Government College of Engineering, Aurangabad
Department of Civil Engineering
S.E. Civil (CBCS Full Time Course -2017-18 onwards)
Scheme of Instruction and Evaluation

Course Code	Course Title	Scheme of Teaching (hrs/week)				Scheme of Evaluation (Marks)						
						Theory				TW	Pr./ VV	Total
		Th	T	Pr.	Cr.	CT -I	CT -II	TA	ESE			
Semester-III												
HS 2001	Environmental Studies	4	0	0	4	15	15	10	60	-	-	100
MA 2001	Engineering Mathematics-III	4	0	0	4	15	15	10	60	-	-	100
AM 2001	Solid Mechanics	4	0	0	4	15	15	10	60	-	-	100
CE 2002	Fluid Mechanics	4	0	0	4	15	15	10	60	-	-	100
CE 2003	Surveying-I	3	0	0	3	15	15	10	60	-	-	100
AM 2004	Lab-Solid Mechanics	0	0	2	1	-	-	-	-	25	25	50
CE 2005	Lab-Fluid Mechanics	0	0	2	1	-	-	-	-	25	25	50
CE 2006	Lab-Surveying-I	0	0	2	1	-	-	-	-	25	25	50
Total of Semester-III		**19**	**0**	**6**	**22**	**75**	**75**	**50**	**300**	**75**	**75**	**650**
Semester-IV												
AM 2007	Civil Engineering Materials	4	0	0	4	15	15	10	60	-	-	100
AM 2008	Structural Analysis	4	0	0	4	15	15	10	60	-	-	100
CE 2009	Building Planning and Design	3	0	0	3	15	15	10	60	-	-	100
CE 2010	Surveying-II	3	0	0	3	15	15	10	60	-	-	100
AM 2011	Lab-Civil Engineering Materials	0	0	2	1	-	-	-	-	25	25	50
CE 2012	Lab-Building Planning and Design	0	0	4	2	-	-	-	-	50	50	100
CE 2013	Lab-Surveying-II	0	0	4	2	-	-	-	-	50	50	100
CE 2014	Open Elective-I (Rural Technology)	3	0	0	3	15	15	10	60	-	-	100
Total of Semester-IV		**17**	**0**	**10**	**22**	**75**	**75**	**50**	**300**	**125**	**125**	**750**
Grand Total		**36**	**0**	**16**	**44**	**150**	**150**	**100**	**600**	**200**	**200**	**1400**

HS 2001: Environmental Studies	
Teaching Scheme	**Examination Scheme**
Lectures : 4 Hrs/Week	Class Test I : 15Marks
Tutorial : 0Hr/Week	Class Test II : 15 Marks
Total Credits : 4	Teachers' Assessment : 10 Marks
	End -Semester Exam : 60 Marks

Pre-requisites: Nil

Course objectives:

1. To become aware about the various types of pollution, its sources, effects and control measures.
2. To become aware about present environmental issues
3. To become aware of the importance of natural resources and environment legislation
4. To become aware about environment biotechnology and bio monitoring
5. To become aware of the biodiversity, conservation methods and factors for the loss of biodiversity

Unit wise Course Outcomes expected:

After completion of this course students will be able to

CO1. Learn about the basics of environment
CO2. Understand the harmful effects of human activities on environment and their solutions
CO3. Understand the use of biotechnology and bio monitoring for the treatment of environment
CO4. Understand the concept of climate change, global warming, acid rain, various disasters and its mitigation measures

Detailed Syllabus:

UNIT-I	***A) Concepts of Environmental Sciences*** Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution of land, in water and in air, Broad nature of chemical composition of plants and animals; *(3Lectures)* ***B) Natural Resources*** Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative); *(3 Lectures)*
UNIT-II	***A) Biodiversity and its conservation*** Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses),and strategies for conservation; *(3 Lectures)* ***B) Environmental Pollution*** Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear;

	Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management; *(3 Lectures)* ***C) Environmental Biotechnology*** Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto remediation, biopesticides, bio-fertilizers; Bio-reactors- Design and application*(3 Lectures)*
UNIT-III	***A) Social Issues and Environment*** Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change-Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics; *(5 Lectures)* **B)** ***Environmental Monitoring*** Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques *(3 Lectures)*
UNIT-IV	***Laboratory Work including Practical and Field Work*** covering, of biogeographical zones and expanse of territorial waters on the map of India; Identification of biological resources (plants, animals, birds) ata specific location; Determination of (i) pH value, (ii) water holding capacity and (iii) electrical conductivity of different types of soils; Determination of energy content of plants by bomb calorimeter; Measurement and classification of noise pollution; Determination of particulate matter from an industrial area by high volume sampler; Determination of ico-chemical parameters (pH, alkalinity, acidity, salinity, COD, BOD) of tap water, well water, rural water supply industrial effluent and sea water &potability issues; Demonstration of Remote Sensing and GIS methods; Industrial visit for environmental biotechnology processes (e.g., any one of the fermentation, tissue culture, pharmaceutical industries)

Text books:

1. Environmental studies, Erach Bharucha,UGC , New Delhi 2014
2. Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd
3. Environmental Protection Act

Mapping of Course outcome with program outcomes (Electrical Engineering)

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	1						1								
CO2	1						1								
CO3	1						1								
CO4							1								

Mapping of Course outcome with program outcomes (Mechanical Engineering)

Corse outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1		3							
CO2	1		3							
CO3	1		3							
CO4	1		3							

1-HIGH 2- MEDIUM 3- LOW

MA 2001: Engineering Mathematics-III

Teaching Scheme	**Examination Scheme**
Lectures : 4 Hrs/Week	Class Test-I : 15 Marks
Total Credits : 04	Class Test-II : 15 Marks
	Teachers Assessment : 10Marks
	End Semester Exam : 60 Marks

Course description:

Engineering Mathematics-III (MA 2001) is a compulsory course to all second year engineering students of the institute in the Semester –III and is a continuation of previous year courses viz. Engineering Mathematics-I (MA1001) and Engineering Mathematics-II (MA1002). This course intends to provide engineering students a coherent and balanced account of major mathematical techniques and tools.

Course Objective:

This course intends to provide an overview of analytical and numerical techniques to solve ordinary and partial differential equations, which we apply to solve many engineering problems of mechanical, civil electrical Engineering.

Course Outcomes:

After completing the course, students will be able to:

CO1	determine the solution of second and higher order linear differential equation and apply knowledge of LDE to solve the problems in civil, mechanical and electrical engineering
CO2	classify, formulate and solve the first order and second order linear, non-linear partial differential equations and apply the knowledge of partial differential equations to solve the problems in civil, mechanical and electrical engineering
CO3	find approximate solution of ordinary differential equations of first order and find the convergence and stability of the approximate solutions

Detailed syllabus:

Unit-I	**Linear Differential Equations (LDE)** Linear Differential Equations **(LDE)** with constant coefficients, Differential equations reducible to LDE with constant coefficients, Simultaneous LDE with constant coefficients	**08 Hrs**
Unit-II	**Applications of Linear Differential Equations (LDE)** L-C-R Circuit, Coupled Electrical Circuits, Bending of beams, Spring-Mass system	**08 Hrs**
Unit-III	**Partial Differential Equations (PDE)** First order linear/ nonlinear Partial Differential Equation Formation **(PDE)**, Lagrange's equation, Linear Partial Differential Equations **(PDE)** of second and higher order with constant coefficients, Linear non-homogeneous PDE.	**08 Hrs**
Unit-IV	**Applications of Partial Differential Equations** Solutions of one-dimensional wave equation, one-dimensional heat equation, Steady state solution of two-dimensional heat equation, Fourier series solutions in Cartesian coordinates.	**08 Hrs**
Unit-V	**The approximation for the solution of first order Ordinary Differential Equations:** Taylor series method, Euler's method, Euler's modified Method, Runge-Kutta Fourth order Method, Milne's Predictor-Corrector Method, Solution of system of ordinary differential equations by Runge-Kutta methods.	**08 Hrs**

Text and Reference Books

1. A Text Book of engineering Mathematics (Vol.1 &2) by P.N.Wartikar & J.N.Wartikar, Pune Vidhyarthi Griha Prakashan, Pune.
2. Advanced Engineering Mathematics by Erwin Kreyszig, Willey Eastern Ltd. Mumbai.
3. Engineering Mathematics-A Tutorial Approach by Ravish R Singh, Mukul Bhatt.
4. Higher Engineering Mathematics by B. S. Grewal, Khanna publication, New Delhi.
5. Advanced Engineering Mathematics by H. K. Dass, S. Chand and Sons.
6. Calculus by G. B. Thomas and R. L. Finney, Addison- Wesley, 1996
7. Elements of Partial Differential Equations by I.N. Sneddon

Mapping of Course outcome with Program Outcomes (Civil Engineering)

Course Outcome	PO 1	PO2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO1 0	PO1 1	PO12
CO1	1	1	2						1			
CO2	1								1			
CO3	1								2			

1 – High, 2 – Medium, 3 - Low

AM-2001: Solid Mechanics

Teaching Scheme		**Evaluation Scheme**	
Lectures	4Hrs/Week	Test- I	15 Marks
Tutorials	---------	Test- II	15 Marks
Total Credits	4	Teacher Assessment	10 Marks
		End-Semester Examination	60 Marks
		Total	100 Marks

Pre-requisites: Fundamental knowledge of Physics, Engineering Mechanics (Static) and Engineering Mathematics.

Course Description: The mechanics of deformable solids or strength of materials or solid mechanics or mechanics of materials, as it is commonly called, is one of the core subject that need to be studied by all engineering students. The course builds on the fundamental concepts of engineering mechanics course. Primary aim of this course is to introduce students to the fundamental concepts and principles applied by engineers - whether civil, mechanical, aeronautical, etc. - in the design of structures of all sorts of sizes and purpose. The course content have been presented in five units so that the students can develop the logic and get insight to analyze beams, trusses and solid circular shafts under various actions.

Course Educational Objectives:

The students will:

1. Expose to understand concepts of shear force, bending moment and plane frame structures
2. Gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures.
3. Study engineering properties of materials, and stress-strain relationship.
4. Learn fundamental principles of equilibrium, compatibility, and principle of superposition in linear solids and structures.
5. Analyze determinate and indeterminate axial members, torsional members, and beams, and determinate trusses to determine axial forces, torque, shear forces, and bending moments.

Course Outcomes: On completion this course, the students will be able to:

1. Have physical insight into behavior, distribution of stresses and strains in various structural members and solve numerical problems
2. Compute shear force and bending moments and draw the diagrams for statically determinate beams for various loading conditions.
3. Explain the concepts of stress and strain, and establish the relationship between them.
4. Derive flexural and shear stress formula and calculate the stresses in statically determinate beams.
5. Analyze determinate and indeterminate bars, beams, columns and determinate trusses to determine axial forces, torques, and slopes and deflections.

Detailed Syllabus:

UNIT-1	**a. Shear Force, Bending Moment Diagrams of Statically Determinate Beams** Axial force, shear force and bending moment diagrams for determinate beams for all types of loading, Relationship between intensity of loadings, shear force and bending moment at a section**.**	**(05 Hrs)**
	b. Analysis of Statically Determinate Plane Framed Structures Concept of perfect, Deficient and Redundant frames, Analysis of trusses by Method of resolution or Method of joints and Method of sections.	**(03 Hrs)**
UNIT-2	**Simple Stresses and Strains** Concept of normal stress and shear stress, Concept of normal strain and shear strain, Stress and strain diagram, Hooke's law, Generised Hook's Law Elastic constants, Volumetric stress and strain, Stresses and strains in uniform and varying sections under axial loading, Saint Venant's principle, Stresses and strains in compound bars under axial loading, Concept of residual stresses, Thermal stresses and strains.	**(08 Hrs)**
UNIT-3	**Stresses in Statically Determinate Beams** **a. Flexural Stresses:** Theory of pure bending, Elastic flexural formula, Assumptions in the theory of bending, Moment of resistance, Section modulus, Flexural stresses in beams with symmetrical solid, hollow and built-up sections, Bending stress distribution. **b. Shear Stresses:** Concept of shear stress, Shear stress formula, Shear stresses in beams with prismatic rectangular, circular and built-up sections.	**(08 Hrs)**
UNIT-4	**Torsion of Circular Shafts** **a. Theory of Torsion:** Concept of torsion, Torsion formula, Assumptions in the theory of pure torsion, , Torsional moment of resistance, Analysis of circular solid and hollow shafts, Shafts with fixed ends, Shafts in series and parallel. **b. Analysis of Columns and Struts:** Axially loaded compression members, Crushing load, Bukling or Critical or crippling loads by Euler's thereory ,	**(08 Hrs)**

	Assumptions in Euler's theory, Concept of effective length, Effect of different idealized end conditions, slenderness ratio, Limitations of Euler's formula, Rankine's theory.	
UNIT-5	a. **Slope and Deflection of Statically Determinate Beams:** Concept of slope and deflection, Equation of elastic curve, Slope and deflection of beams subjected to external loads by double integration method, Macaulay's method, moment area method Deflection by principle of superposition. b. **Principal Stresses and Strains:** Stresses on oblique plane, Concept of principal stresses and strains, Analytical and graphical method (Mohr's circle for plane stresses) to determine principal stresses and strains.	**(08Hrs)**

Text and Reference Books:

1. **S.Ramamrutham**: Strength of Material, Dhanpatrai& Sons, New Delhi.
2. **R. K. Rajput:** Strength of Material, S. Chand & Company , New Delhi.
3. **S. S. Bhavicutti:** Strength of Material (3E), Vikas Publishing House Pvt. Ltd. , New Delhi.
4. **Ferdinand P. Beer and E. Russell Johnston:** Mechanics of Material, McGraw Hill, New Delhi.
5. **James M. Gere and S.P. Timoshenko:** Mechanics of Material, CBS Publishers, New Delhi.
6. **William F. Riley, Leroy D. Struges and Don H. Morris:** Mechanics of Material, Jhon Wiley & Sons Inc., New York.
7. **E.P. Popov:** Introduction to Mechanics of Solids, Prentice Hall of India, New Delhi.
8. **S.H. Crandall, N. C. Dahl and T. V. Lardner:** Mechanics of Solids: An Introduction, McGraw Hill International, Tokyo.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H						L	L			H
CO2	H	H										M
CO3	H	H										H
CO4	H	H	L									

H – High M – Medium L – Low

CE 2002: FLUID MECHANICS

Teaching Scheme		Evaluation Scheme	
Lectures	4Hrs/Week	Test- I	15 Marks
Tutorials	---------	Test- II	15 Marks
Total Credits	4	Teacher Assessment	10 Marks
		End-Semester Examination	60 Marks
		Total	100 Marks

Pre-requisites:

Course Description: Fluid Mechanics is a course that deals with the analysis and quantification of effect of the forces exerted by a fluid on Civil Engineering Structures. In order to design any water retaining structure or a water conveyance system it is necessary to know the fluid properties and its effect on the system. The behavior of fluid flow varies with the properties of fluid, flow characteristics and the surroundings. The fluid behaves differently when it is at rest and in motion. The design criterion is decided on the basis of properties of fluid and classification of flow. In general the fluid flow problems that an Engineer deals with include the fluid flow in closed conduits and in open channel, this course covers all the aspects of fluid flow characteristics and design in pipe flow and also open channel flow. This course is very useful for Civil Engineer as he has to design the Water Conveyance Systems, Design capacity of the Conveyance system, Design of Water retaining structures, Flow regulation system, Discharge measurement etc. This course also forms a prerequisite course for the Water Resources Engineering and Water Power Engineering.

Course Educational Objectives:

1. To understand conceptually the properties of fluids, fluid statics and fluid dynamics
2. To expose to various pressure and discharge measuring devices, and use them in analysis and design.
3. The students will be able to understand, analyze and design the flow through pipes and open channels
4. The students will understand the application of impact of jet, turbine and pumps

Course Outcomes Expected: On completion of this course

1. The student will be able to assess the properties of fluids, effect of fluid at rest and also when in motion.
2. The student will be able to measure discharge using measuring devices
3. The Students will be able to analyze and design pipe network and canal
4. The students will be able to analyze and select the pumps and turbines as per requirements.

Detailed Syllabus:

UNIT-1	**Properties of Fluids:** Scope and application, classification of fluids, Rheological diagram, properties of fluids – Specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension and capillarity. **Fluid Statics :** Pressure at a point, Pascal's Law, measurements of fluid pressure, hydrostatics pressure on plane and curved surfaces, pressure diagram, concept of buoyancy, metacentre, determination of metacentric height, equilibrium of floating bodies.	**8Hrs**
UNIT - 2	**Fluid Kinematics: C**lassification of fluid flows, steady, unsteady, uniform, non-uniform, laminar, turbulent, Reynolds number, vorticity, rotational, irrotational flows, path line, streak line, stream tube. Continuity Equation, flow net. **Fluid Dynamics**: Forces acting on fluid in motion, Euler's equation, Bernoulli's Equation, Momentum equation, correction factors. Measurement of Flow: Venturimeter, Pitot tube, orifices, mouthpieces, flow over notches and weirs.	**8 Hrs**
UNIT – 3	**Flow through Pipes**: Major and minor losses, laws of friction, hydraulic gradient line and total energy line, flow through pipes, equivalent pipes and branching of pipes, three reservoir problems under steady state, Turbulent flow through pipes: Pandtl's theory, velocity distribution equation for smooth and rough pipes, mean velocity and variation of friction factor, Pipe Network Analysis. **Dimensional analysis and similarity**: Dimensions of various physical quantities, Raleigh's method, Buckingham's theorem, types of similarities and Distorted and non-distorted models.	**8 Hrs.**
UNIT -4	**Flow in open channels**: Classification of channels, steady and unsteady flows, uniform and non-uniform flows, laminar and turbulent flows, gradually and rapidly varied Flows, velocity distribution in open channels, basic equation of Fluid flow viz. continuity equation, Bernoulli's equation and momentum equation as applied to Channel flow, uniform flow, Chazy's and Manning's equations, Specific energy diagram, specific force Diagram. **Non uniform flow:** Energy equation for gradually varied flow (GVF), Basic assumptions and Equations, slope profiles with different combinations, Flow measurement appurtenances, Rapidly varied flow, phenomenon of hydraulic jump in rectangular channel section, basic equations, classifications and applications of hydraulic jump, conjugate depths and its computation.	**8 Hrs.**
UNIT-5	**Water Power Engineering:** **Turbines**- Classification and types of turbines, impulse and reaction turbines, components and parts, efficiency and characteristics of turbines based on Performance, specific speed, selection criteria for turbines, Governing of turbines, cavitations, draft tube and its function. **Centrifugal pumps**: Parts of centrifugal pumps, Types, construction and principle of working, Principle of similarity, efficiencies, priming of pumps, cavitations. **Reciprocating pumps**: Types, working principle, slip, Air vessel and its function, multi cylinder pumps. **Impact of jets**: Impulse momentum equation, jet force on stationary and moving vanes, jet propulsion.	**8 Hrs.**

Text and Reference Books:

1. Hydraulics and Fluid Mechanics – Modi and Seth, Standard Book House, Delhi
2. Fluid Mechanics and Hydraulic Machines – by R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi.
3. V.L.Streeter and E.B. Wylie, Fluid Mechanics and Hydraulic machines, McGraw Hill Publications, New York, 2010
4. D.S.Kumar, Fluid Mechanics and Fluid Power Engineering, S.K.Katariya and Sons, New Delhi, 7thEdition, 2010
5. Fluid Mechanics and Hydraulic Machines – by V.L.Streeter and E.B.Wylie, McGraw Hill Publications, New York.
6. Fluid Mechanics and Hydraulic Machines – by Douglas J.F, Gasiorek J.M., Swaffield J.A. (2003) Pearson Education (Singapore) Pvt. Ltd.
7. Open Channel Flow- by K. Subramnaya, Tata MacGraw Hill Publishing Ltd., New Delhi.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	M	M		H		H			
CO2	H	H	H	H	H	M	H	M				
CO3	H	H	H	H	H		H	M				
CO4	H	H	H	H	H	M			H	H		

H – High M – Medium L – Low

CE 2003: Survey I

Teaching Scheme		Evaluation Scheme	
Lectures	3Hrs/Week	Test- I	15 Marks
Tutorials	---------	Test- II	15 Marks
Total Credits	3	Teacher Assessment	10 Marks
		End-Semester Examination	60 Marks
		Total	100 Marks

Prerequisites: Basic knowledge of measurements and its units.

Course description: This course introduces the methods and instruments for measurement necessary for plotting maps and plans. Topics range from surveying, leveling, theodolite, plane table surveying and tacheometry.

Course Objectives:

1. To introduce basic concepts of surveying
2. To study methods and equipments for linear and angular measurements
3. To compute area and volume from given map

Course Outcomes

As an outcome of completing the course, students will able to:

1. Select the equipment for linear and angular measurement
2. Operate levels and theodolite
3. Use different types of surveying and levelling equipments
4. Apply the knowledge of surveying and levelling on field

Detailed Syllabus:

Unit 1	**LINEAR AND ANGULAR MEASUREMENTS** a. Survey: object, classification, principles, difference between map and plan, b. Linear measurements: methods of distance measurements, instruments for measurement of distance, chaining a line, chaining along slope, offsets: instruments for laying offsets, triangulation, chain and cross staff survey, errors c. Angular measurements: Types of compass, Bearings, local attraction and correction to bearings, Chain and compass traversing, graphical method of adjustment, errors	
Unit 2	**LEVELLING** a. Definition, study of auto level, laser level, digital level, b. Types of leveling: simple, differential, fly, check, profile, reciprocal etc. Profile leveling- plotting longitudinal section, cross section, leveling difficulties, volume calculations c. Contouring: Definition, characteristics, use, methods of locating and interpolating contour lines	
Unit 3	**THEODOLITE** a. Introduction to vernier theodolite, types of theodolite, principal axes b. Uses of theodolite: Measurement of horizontal angle, vertical angle, magnetic bearing, prolonging a line, lining in, measuring deflection angles, direct angles, finding out elevations of objects (base accessible or inaccessible) by trignometrical observations c. Theodolite traversing- Computation of consecutive and independent coordinates, adjustment of a closed traverse, Gale's traverse table, omitted measurements, area by coordinates	
Unit 4	A) **PLANE TABLE SURVEY** Introduction, accessories, temporary adjustments, advantages and disadvantages, methods, two point and three point problem and their solution B) Testing and permanent adjustments of Dumpy Level and Transit	C)
Unit 5	**A) TACHEOMETRY** a. Introduction, instruments, methods, principle of stadia method, determination of tacheometric constants, anallatic lens, horizontal and inclined sights with vertical staff b. Tacheometric contouring **B) MINOR INSTRUMENTS** Study and use of planimeter, abney level, box sextant, Indian pattern clinometer	**C)**

Recommended Books:

1. Prof. T. P. Kanetkar and Prof. S.V.Kulkarni, Surveying and leveling Vol. I & II, Pune VidyarthiGrihaPrakashan, Pune, 23rd Edition, 1985
2. Dr. A.M.Chandra , Plane surveying, New Age International Publishers New Delhi, Second Edition, 2006
3. Dr. B.C.Punmia , Surveying Vol I & II, Laxmi Publications (P) Ltd. New Delhi, Sixteenth Edition Reprint 2008

   R. Subramanian, Surveying and Levelling, Oxford University Press, New Delhi, First Edition, 2007

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			H	H		M	M	M		M	
CO2	M	M		H	H	M	M	M	M		M	
CO3	H	H	H	M	M	M		M	M	M		M
CO4	H	H	H	M	M	M	M	M	M		L	M

H – High M – Medium L – Low

AM-2004: Lab- Solid Mechanics

Teaching Scheme		Evaluation Scheme	
Practical	2 Hrs/Week	Term-Work	25 Marks
Total Credits	01	Viva-voce	25 Marks
		Total	50 Marks

Objective:

In this laboratory, students will have the opportunity to apply loads to various materials under different equilibrium conditions. The student will perform tests on materials in tension, compression, torsion, bending, and impact. These conditions and/or constraints are designed to reinforce classroom theory by having the student perform required tests, analyze subsequent data, and present the results in a professionally prepared report. The machines and equipment used to determine experimental data include universal testing machines, torsion equipment, compression testing machine, impact tester, hardness tester, etc. Data will be collected using Dial indicators, extensometers.

Course Outcome (COs):

On successful completion of this course, students will be able to-

1. Determine the various and stresses modulus for the materials.
2. Calculate & Compare the hardness values for various materials.
3. Apply the concept of impact loading and to determine impact values for various materials.

Minimum ten experiments shall be conducted from the following list.

List of Experiments:

1) Tension test on Mild steel, High Yield strength deformed and cast iron specimen
2) Cold bend test on Mild and HYSD (I.S. 1608) steel bars.
3) Compression test on metals (I.S.1708).
4) Compression test on Wood (parallel and perpendicular to grains) (I.S.1708).
5) Direct shear test (Single, Double) on steel, Copper, brass specimen (I.S 5242-9779).
6) Punching shear test on thin metallic sheets.
7) Torsion test on circular mild steel bar (I.S. 1717).
8) Izod and Charpy Impact test on metals (IS: 1598 and IS: 1757 – 1973).
9) Study of Buckling of column.
10) .Bending test on Timber beam.
11) Flexural test on Concrete Beams
12) Compression tests on concrete cubes
13) Testing of structural steel

Term work shall consist of submission of journal containing the experiments performed by the candidate. Viva Voce examination based on the term work shall be conducted at the end of the semester.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	S	S	S							
CO2	H	H	H	H	H	M						
CO3	H	H	H	H	H							

1 – High 2 – Medium 3 - Low

CE 2005: Lab: Fluid Mechanics

Teaching Scheme		Evaluation Scheme	
Practical	2 Hrs/Week	Term-Work	25 Marks
Total Credits	01	Viva-voce	25 Marks
		Total	50 Marks

Course Educational Objectives:

1. To provide practical experience through laboratory work to understand the theory of fluid mechanics and to apply this to practical situations
2. Use various measuring devices for data acquiring and to establish its correlation with theory.
3. To establish relations between the pre and post jump behavior of fluid flow

Expected Course Outcomes:

1. The student will experience the theoretical concepts through the experimentation
2. The students will be able to calibrate the measuring devices and will be able to use the output of those devices for other analysis and design.
3. The students will be able to calculate the post jump flow characteristics in open channel.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	S	S	S							
CO2	H	H	H	H	H	M						
CO3	H	H	H	H	H							

H : High M:Moderate L: Low

CE 2006: Lab Survey I

Teaching Scheme		Examination Scheme	
Credits	01	Term Work	25 Marks
Practical	2 Hrs/Week	Practical	25 Marks
		Total	**50 Marks**

Course Outcome: On successful completion of this course, students will be able to

CO1	Perform the experiments for linear measurements
CO2	Execute survey for linear and angular measurements

CO3	Coordinate the field activities for surveying and levelling works
CO4	Set out alignments for roads, railways

List of Experiments

Sr. No.	Details
1	Use of instruments for linear measurements
2	Use of dumpy level to determine elevations of points.
3	Differential Levelling to determine elevations of points.
4	Study and use of plane table survey.
5	Radiation and intersection method in plane table survey.
6	Study and use of Theodolite for measurement of angles.
7	Measurement of horizontal and vertical angle using transit theodolite.
8	Measurement of horizontal angle by method of repetition.
9	Computation of horizontal distance and elevations by tacheometry for horizontal and inclined sights.
10	Study and use of planimeter, box sextant, abney level and Indian pattern clinometer

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			H	H				L	M	L	
CO2	M	L		H	H	M			M	L	L	
CO3	H	M	M	H	H	M			M	M	L	
CO4	H	H	H	M	M	M			M	M	M	

H : High M:Moderate L: Low

AM-2007 CIVIL ENGINEERING MATERIALS

Teaching Scheme		Evaluation Scheme	
Lectures	4 Hrs/Week	Test Test	15 Marks 15 Marks
Tutorials	0 Hrs/Week	Teacher Assessment	10 Marks
Total Credits	4	End-Semester Examination	60 Marks

Prerequisites:
Student should know the different civil engineering material. Student should know the common material used for construction.Student should have knowledge of basic civil engineering.

Course Descriptions:
Civil engineering materials covers information of important civil engineering materials, importance and information of Indian standard codes applicable to civil engineering material also cover the concrete production, mix design, and properties of concrete.

Course Objectives:
1. To identify suitable materials for construction of particular component of a structure.
2. To understand codal limitation for various materials.
3. To understand properties and uses of construction materials.

Course Outcome: On successful completion of this course, students will be able to-

1) Explain the properties of civil engineering materials.
2) Estimate the proportions of ingredients of civil engineering materials.
3) Discuss the properties of civil engineering materials.
4) Design the concrete mix.

UNIT1-	Introduction to Stone , Bricks, Tile Roofing and Flooring ,Timber, Lime, Manufacture, properties and Codal requirements of Materials.Cement:Production, chemical composition, types of cement and their properties,, hydration process, physical and chemical tests and standards **,**Chemical and Mineral Admixtures	
UNIT2-	Fine Aggregate**:** Natural and manufactured sand, particle size distribution, fineness modulus, grading curves, specific gravity ,moisture content, bulking of sand, water absorption, bulk density and standard specifications, Coarse Aggregate:Types, particle size distribution, fineness modulus, grading curves moisture content, specific gravity, absorption, bulk density, flakiness index, elongation index, crushing value, impact value, abrasion and attrition and standard specifications Artificial Sand its properties and uses and comparison with Natural sand.	
UNIT 3-	Types of Paints, Enamels, Varnishes, Tar, Bitumen, Asphalt Properties and Uses. Modern material:Rubber, polymers, Fibres, Fibre reinforce concrete, properties and uses Introduction to Composite materials, precast, prestress, ferro-cement, heat insulating materials. Water proofing materials, sound insulating materials.	
UNIT4-	Types of structural steel, permissible stresses. Various Indian standard sections and their properties. Relevant IS specifications, prefabrication construction, metal sheets, hollow metal pipes, fabric membrane, ferrous metal and non-ferrous	

	metals.	
UNIT5-	Concrete, Concrete production: batching, mixing, transporting, placing, compaction, curing Fresh concrete: workability and its measurement, cohesiveness, segregation, bleeding, setting and its measurement, Functioning of Ready Mix Concrete Plants, Fundamentals of Concrete mix proportioning: Characteristic strength of concrete, Quality control, Methods of concrete mix proportioning: IS Method	

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	L			M	M					
CO2	M	M	M		L	M	L					
CO3	M	M				L	L					
CO4	H	M	H	H		L	L					

H: High M:Moderate L: Low

Text and Reference books:

1. A M Neville, Properties of Concrete, 4th edition, 2006, ELBS with Longman, UK
2. M L Gambhir, Concrete Technology, 3rd edition, 2006, Tata McGraw Hill, New Delhi
3. M S Shetty, Concrete Technology, 2008, S. Chand & Co., New Delhi
4. Design of Steel Structure by N Subramanian, Oxford University Press, New Delhi.
5. Design of steel structure by Limit State Method as per IS: 800- 2007 by Bhavikatti S S,I K International Publishing House, New Delhi
6. S. K. Duggal, Building Material Oxford & IHB Publishing Co. Ltd. New Delhi 2000.
7. B.C. Punmia Building Construction.
8. S. K. Duggal Building Materials (3rd edition), New Age International (P) Limited, Publishers

AM-2008 Structural Analysis

Teaching Scheme		**Evaluation Scheme**	
Lectures	4 Hrs/Week	Test- I	15 Marks
Tutorials	---------	Test- II	15 Marks
Total Credits	4	Teacher Assessment	10 Marks
		End-Semester Examination	60 Marks
		Total	100 Marks

Prerequisites:
The students should have undergone course of AM 2001: Solid Mechanics

Course Description:
AM 2008 Structural Analysis subject provides better understanding of energy principles and their applications for the analysis of structures. Various methods for the analysis and suitability of a particular method based on the type of structure is also a part of the curriculum.
The understanding of this fundamental course will form the base for learning advanced subjects in structural analysis.

Course Objectives:
1) To equip the students with fundamental understanding of principle and methods used for the analysis of statically indeterminate structures.
2) To expose the students to the concept of influence lines and its applications.

Course Outcomes:
On the successful completion of this course, the student will be able to
1. Distinguish between determinate and indeterminate structures and methods of analysis
2. Apply force method for the of analysis of a given structure
3. Apply displacement method for the of analysis of a given structure
4. Demonstrate the ability to choose suitable method for the analysis
5. Recognize the importance of influence line diagrams and its applications

Detailed Syllabus:

Unit 1	**Fundamentals of Structural Analysis** Review of strain energy, Energy theorems: Castigliano's theorems, reciprocal deflection theorem and their applications, Unit load method, Deflection of statically determinate pin jointed trusses, Degree of indeterminacy of a structure	**8Hrs**
Unit 2	**Analysis of Indeterminate Beams** Propped cantilever, Fixed and Continuous beams, Clapeyron's theorem of three moments, Yielding of supports, Deflection at a section using unit load method. Shear force, Bending moment at a section and Shear force and bending moment diagrams.	**8 Hrs**
Unit 3	**Analysis of Indeterminate Plane Frames and Trusses: Force Method** Force method of analysis, Analysis of plane frames with degree of static indeterminacy up to three, Analysis of pin jointed trusses with degree of static indeterminacy up to two.	**8 Hrs.**
Unit 4	**Analysis of Beams and Plane Frames: Displacement Method** Slope Deflection Method: Slope deflection equations	**8 Hrs.**

	Moment Distribution Method: Carry over and distribution theorems Application of methods to analysis of beams and frames with degree of kinematic indeterminacy up to three.	
Unit 5	**Influence Line Diagrams and Rolling Loads** Concept of influence line, Muller Breslau's principle, Influence line diagram for support reactions, shear force and bending moment at a section of statically determinate beams and forces in the members of statically determinate trusses. Wheel loads, Criteria for maximum shear force and bending moment	**8 Hrs.**

Reference Books:

1. Timoshenko S.P. and Young D.H., Theory of Structures, Tata McGraw Hill, New Delhi
2. C.H. Norris, J.B. Wilbur and S.Utku, Elementary Structural Analysis, Tata McGraw Hill, New Delhi
3. S.J. Kinney, Indeterminate Structural Analysis, Oxford and IBH
4. C.K. Wang, Indeterminate Structural Analysis, Tata McGraw Hill, New Delhi
5. Weaver, William, Gere, James M., Matrix Analysis Framed Structures, CBS, New Delhi
6. Russell C. Hibbeler, Structural Analysis, Pearson Education, India
7. Devdas Menon, Structural Analysis, Narosa Publications, New Delhi
8. C.S. Reddy, Basic Structural Analysis, Tata McGraw Hill, New Delhi
9. S. Ramamrutham and N. Narayan, Theory of Structures, Dhanpat Rai, New Delhi
10. N.C. Sinha and P.K. Gayen, Advanced Theory of Structures, Dhanpat Rai, New Delhi

Mapping of Course Outcomes with Program Outcomes:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	H	H	M	L	M							
CO2	H	H	M	M	M						L	
CO3	H	H	M	M	M						L	
CO4	H	H	M	M	M						L	
CO5	M	M	M	M	L							

H – High M – Medium L – Low

CE2009: Building Planning and Design

Teaching Scheme		Evaluation Scheme	
Theory	3 Hrs/Week	Class Test-I	15 Marks
		Class test-II	15 Marks
Tutorials		Teacher Assessment	10 Marks
Total Credits	03	End-Semester Examination	60 Marks
		Total	**100 Marks**

Prerequisites: No

Course description: This course introduces the elements of building planning, design and construction. This course forms the foundation of the Civil Engineering, in which he will be able to decide on the requirements of various types of buildings and its components along with the standard dimensions. He will be able to plan design and draw the drawings which are required to be submitted to the various authorities for permissions. The drawings prepared by the engineers are also used by the site engineer and hence the reading, understanding and execution of work as per drawings forms the major part of this course.

Course Objectives:

To understand the requirements for various types of buildings, planning and designing

To learn the functions of various components of buildings, the standard norms for its size and grouping so as to make it convenient for the stakeholder

To decide the various construction techniques to be adopted for different construction works for field problems.

Course Outcomes:

On completion of this course, students will able to:

1. Decide the various components of buildings
2. Plan , Design and Draw various building drawings as per standard norms
3. Apply the knowledge of building planning and design the buildings
4. Able to decide the suitable construction technique / methods for various construction works

Detailed Syllabus:

Unit 1	Relative functions and Role of owner, Architect, Structural Engineer and Contractor, Building byelaws of Municipal Council and Corporation, Principles of planning, Preparation of Submission and working Drawings.	
Unit 2	**Building Byelaws and design Principles of Buildings: -** Functions of local authority, terminology and definition, site selection and its criteria, classification of buildings, area and height limitations, setback, floor area ratio, floor space index with the standard norms, parts of buildings, habitable room, kitchen, bathrooms and water closets, mezzanine floor, stair cases, drawing submission and approval procedure of building plans,	
Unit 3	General requirements of residential buildings, Hospital, Primary school, High school, college building and commonly observed industrial buildings.	

Unit 4	Construction Techniques, Formwork, Damp proofing, termite proofing and Fire protections, Shoring, Underpinning and scaffolding	
Unit 5	**Building Finishes: -** Plastering, Pointing, White washing and colour washing, Distempering, painting, varnishing, Waterproofing Treatment, Plumbing services. Thermal and sound insulation, Ventilation and Air conditioning,	

Text and Reference books

1. Dr. B.C. Punmia, "Building Construction" Laxmi Publications Pvt. Ltd., New Delhi, Edition, 1998
2. S.P.Arora and S.P.Bindra, "A Text Book of Building Construction", Dhanpat Rai& Sons, Delhi, Edition 1996
3. M.G. Shah, C.M.Kale, S.Y. Patki, "Building Drawing with an Integrated Approach to Built Environment", Tata McGraw Hill Education Private Limited, New Delhi, Third Reprint 2012.
4. NationalBuilding Code of India, S.P. 7 ISI
5. Y.S.Sane, "Planning and Designing Buildings", Engineering Book Publishing Co., Pune – 16, Edition 1996
6. M.G. Shah, C.M. Kale, S.Y. Patki, "Building Drawing with an Integrated Approach to Built Environment", Tata McGraw Hill Education Private Limited, New Delhi, Third Reprint 2012.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	H	H								
CO2	M	H	H	H	H							
CO3		H	H	H	H	M	M	L				
CO4					H	H	H	H	H	H	M	M

H – High M – Medium L – Low

CE 2010: Survey II	
Teaching Scheme **Lectures: 3 Hrs/Week** **Credits 03**	**Examination Scheme** **Class Test I (15 Marks)** **Class Test II (15 Marks)** **Teachers Assessment (10 Marks)** **ESE Assessment (60 Marks)**

Prerequisites: Knowledge of measurements and mapping

Course description: This course introduces the advanced methods and instruments for measurement necessary for plotting maps and plans.

Course Objectives:

1. Understand the advanced methods in Survey.
2. Study the advanced methods & equipments for linear and angular measurements.

Course Outcome: On successful completion of this course, students will be able to-

CO1	Solve problems related with setting out the curves
CO2	Explain terminologies in photogrammetry and remote sensing
CO3	Describe hydrographic surveying
CO4	Illustrate the use of geodetic surveying
CO5	use advanced equipments and methods of mapping

Detailed Syllabus:

Unit 1	**CURVES** Introduction, degree and radius of a curve, Types of curve, Simple circular curve- Elements, setting out by linear and angular methods, Compound curves- Elements and setting out of compound curve, Transition curve- types, uses, length of transition curve, elements of transition curve, length of combined curve by method of deflection angle
Unit 2	**PHOTOGRAMMETRY** Introduction, types, types of photograph, Terrestrial photogrammetry, phototheodolite, principle of terrestrial photogrammetry, Aerial photogrammetry: technical terms, scale, ground coordinates, relief displacement, flying height, computation of length and height from photograph, flight planning, ground control, radial line method of plotting, Stereoscopic vision, fusion, stereoscope, parallax in aerial stereoscopic views, difference in elevation by stereoscopic parallax, Photographic interpretation, applications of photogrammetry, Introduction to remote sensing
Unit 3	**A) HYDROGRAPHIC SURVEYING** Introduction, horizontal and vertical control, Shore line survey, Tide, tide gauges, Sounding, equipment, shore signal, angle measuring instruments, locating the sounding, reduction of sounding, plotting the sounding **B) MODERN SYSTEMS IN SURVEYING AND MAPPING** Electronic distance measurement, Digital theodolite, Total station, Global positioning system, Geographic information system
Unit 4	**GEODETIC SURVEYING** a. Triangulation, triangulation figures, classification of triangulation systems, selection of stations, intervisibility and heights of stations, towers and signals, phase of a signal, eccentricity of signals b. Measurement of angle, instruments used, methods of observations, satellite station and reduction to center **c.** Base line measurement, field work, correction to measurement, reduction to MSL,

	extension of base
Unit 5	**A. INTRODUCTION TO TRIANGULATION ADJUSTMENTS** Kinds of errors, laws of weights, determination of most probable value of a quantity, normal equation, conditioned quantities, probable error, distribution of error to the field measurements, method of correlates, Introduction to Station adjustment, figure adjustment and spherical excess, adjustment of quadrilateral **B. SETTING OUT WORKS** Setting out buildings, culverts, bridges and tunnels

Recommended Books:

1. Prof. T. P. Kanetkar and Prof. S.V.Kulkarni, Surveying and leveling Vol. I & II, Pune Vidyarthi Griha Prakashan, Pune, 23rd Edition, 1985
2. Dr. A.M.Chandra , Plane surveying, New Age International Publishers New Delhi, Second Edition, 2006
3. Dr. B.C.Punmia , Surveying Vol I & II, Laxmi Publications (P) Ltd. New Delhi, Sixteenth Edition Reprint 2008
4. R. Subramanian, Surveying and Levelling, Oxford University Press, New Delhi, First Edition, 2007

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S			M	M			M	M	
CO2	M	M	M		M	M	M		M		L	
CO3	M	M	M		M	M	M		M		L	
CO4	S	S	M	M	M	L	L		M			
CO5	S	S	S	S	M	M			L		L	

S : Strong M:Moderate L: Low

AM 2011: LAB-Civil Engineering Materials

Teaching Scheme		Evaluation Scheme	
Practical	2 Hrs/Week	Term-Work	25 Marks
		Viva-voce	25 Marks
Total Credits	01	**Total**	**50 Marks**

Course Outcome: On successful completion of this course, students will be able to-

1) Perform the experiments to determine the properties of various materials in concrete through tests as per relevant standards.
2) Design a concrete mix for given materials and requirements.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	H	H					L	H	L	H
CO2	M	M	M	M					L	H	L	H
CO3												
CO4												

H : High **M:Moderate** **L: Low**

Term Work:

It shall consist of record of 12 experiments performed in the laboratory. The list of experiments is given below. A report of visit to a construction site shall also be included.

A) Cement (minimum 4)

1. Field Test of cement
2. Fineness by Air permeability Test
3. Standard consistency,
4. Initial and Final Setting time
5. Soundness
6. Compressive strength

B) Fine aggregate (minimum 2)

1.Sieve analysis to determine Fineness modulus and grading curve
2.Water absorption, moisture content and specific gravity
3.Bulking of sand

C) Coarse Aggregate (minimum 2)

1. Sieve analysis to determine Fineness modulus and grading curve
2. Water absorption, moisture content and specific gravity
3. Flakiness and Elongation Index of aggregates

D) Tests on Fresh Concrete (minimum 2)

1. Workability of concrete by slump test
2. Workability of concrete by compaction factor test
3. Workability of concrete by Vee Bee consistometer test
4. Workability of concrete by flow test

E) Test on Brick (minimum 2)

1. Water Absorption Test
2. Compressive Strength
3. Shape and Size Test

F) Test on Tile (minimum 2)

1. Tile Abrasion Test
2. Water Absorption Test
3. Hardness Test

G) Concrete mix proportioning using natural and manufactured sand as per IS 10262-2009

H) Visit to construction site.

CE 2012: Lab Building Planning and Design

Teaching Scheme	**Examination Scheme**	
Practical: 4 Hrs/Week	**Term Work**	**: 50 Marks**
	Oral	**: 50 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Identify the various components of buildings
CO2	Plan , Design and Draw various building drawings as per standard norms
CO3	Apply the knowledge of building planning and design the buildings as per clients requirement
CO4	Suggest different alternatives for grouping of units in a building together

Perform following experiments.

Sr. No.	Details
1	Measured Drawing of Residential Building (Including Site Visit)
2	Data Drawing for Residential Building (Load Bearing and Frame Structure)

3	Details of Data Drawing
4	Preparation of four plans of one room, two room tenements, Apartments and bungalow
5	Line Plan of at least four types of Public Buildings such as 1. High school/ Engineering College / Arts, commerce, Science College 2. Hospital of at least 100 beds 3. Any medium scale manufacturing industry 4. Commercial complex/ multiplex theaters/ shopping mall
5	**Planning and Design of Public Building (Drawing)** Drawing of one public building, using conventional or drafting software- Any one public building from above exercise 5 may be considered for detailed drawing purpose.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2		H	H		M							
CO3		H	H		M				L			
CO4		M	H		H	M	L					

H - High M – Medium L - Low

CE 2013: Lab Surveying II

Teaching Scheme	**Examination Scheme**
Practical 4 Hrs/Week	**Practical (50 Marks)**
Credits 02	**Term Work (50 Marks)**

Course Outcome: On successful completion of this course, students will be able to-
Course Outcome: On successful completion of this course, students will be able to

CO1	Demonstrate use of Theodolite, EDM
CO2	Use the advanced survey instruments
CO3	practice for setting out circular curve
CO4	Coordinate and perform surveying project works

List of Experiments

Sr. No.	Details
1	Study of one second theodolite and measurement of horizontal and vertical angle
2	Study of nautical sextant and measurement of angle using nautical sextant

3	Study and use of stereoscope and parallax bar
4	To find air base distance and difference of elevation for a given pair of photograph
5	Study and use of E.D.M. and total station
6	Three point problem for locating position of boat
7	Measurement of base line by subtense bar method
8	Satellite station and reduction to centre
9	Setting out simple circular curve by linear and angular method
10	Setting out a building

List of Projects

Sr. No.	Details
1	Theodolite traverse survey of a closed traverse for at least 0.5 ha area with details such as buildings, roads etc.
2	Plane table survey of a closed traverse of min 4 sides for at least 0.5 Ha with details as building, roads etc.
3	Road project for minimum length of 500 m including fixing of alignment, profile leveling, cross sectioning (use of total station may be taken.)
4	Block contouring for minimum of 0.5 Hectares area

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				H	H							
CO2	M	M		H	H							M
CO3		H	H		M			M	M			
CO4	H	H	H	M	M	H	H	H	H		M	

H : High M:Moderate L: Low

CE2014: Rural Technology

Teaching Scheme		Evaluation Scheme	
Theory	3 Hrs/Week	Class Test-I	15 Marks
		Class test-II	15 Marks
Tutorials		Teacher Assessment	10 Marks
Total Credits	03	End-Semester Examination	60 Marks
		Total	100 Marks

Prerequisites: Basic knowledge of rural and urban society.

Course description: This course introduces the various characteristics of rural and urban society. The course include detailed information of various modern technology for rural development such as nursery production, greenhouses, vermi-technology, organic farming, bio-composting, low cost storage technologies for fruits and vegetables etc . You will also learn the various effects of those modern technologies on environment.

Course Objectives:

To understand need of rural development
To learn various techniques for increase the crop production
To understand various effects of modern technology on environment
To identify suitable technique for rural development

Course Outcomes

As an outcome of completing the course, students will able to:

1. Understand the concept and necessity rural development
2. Use of modern techniques in crop production
3. Learn the solutions for storage of fruits and vegetables
4. Learn the choice of techniques for production and storage at available resources

Detailed Syllabus:

Unit 1	Rural social institution in India, characteristics of rural society, characteristics of urban society, contrast between rural and urban society, concept of social welfare, welfare organization and their role, need for rural industries, objectives and scope, relation between agriculture and industry	
Unit 2	Perspectives of development, knowledge and actions, ethical problems, societal goals, change in societal forms, rural and urban statistics on inequality, unemployment, migration, pollution, depletion of natural resources, views on society and technology relationship, illustration on technology innovation from domestic, agricultural, energy and transportation sector.	
Unit 3	Nursery production, importance and classification, establishment of commercial nursery- bed culture, manure and fertilizers, irrigation, protection, lifting, grading, storage, packing and transportation of nursery plants. Greenhouse definition, types of greenhouse structure, greenhouse framework, covering materials, greenhouse benches, climate control in greenhouse, automated systems in greenhouse,	

	greenhouse precautions, advantages of greenhouse and greenhouse cultivation of tomato, cucumber, lady figure strawberry, Marigold, Rose etc.	
Unit 4	Non-refrigerated Low Cost Storage Technology of Fruits and Vegetables: storage in pit, bulk storage of dried bulb crop, storage of root and tuber crops, storage using evaporative coolers, storage using windbreaks, storage in barns, storage in cellars, storage in clamps, storage in Zero Energy Cool Chamber, night ventilation storage. Organic Farming: Definition, its components, importance and certification	
Unit 5	Vermi Technology: Earthworm classification, Species, External and internal features of verms, Use of earthworms, vermi-composting materials, requirement of vermin-culture and vermin-composting, Factors affecting earth worm's growth, Types of vermi-composting, methods of vermi-composting, Harvesting and storage of vermi-compost, advantages of vermi-compost, Use and benefits of vermi-compost, Effect of vermi-compost on plants, chemical composition of vermi-compost, vermin-wash (worm-tea), Chemical composition of vermin-wash, Use and advantages of vermi-wash. Bio-composting: methods of bio-composting, decomposition process, difference between bio-compost and Farm yard manure (FYM), Materials used in bio-compost, advantages of bio-compost. Precaution needed for compost preparation. NADEP Compost: Preparation of NADEP compost, construction and design of Nadep compost tank, Material use for preparation of NADEP compost, Substrate use for the production of compost.	

Recommended Books:

1. Dr. V.Nath, "Rural Development and Planning in India", Concept Publishiing Company Pvt. Ltd.
2. Dr. Kumar, Lakshmi NarainAgrwal, "Rural Sociology", Educational Pubilsher.
3. Dr. Devendra Thakur, "Rural Development and Planning In India", Deep & Deep Publications.
4. J.S. Singh, S.P. Singh and S.R. Gupt, "Ecology Environment and Resource Conservation", Anamaya Publishers.
5. M. K. Sadhu, "Plant Propagation", New Age International Publishers.
6. T. V. Sathe, "Vermiculture and Organic Farming", Daya Publishing House, New Delhi.
7. Arun K Sharma , "A Hand book of Organic Farming", Agro Bios Inida, New Delhi.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M						H					
CO2	M	L			M							
CO3		H	H		M		M					M
CO4	H					M						

H – High M – Medium L – Low

Open Elective – OE -3008 DISASTER MANAGEMENT

Teaching Scheme		Evaluation Scheme	
Theory	3 Hrs./Week	Class Test-I	15 Marks
		Class test-II	15 Marks
Tutorials		Teacher Assessment	10 Marks
Total Credits	1	End-Semester Examination	60 Marks
		Total	100 Marks

Course Outcome: On successful completion of this course, students will be able to-

1. Describe the concept of terminology used in disaster management.
2. To understand medical and psycho-social response to disasters.
3. To gain understand approaches of disaster risk reduction.
4. To build skills to respond to disaster.
5. To enhance awareness of disaster risk management institutional processes in India.

Detailed Syllabus:

Unit -1:	**Types of Disasters** Concept and definition of disaster, types of disaster, natural disaster (earthquake, cyclone, floods, Fires, volcanoes, Lightening, Landslides, Cloud bursting), man-made disaster (armed conflicts and civil strip, technological disaster, human settlement, slow disaster (famine, draught, epidemics) and rapid onset disaster (air crash, tidal waves, tsunami), difference between accident and disaster, human resettlement and rehabilitation issues during and after disasters, effect on structural element.	
Unit -2:	**Approaches to Disaster Risk Reduction** Disaster risk reduction strategies, disaster cycle – its analysis, phases,, culture of safety, prevention, mitigation and preparedness, early warning system models in disaster preparedness, community based DRR, structural and non-structural measures in DRR, policies for disaster preparedness programs, preparedness planning, roles and responsibilities, DRR master planning for future, capacity building.	
Unit -3:	**Disaster Risk Management in India** Hazard and vulnerability profile of India, disaster management Indian scenario, India's vulnerability profile, Components of disaster relief : Water, flood, sanitation, shelter, health, waste management, Institutional arrangements (Mitigation, response and preparedness, disaster management act 2005 and policy guidelines, other related policies, plans, programmes and legislation)	

Unit -4:	**Disaster Management** Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.	
Unit -5:	**Post Disaster Measures** Retrofitting of Structures, Sources of weakness in framed buildings, Classification of retrofitting techniques, Conventional and non-conventional methods, Comparative study of various methods and case studies. Introduction to Base Isolation systems. IS code provisions for retrofitting of masonry structures, failure modes of masonry structures and repairing techniques.	

Text and Reference books:

1. Seismic Design of Reinforced Concrete and Masonry Building- Paulay, Wiley India.
2. Earthquake Resistant Design of Structure- P. Agarwal and M. Shrikhande, Prentice-Hall Publications.
3. A Practical guide to Disaster Management By A.K.Jain, Publisher- Pragun, ISBN - 978-81-89930-82-1(PB), 2008
4. Disaster Management By Mukesh Kapoor, Year of Publication -2009
5. Disaster Management –Global Challenges to Local Solutions By Rajib Shah, R.R.Krushnan, Year of Publication 2009
6. Disaster Mitigation-Experiences and reflections By PraddepSahni, Year of Publication 2003
7. Disaster Management By S. Narayan, Edition First, Year of Publications 2000
8. Disaster Relief By Prabhas C. Sinha, ISBN – 8190309897, Year of Publication - 2006
9. Disaster Education and Management By Rajendrakumar Bhandari, Publisher-Springer India, ISBN- 978813225653, Edition 2013.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	H							M		
CO2	M	H	H		H	H				M		
CO3	M	H	H		H	M	M					
CO4		H	H	H	H	M						

**H – High M – Medium L – Low **

CE2014: Watershed Management

Teaching Scheme		Evaluation Scheme	
Theory	3 Hrs/Week	Class Test-I	15 Marks
		Class test-II	15 Marks
Tutorials		Teacher Assessment	10 Marks
Total Credits	03	End-Semester Examination	60 Marks
		Total	100 Marks

Prerequisites: nil

Course description: This course introduces the watershed and different techniques which are used for its sustainable development. The course provides experience in solving the difficulties in watershed management, use of modern techniques, role of various sectors, etc. You will also learn necessity of watershed management.

Course Objectives:

To understand the concept of watershed management, its necessity and modeling
To understand how to tackle with difficulties in watershed management
To learn various techniques of watershed management
To identify different sector which are beneficial in watershed management

Course Outcomes

As an outcome of completing the course, students will able to:

1. Understanding the concept and necessity of watershed management
2. Learning the solutions for various difficulties in watershed management
3. Use of modern techniques in watershed management (such as GIS)
4. Learn the integrated approach for watershed management

Detailed Syllabus:

Unit 1	(Introduction and basic concepts) Concepts of watershed, introduction to watershed management, its necessity and objective, different stack holders and their relative importance, characteristics of watershed, hydrology and hydrogeology, socio-economic characteristics, watershed management policies and decision making.	
Unit 2	(Watershed modeling) standard modeling approaches and classification, system concepts for watershed modeling, different hydrologic processes accounted in modeling, modeling on rainfall runoff process, subsurface flows and groundwater flows, planning of watershed management activities, preparation of action plans, administrative requirements.	
Unit 3	storm water management, design of drainage system, flood frequency analysis, flood routing through channels and reservoir, flood control and reservoir operation, case studies of flood damages. Types of erosion, soil erosion, estimation of soil erosion, universal soil loss equation, effects of erosion on land fertility and land capability, control measures to erosion, reclamation of saline and alkaline soils.	
Unit 4	Drought assessment and classification, drought analysis technique, drought mitigation planning. Rainwater harvesting, catchment harvesting, harvesting structures.	

Unit 5	Introduction to integrated approach, conjunctive use of water resources. Role of ecosystem, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, social forestry, management of forest, wild land and grass land. Role of GIS in watershed modeling, its need and necessity, data development, and its application.	

Recommended Books:

1. Murthy J. V. S., "Watershed Management", New Age International Publishers.
2. R. Awurbs and WP James, "Water Resource Engineering", Prentice Hall Publishers.
3. Murthy V. V. N., "Land and water Management", Kalyani Publications.
4. Majumdar D. K., "Irrigation and Water Management", Printice Hall of India.
5. Israelsen, O.W., and Hansen,V.E., "Irrigation Principles and Practices", John Wiley and Sons Inc., USA.
6. Mays, L.W., "Water Resources Handbook", McGraw-Hill.
7. Agarwal G.D., "Irrigation Engineering", B. Bharti Prakashan, Merrut.
8. Modi P.N., "Irrigation Engineering", Standard Book House, Delhi.
9. Paul A. Longley, Michael F., Good child, David J. Maguire and David W. Rhind, "Geographic Information Systems and Science", John Wiley & Sons, Ltd.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	M	L	M		L		M			
CO2		H	H				M					
CO3		M			H							
CO4		M	M		M		H		L	M	M	

H – High M – Medium L – Low

The details of Classes to be conducted for Non-CBCS students to be admitted in SE (Civil) from 2017-18 onwards

Name of the Department: Civil Engineering

Sr. No.	Class	Semester	Old Course Code and Course Name. NON CBCS		Corresponding New Course Code and Course Name CBCS		Units Covered in New Course	Units Not Covered in New Course with details from curriculum for incomplete Unit	Additional Classes to be conducted for Units Not Covered in New Course
1	SE	I	GE-241	Engineering Mathematics III	MA 2001	Engineering Mathematics-III	I, II, III	IV, V	Classes to be conducted for Units IV & V
			GE-242	Environmental Science	HS 2001	Environmental Science	All units	Nil	Not needed
			AM-243	Mechanics of Materials	AM 2001	Solid Mechanics	All units	Nil	Not needed
			CE-244	Fluid Mechanics I	CE 2002	Fluid Mechanics	I,II,III,IV	V	Classes to be conducted for Unit V
			CE-245	Surveying- I	CE 2003	Surveying-I	All units	Nil	Not needed
			CE-246	Computer Programming	--	--	Nil	All units	Classes to be conducted for all units
			AM-247	Lab: Mechanics of Materials	AM 2004	Lab-Solid Mechanics	All units	Nil	Not needed
			CE-248	Lab: Fluid Mechanics I	CE 2005	Lab-Fluid Mechanics			
			CE-249	Lab: Surveying- I	CE 2006	Lab-Surveying-I	All units	Nil	Not needed
			CE-250	Lab: Computer Programming	--	--	Nil	All units	Classes to be conducted for all units
	SE	II	CE-259 to 260	Open Elective	CE 3008	Disaster Management	All units	Nil	Not needed
			AM-252	Theory of Structures I	AM 2008	Structural Analysis	I, II, III	IV,V	Classes to be conducted for Units IV & V
			GE-251	Engineering Mathematics IV	MA3001	Numerical Methods for Enginnering	I, II, III	IV,V	Classes to be conducted for Units IV & V

			CE-253	Fluid Mechanics II	--	--	Nil	All units	Classes to be conducted for all units
			CE-254	Survey II	CE 2010	Surveying-II	All units	Nil	Not needed
			CE-255	Building Construction & Design	CE 2009	Building Planning and Design			
			CE-256	Lab: Survey II			All units	Nil	Not needed
			CE-257	Lab: Building Construction & Design					
			CE-258	Lab:Fluid Mechanics II	--	--	Nil	All units	Classes to be conducted for all units