, determination of permissible risk.

UNIT-V

Irrigation: Definition, necessity of irrigation, types of irrigation, advantages and ill-effects of irrigation.

Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture tension, soil moisture stress, soil moisture constants, plant water relationship, moisture stress and plant response, consumptive use, crop factor, duty, factors affecting duty, types of crops and their water requirements, crop rotation.

Suggested Reading:

- 1) K. Subramanya, *Engineering Hydrology*, Tata McGraw Hill Publishing Co.Ltd. 1996.
- 2) H.M. Raghunath, *Hydrology – Principles, Analysis and Design*, New Age International Publishers, 1996.
- 3) Michael, A.M, *Irrigation Theory & Practice*, Vikas Publishing House, New Delhi, 1978
- 4) Ray K.Linsley, Jr, Max A. Kohler, Joseph L.H.Paulhus, *Hydrology for Engineers*, McGraw-Hill Book Company, 1980
- 5) VenTe Chow, *Hand book of Applied Hydrology*, McGraw-Hill Book Company, New York, 1964

Course Code	Course Title					Core / Elective	
MC916CE	Environmental Sciences					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	3	-	-	-	30	70	3
Course Objectives <ul style="list-style-type: none"> ➤ To study the basic concepts, sources of water, floods and their impact on environment ➤ To know the ecosystems and energy resources systems ➤ To understand the Biodiversity concepts and their advantages ➤ To study the different pollutions and their impact on environment ➤ To know the social and environment related issues and their preventive measures Course Outcomes <ul style="list-style-type: none"> ➤ Awareness of effects of hazardous environment. ➤ Idea about optimum utilization of natural resources. ➤ Be a catalyst in moving towards Green technologies ➤ Information about rules and regulations of pollution control 							

UNIT-I

Environmental Studies: Definition, scope and importance, need for public awareness.

Natural resources: Water resources; use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams:benefits and problems. Effects of modern agriculture, fertilizer- pesticide problems, water logging and salinity.

UNIT-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

Energy resources: Growing energy needs, renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

UNIT-III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution; solid and liquid waste management.

Environment Protection Act: Air, water, forest and wild life Acts, enforcement of environmental legislation.

UNIT-V

Social Issues and the Environment: Water conservation, watershed management, and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle, and disaster management in India.

Suggested Readings:

- 1) A.K. De "*Environmental Chemistry*", Wiley Eastern Ltd.
- 2) E.P. Odum "*Fundamentals of Ecology*", W.B. Saunders Co., USA.
- 3) M.N. Rao and A.K. Datta "*Waste Water Treatment*", Oxford and IBK Publications. Benny Joseph "*Environmental Studies*", Tata McGraw Hill, 2005.
- 4) V.K. Sharma "*Disaster Management*", National Centre for Disaster Management, IIPE, Delhi, 1999.
- 5) "Green Building Council of India", Teri Document.

Course Code	Course Title					Core / Elective	
HS401BM	Managerial Economics And Accountancy (Common to all branches)					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	3	-	-	-	30	70	3

Course Objectives

- To learn important concepts of Managerial Economics and apply them to evaluate business decisions.
- To understand various parameters that determines the consumers' behavior.
- To evaluate the factors that affect production.
- To understand the concepts of capital budgeting and payback period.
- To study the concepts of various book-keeping methods.

Course Outcomes

- Determine the objectives, nature, scope, role & responsibilities of a manager of a business undertaking.
- Predict the demand for a product or product mix of a company & to analyze various factors influencing demand elasticity.
- Forecast & compute the future sales level of a product by using various quantitative & qualitative techniques and with the help of past sales data.
- Discuss the process & principles of accounting and prepare Journal, Ledger, Trial Balance, Manufacturing A/c, Trading A/c., Profit & Loss A/c. and Balance Sheet of an enterprise

Unit-I

Meaning and Nature of Managerial Economics: Managerial Economics and its usefulness to Engineers, Fundamental Concepts of Managerial Economics-Scarcity, Marginalism, Equimarginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

Unit-II

Consumer Behavior: Law of Demand, Determinants, Types of Demand; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply and Concept of Equilibrium. (Theory questions and small numerical problem can be asked)

Unit - III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price - Output determination under Perfect Competition and Monopoly (theory and problems can be asked)

Unit-IV

Capital Management: Significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions and numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked)

Unit-V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance, concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios)

Suggested Readings:

- 1) Mehta P.L., *Managerial Economics —Analysis*, Problems and Cases , Sulthan Chand & Sons Educational Publishers, 2011
- 2) Maheswari S.N., *Introduction to Accountancy* , Vikas Publishing House, 2005
- 3) Pandey I.M., *Financial Management* , Vikas Publishing House, 2009

Course Code	Course Title					Core / Elective	
PC451CE	Material Testing Lab					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	-	-	-	2	25	50	1
Course Objectives <ul style="list-style-type: none"> ➤ Understand the experiments on various materials to assess their behavior and limitations ➤ Learn the brittle and ductile material failure patterns ➤ Understand the shear force, bending moment and deflection for different types of beams ➤ Know the rigidity modulus by conducting spring and torsion test Course Outcomes <ul style="list-style-type: none"> ➤ Evaluate Young's modulus, rigidity modulus, hardness number, flexural rigidity and impact strength of given specimens ➤ Find the cracking stress and compressive strength of bricks ➤ Determine the stiffness of close coiled helical springs ➤ Find the deflection of a beam 							

Cycle - I

1. Uni-axial tension test on a specimen of ductile material
2. Stress-Strain characteristics of a ductile material
3. Brinell's hardness test
4. Compression test on brick
5. Bending test on simply supported beam of timber

Cycle - II

6. Torsion test on a specimen of ductile material
7. Compression test on close coiled helical spring
8. Bending test on simply supported beam of steel
9. Bending test on fixed beam of steel
10. Izod impact test

e-Resources:

1. <http://nptel.ac.in/>
2. <http://mhrd.gov.in/e-contents>
3. <http://vlab.co.in/>

Note: Atleast ten experiments should be conducted in the Semester.

Course Code	Course Title					Core / Elective	
PC452CE	Fluid Mechanics - I Lab.					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	-	-	-	2	25	50	1
Course Objectives <ul style="list-style-type: none"> ➤ Calibration of flow measuring devices ➤ Verification of the Bernoulli's theorem ➤ Demonstration of the various losses in pipes Course Outcomes <ul style="list-style-type: none"> ➤ Ability to measure flow in closed conduits and flumes ➤ Application of Bernoulli's principle in Hydraulics ➤ Computation of various losses in pipes and pipe fittings 							

List of Experiments:

1. Determination of C_d and C_v of an orifice
2. Calibration of a mouth piece
3. Determination of C_d of a mouth piece for unsteady flow in a hemi-spherical tank
4. Calibration of a rectangular notch
5. Calibration of a triangular notch
6. Calibration of a broad crested weir
7. Verification of Bernoulli's principle
8. Determination of types of flows
9. Determination of major and minor losses in the pipes
10. Calibration of a Venturi meter

e-Resources:

1. <http://nptel.ac.in/>
2. <http://mhrd.gov.in/e-contents>
3. <http://vlab.co.in/>

Note: Atleast ten experiments should be conducted in the Semester.

Course Code	Course Title					Core / Elective	
PC453CE	Surveying - II Lab.					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	-	-	-	2	25	50	1
<p>Course Objectives</p> <ul style="list-style-type: none"> ➤ Know the importance of theodolite, total station and their practical applications ➤ Study the basic concept of trigonometrical leveling, and field applications ➤ Analyze the horizontal and vertical curves for survey work related to Roads and Railways ➤ Know the principles of aerial photogrammetry and its applications ➤ Study the various applications of GPS, GIS and remote sensing for field work. <p>Course Outcomes</p> <ul style="list-style-type: none"> ➤ Understand the basic working principles of theodolite and total station ➤ Calculation of applicable corrections to the measured values ➤ Computation of omitted measurements areas ➤ Computation of setting out data for setting out of horizontal and vertical curves by various methods ➤ Understand and learn the basic concepts related to Photogrammetry, GIS and GPS ➤ Learn various applications of the Photogrammetry, GIS and GPS for land surveying 							

1. Measurement of horizontal angles by repetition and reiteration methods using Vernier Theodolite.
2. Theodolite traversing using Gale's traverse table and balancing of the traverse by Bowditch's method
3. Measurement of vertical angle: Application to simple problems of height and distance by measuring angle of elevation and depression
4. Single plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are placed in a same vertical plane- when base of the Object inaccessible.
5. Two plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are not placed in the same vertical plane- when base of the Object inaccessible.
6. Setting out of a simple circular curve by linear method
7. Setting out of a simple circular curve by angular method
8. Setting out of a transition curve by linear method
9. Setting out of a transition curve by angular method
10. Introduction to Total station and applications: To determine difference in elevation of any two given points. The introduction includes, setting up of the Total station over a station, input values, field measurements, downloading of the data in to a computer.

11. Total station and applications: Application to simple problems of height and distance by measuring angle of elevation and depression and determination of R.L of the target object.
12. Total station and applications: Determination of area enclosed in a closed traverse having minimum 5 stations. Plot the measured values by using a software package.
13. Geographic Position System (GPS), Geographical Information system (GIS) and their applications: Determination of Latitude and Longitude of any four stations and computation of the area. Check trust worthiness of the measured results.
14. Visual interpretation of given aerial photograph/satellite imagery
15. Study of topographic map.

e-Resources:

1. <http://nptel.ac.in/>
2. <http://mhrd.gov.in/e-content>
3. <http://vlab.co.in/>

Note: Atleast ten experiments should be conducted in the Semester.

Course Code	Course Title					Core / Elective	
MC916CE	Environmental Sciences (for ECE & AE)					Core	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
NIL	3	-	-	-	30	70	3
<p>Course Objectives</p> <ul style="list-style-type: none"> ➤ To study the basic concepts, sources of water, floods and their impact on environment ➤ To know the ecosystems and energy resources systems ➤ To understand the Biodiversity concepts and their advantages ➤ To study the different pollutions and their impact on environment ➤ To know the social and environment related issues and their preventive measures <p>Course Outcomes</p> <ul style="list-style-type: none"> ➤ Awareness of effects of hazardous environment. ➤ Idea about optimum utilization of natural resources. ➤ Be a catalyst in moving towards Green technologies ➤ Information about rules and regulations of pollution control 							

UNIT-I

Environmental Studies: Definition, scope and importance, need for public awareness.

Natural resources: Water resources; use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams:benefits and problems. Effects of modern agriculture, fertilizer- pesticide problems, water logging and salinity.

UNIT-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

Energy resources: Growing energy needs, renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

UNIT-III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution; solid and liquid waste management.

Environment Protection Act: Air, water, forest and wild life Acts, enforcement of environmental legislation.

UNIT-V

Social Issues and the Environment: Water conservation, watershed management, and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle, and disaster management in India.

Suggested Readings:

- 1) A.K. De "*Environmental Chemistry*", Wiley Eastern Ltd.
- 2) E.P. Odum "*Fundamentals of Ecology*", W.B. Saunders Co., USA.
- 3) M.N. Rao and A.K. Datta "*Waste Water Treatment*", Oxford and IBK Publications. Benny Joseph "*Environmental Studies*", Tata McGraw Hill, 2005.
- 4) V.K. Sharma "*Disaster Management*", National Centre for Disaster Management, IPE, Delhi, 1999.
- 5) "Green Building Council of India", Teri Document.