E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

NAGAPATTINAM – 611 002.

(Affiliated to Anna University, Chennai | Accredited by NAAC with 'A++' Grade

Accredited by NBA | Approved by AICTE, New Delhi)

B.E CIVIL ENGINEERING (R-2023)

CURRICULUM AND SYLLABUS FOR SECOND YEAR: THIRD SEMESTER (III)

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	C	Maximum Marks		
							CA	ES	TOTAL
Theory Courses									
2301MA303	Transforms and Partial Differential Equations	BSC	3	1	0	4	40	60	100
2302CE301	Engineering Geology	PCC	3	0	0	3	40	60	100
2302CE302	Mechanics of Fluids	PCC	3	0	0	3	40	60	100
2302CE303	Mechanics of Solids - I	PCC	3	0	0	3	40	60	100
2302CE304	Surveying	PCC	3	0	0	3	40	60	100
2302CE305	Construction Materials and Technology	PCC	3	0	0	3	40	60	100
2301GEX07	Environmental science	BSC	1	0	2	2	50	50	100
Laboratory Courses									
2302CE351	Surveying Laboratory	PCC	0	0	2	1	60	40	100
2302CE352	Strength of Materials Laboratory	PCC	0	0	2	1	60	40	100
	Professional Development course - I	ECC	0	0	2	1	100	--	100
2301LS301	Life Skills - III	-	0	0	0	0	100	--	100
TOTAL			**20**	**1**	**6**	**24**	**610**	**490**	**1100**

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

2301MA303	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

PREREQUISITE:

1. Basic Calculus
2. Sequences and Series

COURSE OBJECTIVES:

1. To develop the Fourier series in $(0,2\pi)$,odd and even functions and Half range cosine and sine series (0,l)
2. To familiarize the students with Fourier Transforms and Inverse Transforms
3. To familiarize the student with formation of partial differential equations, linear partial differential equations of second order with constant coefficient
4. To make the students understand Steady state solution of two dimensional equation of heat conduction.
5. To acquaint the student, Inverse Z - transform (using partial fraction and residues) Solution of difference equations using Z - transform.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Determine the Fourier series, Half range sine and cosine series
CO2:	Evaluate Fourier Transforms, Inverse Fourier Transforms and Convolution theorem
CO3:	Compute Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types
CO4:	Solve one dimensional wave and heat equations.
CO5:	Formation of difference equations – Solution of difference equations using Z - transform.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

COURSE CONTENTS:

MODULE I	FOURIER SERIES	9 Hours

Dirichlet‟s conditions – General Fourier series – Odd and even functions – Half range sine series – Half

range cosine series – Parseval‟s identity – Harmonic analysis.		
MODULE II	**FOURIER TRANSFORMS**	**9 Hours**
Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval‟s identity		
MODULE III	**PARTIAL DIFFERNTIAL EQUATIONS**	**9 Hours**
Formation of partial differential equations – Singular integrals -- Solutions of standard types of first order partial differential equations - Lagrange‟s linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types		
MODULE IV	**APPLICATION OF PARTIAL DIFFERENTIAL EQUATIONS**	**9 Hours**
Classification of PDE – Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.		
MODULE V	**Z TRANSFORMS AND DIFFERENCE EQUATIONS**	**9 Hours**
Z- transforms - Elementary properties – Inverse Z - transform (using partial fraction and residues) – Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.		
		TOTAL: 45+15= 60 Hours

REFERENCES:

1. *Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012.*
2. *Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers Delhi,2012.*
3. *Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematic for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.*
4. *Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd , 2007.*
5. *Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Limited, New Delhi, 2008.*
6. *Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.*
7. *Datta.K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd,*

2302CE301	ENGINEERING GEOLOGY	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Basics of Geography and
2. Engineering Science

COURSE OBJECTIVES:

1. To give the basic knowledge of Geology that is required for constructing various civil Engineering Structures
2. To study geological hazardous and Environmental Geology
3. To study the structural Geology
4. To study earth quakes and importance of Geophysical studies
5. To study Geology of dams reservoirs and tunnels

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Illustrate the concepts of geological formations, weathering and plate tectonics above and below the surface of the earth.
CO2:	Interpret the physical, mechanical and engineering properties of minerals.
CO3:	Classify the rocks based on their origin, composition, engineering properties and uses.
CO4:	Discuss the geological structures such as fold, fault, joints etc and Outline the subsurface the geological formation by geophysical investigation using seismic and electric method.
CO5:	Describe the geological condition for construction of dams, tunnels, building and road cuttings.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	1	-	-	-	-	-
CO2	3	1	-	-	-	-	1	-	-	-	-	-
CO3	3	1	-	-	-	-	1	-	-	-	-	-
CO4	3	1	-	-	-	-	1	-	-	-	-	-
CO5	3	1	-	-	-	-	1	-	-	-	-	-

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	-	2
CO2	-	2
CO3	-	2
CO4	-	2
CO5	-	2

COURSE CONTENTS:

MODULE I	PHYSICAL GEOLOGY	9 Hours

Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea– relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.		
MODULE II	**MINEROLOGY**	**9 Hours**
Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole– hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.		
MODULE III	**PETROLOGY**	**9 Hours**
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.		
MODULE IV	**STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS**	**9 Hours**
Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.		
MODULE V	**APPLICATION OF GEOLOGICAL INVESTIGATIONS**	**9 Hours**
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Hydro geological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.		
		TOTAL: 45 HOURS

REFERENCES:

1. Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.

2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.

3. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010

4. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.

2302CE302	MECHANICS OF FLUIDS	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Engineering physics

COURSE OBJECTIVES:

1. To introduce the students about properties and behavior of the fluids under static conditions
2. To impart basic knowledge of the dynamics of fluids through the control volume approach
3. To expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on pipe bends with an exposure to the significance of boundary layer theory and its applications

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Explain the fundamental properties of fluids and methods of pressure measurement in fluid Statics.
CO2:	Apply the conservation laws applicable to fluids and its application through fluid kinematics and Dynamics.
CO3:	Estimate the losses in pipelines for both laminar and turbulent conditions and analysis of pipes Connected in series and parallel.
CO4:	Compute the drag force excreted by the fluid on the flat solid surface by the concept of Boundary layer and its application.
CO5:	Formulate the relationship among the parameters involved in the given fluid phenomenon and To predict the performance of prototypes by model studies.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	1	-	-	-	2
CO2	2	1	-	-	-	-	-	1	-	-	-	2
CO3	3	2	1	-	-	-	-	1	-	-	-	2
CO4	3	2	1	-	-	-	-	1	-	-	-	2
CO5	3	2	1	-	-	-	-	1	-	-	-	2

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	-	1
CO2	-	1
CO3	-	1
CO4	-	1
CO5	-	1

COURSE CONTENTS:

MODULE I	**FLUID PROPERTIES AND FLUID STATICS**	**10 Hours**
Fluid properties - density, specific weight, specific volume, specific gravity, viscosity, vapour pressure, capillarity and surface tension. fluid statics- hydrostatic law -pascal's law - pressure measurement – buoyancy and meta-centre- reynold‟s transportation theorem		
MODULE II	**FLUID KINEMATICS AND FLUID DYNAMICS**	**10 Hours**
Classification of fluid flow - velocity and acceleration - continuity equation - stream line, streak line, path line, velocity potential and stream function. Dynamics: euler's equations of motion-bernoulli's theorem and proof - application of bernoulli's equation - orifice meter, venturi meter. Linear momentum equation – application to pipe bends – moment of momentum equation.		
MODULE III	**INCOMPRESSIBLE VISCOUS FLOW**	**9 Hours**
development of laminar and turbulent flows in circular pipes-hagen-poiseuille equation-darcy-weisbach equation-major and minor losses-pipes in series and in parallel. empirical formulae for friction loss - definition and differences between pipe flow and open channel flow-moody diagram-total energy line– hydraulic grade line–siphon		
MODULE IV	**BOUNDARY LAYERS**	**9 Hours**
Definition of boundary layers–laminar and turbulent boundary layers–displacement, momentum and energy thickness–momentum integral equation–applications–separation of boundary layer-drag and lift forces.		
MODULE V	**DIMENSIONAL ANALYSIS, SIMILITUDE AND MODEL ANALYSIS**	**7 Hours**
Dimensional homogeneity-dimensionless numbers-methods of dimensional analysis-rayleigh's method-buckingham's pi theorem-method of selecting repeating variables -types of similarities–hydraulic similitude - model analysis-types of models-similarity laws.		
		TOTAL: 45 HOURS

REFERENCES:

1. S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2012

2. Pani B S, Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.

3. Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2014.

4. Narayana Pillai N. Principles of Fluid Mechanics and Fluid Machines, (3rd Ed.) University Press (India) Pvt. Ltd. 2009

5. R.K.Bansal, "Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi, 2021.

6.https://nptel.ac.in/courses/112/105/112105183/

2302CE303	MECHANICS OF SOLIDS I	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Engineering physics
2. Engineering Mathematics II

COURSE OBJECTIVES:

1. To Learn the use scalar and vector analytical techniques for analyzing forces in Statically determinate structures.
2. To develop basic dynamics concepts – force, momentum, work and energy;
3. To impart knowledge on fundamental concepts of Stress, Strain and deformation of solids with applications to bars, and beams.
4. To acquire the ability to analyze the mechanism of load transfer in beams, the induced stress resultants and deformations.
5. To develop the clear understanding of the effect of torsion on shafts and springs.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Illustrate the vectorial and scalar representation of forces and moments and Calculate dynamic Forces exerted in rigid body.
CO2:	Describe the mechanical behavior of engineering materials subjected to various types of Stresses and compute the resulting strain and strain energy.
CO3:	Analyze the bending of various types of beams under static loading conditions.
CO4:	Compute the bending and shear stress distribution for different cross sections of beams.
CO5:	Compute the torsion for the circular shaft and Properties of spring.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	1	-	-	-	1
CO2	2	1	-	2	-	-	-	1	-	-	-	1
CO3	3	2	1	-	2	-	-	1	-	-	-	1
CO4	2	1	-	-	-	-	-	1	-	-	-	1
CO5	3	2	1	2	-	-	-	1	-	-	-	1

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

COURSE CONTENTS:

MODULE I	STATICS AND DYNAMICS OF PARTICLES	8 Hours

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Newton‟s first Law of Motion, Space and Free-Body Diagrams, Kinematics - Motion of Particles- Kinetics- Newton‟s Second Law of Motion -Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods.		
MODULE II	**STRESSES AND STRAINS**	**9 Hours**
Elasticity and plasticity – Types of stresses & strains–Hooke‟s law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson‟s ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses-Principal stresses and Principal strains- Strain energy – Resilience – Gradual, sudden, impact and shock loadings.		
MODULE III	**SHEAR FORCE AND BENDING MOMENT**	**9 Hours**
Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.		
MODULE IV	**FLEXURAL STRESSES**	**9 Hours**
Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.		
MODULE V	**TORSION**	**9 Hours**
Torsion of Circular and Hollow Shafts – Elastic Theory of Torsion – Stresses and Deflection in Circular Solid and Hollow Shafts – combined bending moment and torsion of shafts – strain energy due to torsion – Modulus of Rupture – Power transmitted to shaft.		
		TOTAL: 45 HOURS

REFERENCES:

1. *Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 11thEdition, 2017.*
2. *Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.*
3. *Vazirani.V.N and Ratwani.M.M, ―Analysis of Structures‖, Vol I Khanna Publishers, New Delhi,1995.*
4. *Junnarkar.S.B. and Shah.H.J, ―Mechanics of Structures‖, Vol I, Charotar Publishing House, New Delhi 1997.*
5. *Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.*
6. *Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2017.*
7. *https://nptel.ac.in/courses/112107146*
8. *https://easyengineering.net/ce6402-strength-of-materials-som_14/*
9. *https://karthikacivil.weebly.com/strength-of-materials.html*

2302CE304	SURVEYING	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Geo-informatics
2. Topography

COURSE OBJECTIVES:

1. To understand the importance of surveying in the field of civil engineering and study the basics of linear/angular measurement methods like chain surveying and compass Surveying.
2. To know the basics of leveling survey in elevation and angular measurements and also Understand the basics of Theodolite and Curves.
3. Gain a basic understanding of the principles and operation of the global position system and Total Station

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Introduce the basics of various surveying and its principles.
CO2:	Imparts knowledge in computation of levels of terrain and ground features.
CO3:	Imparts concepts of Theodolite Surveying for complex surveying operations & the ability to design curves.
CO4:	To acquire the knowledge about Areas and Volumes Calculation.
CO5:	Imparts the knowledge on modern surveying instruments.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	3	-	2	2	-	2	2
CO2	3	3	2	2	2	3	-	2	2	-	3	3
CO3	3	3	3	2	3	3	-	2	2	-	3	3
CO4	3	3	3	3	3	3	2	2	3	-	3	3
CO5	3	3	3	2	3	3	2	2	3	-	3	3

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	3	3
CO2	3	3
CO3	3	3
CO4	3	3
CO5	3	3

COURSE CONTENTS:

MODULE I	BASICS OF SURVEYING	10 Hours

Definition – Classifications – Basic principles –Chain traversing – Compass – Basic principles – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip – compass traversing – Plane table and its accessories – Merits and demerits – Radiation – Intersection – Resection – Plane table traversing.		
MODULE II	**LEVELLING**	**9 Hours**
Levelling – Levels – Functions – Accessories – Types of levels: Dumpy level – Leveling staff – Bench Mark –Reduced Level – Rise and Fall – Line of Collimation – Back Site – Fore Site – Intermediate Site – Change Point –Height of Instruments – Problems.		
MODULE III	**THEODOLITE SURVEY & CURVES**	**10 Hours**
Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry – Trigonometric leveling – Single Plane method – Double Plane method. Types of Curves – Elements of simple circular curve – Simple curve – Transition curve – Vertical Curve.		
MODULE IV	**AREA & VOLUME CALCULATION**	**9 Hours**
Area Calculation – Methods (Mid-Ordinate Rule, Average Ordinate Rule, Trapezoidal Rule and Simpon‟s Rule) – Volume Calculation – Methods (Prisomoidal Rule and Trapezoidal Rule) – Problems.		
MODULE V	**MODERN SURVEYING**	**7 Hours**
Total Station: Digital Theodolite, EDM, Electronic field book – Advantages – Parts and accessories – Working principle – Observables – Errors - Field procedure and applications. GPS: Advantages – System components – Signal structure - Data processing – Errors in GPS – Field procedure and applications. Remote Sensing and GIS – Definition, Basic Principles and Components of Remote Sensing and GIS.		
		TOTAL: 45 HOURS

REFERENCES:

1. *Arora K.R.,"Surveying Vol 1& 2", Standard Book House, 10th Edition2008.*
2. *Alfred Leick,"GPS Satellite Surveying", John Wiley & Sons Inc., 3rd Edition, 2004.*
3. *Goucheng Xu,"GPS Theory, Algorithms and Applications", Springer – Berlin, 2003.*
4. *Satheesh Gopi, Rathish Kumar, N. Madhu,"Advanced Surveying, Total Stations GPS and Remote Sensing"Pearson education,2007.*
5. *https://nptel.ac.in/courses/105/107/105107122/ (Link for NPTEL/SWAYAM/MOOC Courses)*
6. *https://nptel.ac.in/courses/105/107/105107121/ (Link for NPTEL/SWAYAM/MOOC Courses)*

2302CE305	CONSTRUCTION MATERIALS AND TECHNOLOGY	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Material science

COURSE OBJECTIVES:

1. To introduce students to various Construction Materials, Techniques, and Technology commonly used in civil engineering construction.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Understand the good quality stones, bricks, lime, cement, and concrete blocks for construction.
CO2:	Illustrate the market forms of timber, steel, aluminum, and applications of various composite materials.
CO3:	Acquire knowledge of different construction practices and service requirements.
CO4:	Demonstrate various equipment for construction works.
CO5:	Demonstrate various recent Construction Technology

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	1	2	1	-	-	-	1
CO2	3	2	1	2	-	1	2	1	-	-	-	1
CO3	3	2	1	2	-	1	2	1	-	-	-	1
CO4	3	2	1	1	-	1	2	1	-	-	-	1
CO5	3	2	2	2	-	1	2	1	-	-	-	1

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	1	2
CO2	1	2
CO3	1	2
CO4	1	2
CO5	1	2

COURSE CONTENTS:

MODULE I	STONES - BRICKS - LIME-CEMENT - CONCRETE BLOCKS	9 Hours

Stone as building material- Criteria for selection, Tests on stones - Bricks , Classification, Manufacturing of clay bricks, Tests on bricks , Compressive strength , Water Absorption , Efflorescence - Lime , Preparation of lime mortar - Cement , types , Manufacturing process - Concrete hollow blocks - Lightweight concrete blocks

MODULE II	**TIMBER – GLASS - CERAMICS AND COMPOSITE MATERIALS**	**9 Hours**
Timber , Market forms , Plywood , Veneer , False ceiling materials - Steel , Mechanical treatment - - Aluminum, Uses , Market forms - Glass - Ceramics - Refractories - Composite Materials,Types and applications		
MODULE III	**CONSTRUCTION PRACTICES & SERVICE REQUIREMENTS**	**9 Hours**
Types of Foundations - Stone Masonry and Brick Masonry - Plastering and Pointing - Cavity Walls and Diaphragm Walls – Formwork, Centering and Shuttering, Shoring, Scaffolding and Underpinning - Roofing and Flooring - Joints in concrete, Contraction/Construction/Expansion joints - Fire Protection and Thermal Insulation - Ventilation and Air conditioning - Acoustics and Sound Insulation - Damp Proofing and Anti Termite Treatment.		
MODULE IV	**CONSTRUCTION EQUIPMENTS**	**9 Hours**
Selection of equipment for earthwork excavation – concreting - material handling and erection of structures – Dewatering and pumping equipment- tunneling equipment - Equipment for compaction, batching, mixing and concreting - Equipment for foundation and pile driving.		
MODULE V	**RECENT CONSTRUCTION TECHNOLOGY**	**9 Hours**
Construction Methods for Bridges - Construction methods for Highway - railways – caisson - cofferdam- Recent Construction Materials		
		TOTAL: 45 HOURS

REFERENCES:

1. *Varghese.P.C, Building Construction, Second Edition PHI Learning ltd., 2016.*
2. *Punmia ,B.C Building construction , Laxmi publication (p)ltd..,2008.*
3. *Peurifoy R.L., Schexnayder,C.J., Shapira A., Schmitt.R., Construction Planning Equipment and Methods, Tata McGraw-hill, 2011.*

2301GEX07	ENVIRONMENTAL SCIENCES AND SUSTAINABLITY	L	T	P	C
		1	0	2	2

PREREQUISITE:

1. Basic environmental studies

COURSE OBJECTIVES:

1. Realize the interdisciplinary and holistic nature of the environment.
2. Understand how natural resources and environment affect the quality of life and stimulate the quest for sustainable development.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Describe the importance of ecosystem.
CO2:	Describe the various environmental issues and its prevention.
CO3:	Organize various natural resources and the immediate need to conserve it.
CO4:	Select the various ways of conservation of biodiversity.
CO5:	Investigate the different types of pollution and its effects.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	3	-	-	-	-	-
CO2	2	1	-	-	-	-	3	-	-	-	-	-
CO3	3	2	1	1	1	1	3	2	2	2	3	2
CO4	3	2	1	1	1	1	3	2	2	2	3	2
CO5	3	2	1	1	1	1	3	2	2	2	3	2

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

COURSE CONTENTS:

MODULE I	ECOSYSTEM	8 Hours

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers. Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, rivers, oceans)		
MODULE II	**ENVIRONMENTAL ISSUES AND SOLUTIONS**	**7 Hours**
Current Environmental Issues: Acid rain, Ozone layer depletion, Global warming, Greenhouse effect **Solutions:** 12 principles of green Chemistry-Rain water harvesting.		
MODULE III	**BIODIVERSITY**	**10 Hours**
Introduction to biodiversity -genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.		
MODULE IV	**NATURAL RESOURCES**	**10 Hours**
Forest resources: Use and over-exploitation, deforestation- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over utilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity– Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Energy Conversion Processes Biogas – production and uses, anaerobic digestion – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.		
MODULE V	**ENVIRONMENTAL POLLUTION**	**10 Hours**
Definition – Source, causes, effects and control measures of: (a) Air pollution (b) Water pollution(c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution –(f) Nuclear pollution (g) Thermal pollution role of an individual in prevention of pollution.		
		TOTAL: 45 HOURS
LIST OF EXPERIMENTS:		
MINI PROJECT ADDITIONAL TOPICS		
Soil Science		
1. Effects of climate change on soil erosion.		
2. The role of land management in maintaining soil health.		
3. Effects of salinity in coastal region Agricultural activity.		
4. The effects of climate change on agriculture.		
Urban Ecology		
1. How road construction impacts biodiversity and ecosystems.		
2. The effects of urbanization and city planning on water cycles.		
3. Impacts of noise pollution on human health.		
Pollution and Bio-remediation		
1. The role of bio-remediation in removing “forever” chemicals from the environment.		
2. Impacts of air pollution on human health.		
3. How to improve plastic recycling processes?		
4. Individual measures to reduce consumption and creation of micro plastics.		
General Topics		
1. Impact of Urbanization on Local Biodiversity		
2. Renewable Energy Options for Sustainable Living.		
3. Waste Management Strategies in Urban Areas		
4. Climate Change and Its Effects on Local Ecosystems		
5. Air Quality Monitoring in Urban centers		

6. Water Quality Assessment in Local Water Bodies
7. Green Roof Technology and Its Environmental Benefits
8. Impact of Plastic Pollution on Marine Life.
9. Eco-friendly Practices in Agriculture:
10. The Role of Community Gardens in Urban Sustainability
11. Alternate energy sources for community Development.
12. E-Waste Management.
13. Energy Audit of a building.
14. Rainwater harvesting system.
15. Population growth variation among nations.
16. Population explosion.
17. Family welfare programme.
18. Women welfare programme.
19. Child welfare programme.
20. Environmental impact analysis.
21. Role of information technology in environmental protection and human health.
REFERENCES:
1. *Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.*
2. *Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.*
3. *Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.*
4. *Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.*
5. *Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006*
6. *https://en.wikipedia.org/wiki/Carbon_capture_and_storage*
7. *Ravikrishnan "Environmental Science and Engineering" Sri Krishna Hi-tech Publishing Company Pvt .*

2302CE351	SURVEYING LAB	L	T	P	C
		0	0	2	1

PREREQUISITE:

1. Geo-informatics

COURSE OBJECTIVES:

1. At the end of the course the student will possess knowledge about survey field techniques.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Impart knowledge on the usage of basic surveying instruments like chain/tape, compass and plane table instruments
CO2:	Able to use levelling instrument for surveying operations.
CO3:	Able to use theodolite for various surveying operations.
CO4:	Able to carry out necessary surveys for social infrastructures.
CO5:	Able to prepare planimetric maps.
CO6:	Impart knowledge on the usage of basic surveying instruments like chain/tape, compass and plane table instruments

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	2	3	2	3	3	3	3	1
CO2	3	2	3	-	3	3	3	3	3	3	3	1
CO3	3	1	2	-	3	2	-	-	3	-	-	2
CO4	3	3	3	2	2	3	3	2	3	3	3	1
CO5	3	3	3	2	2	3	3	2	3	3	3	1
CO6	3	2	3	3	2	3	2	3	3	3	3	1

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	3	3
CO2	3	3
CO3	3	3
CO4	3	3
CO5	3	3
CO6	3	3

LIST OF EXPERIMENTS:

CHAIN SURVEY

1. Survey of an Area by Chain (Closed Traverse and Plotting).

COMPASS SURVEY

1. Survey of a given area by Prismatic Compass (Closed Traverse) and plotting after adjustment.
2. Determination of Distance between Two Inaccessible Points with Compass.

LEVELLING

1. Fly levelling using Dumpy level (Differential Leveling).
2. Longitudinal Section and Cross Section.

PLANE TABLE SURVEYING

1. Plane Table Surveying – Radiation.
2. Plane Table Surveying – Intersection
3. Plane Table Surveying – Resection
4. Plane Table Surveying – Traversing

THEODOLITE SURVEYING

1. Measurement of Horizontal Angle by Repetition Method.
2. Measurement of Horizontal Angle by Reiteration Method.
3. Determining a Height of Object by Measuring Vertical Angle.

TOTAL STATION

1. Stake Out suing Total Station (Demonstration).

TOTAL: 45 HOURS

REFERENCES:

1. *T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Volume 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint, 2015.*
2. *Dr. B. C. Punmia, Ashok K. Jainand Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition, 2016.*
3. *James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001*
4. *Bannisterand S. Raymond, Surveying, Seventh Edition, Longman 2004 a. David Clark, Planeand Geodetic Surveying for Engineers, Volume I, Constable and Company Ltd, London, CBS, 6th Edition, 2004.*
5. *David Clark and James Clendinning, Plane and Geodetic Surveying for Engineers, VolumeII, Constable and Company Ltd, London, CBS, 6th Edition, 2004.*
6. *S. K. Roy, Fundamentals of Surveying, Second Edition, Prentice „Hall of India 2004.*
7. *K. R. Arora, Surveying Vol. I & II, Standard Book house, Eleventh Edition, 2013.*
8. *T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Volume 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint, 2015.*

2302CE352	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE:

1. Engineering physics

COURSE OBJECTIVES:

1. To find the strength properties of different construction materials like steel, concrete, brick and timber.
2. To evaluate stiffness properties of springs and to find the hardness properties of various metals.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Determine the mechanical properties of steel.
CO2:	Determine the stiffness of spring.
CO3:	Determine the hardness of metal.
CO4:	Determine the physical properties of cement.
CO5:	Determine the physical properties of brick and wood.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	1	-	1	-	-	-	3
CO2	3	2	1	3	-	1	-	1	-	-	-	3
CO3	3	2	1	3	-	1	-	1	-	-	-	3
CO4	3	2	1	3	-	1	-	1	-	-	-	3
CO5	3	2	1	3	-	1	-	1	-	-	-	3
CO6	3	2	1	3	-	1	-	1	-	-	-	3

COs Vs PSOs MAPPING:

COs	PSO1	PSO2
CO1	1	3
CO2	1	3
CO3	1	3
CO4	1	3
CO5	1	3

LIST OF EXPERIMENTS:

TESTS ON STEEL

1. Tension test on steel rod
2. Torsion test on mild steel rod

3. Deflection test on metal beam
4. Double shear test on metal
5. Impact test on metal specimen (Izod and Charpy)
6. Hardness test on metals (Rockwell and Brinell Hardness Tests)
7. Test on helical spring

TESTS ON CEMENT

1. determination of fineness of cement
2. determination of consistency of cement
3. determination of specific gravity of cement
4. determination of initial and final setting time of cement

TESTS ON BRICKS & MORTAR

1. determination of compressive strength of bricks
2. determination of water absorption of bricks
3. determination of compressive strength of mortar

TEST ON WOOD

1. determination of Compression test on wood

TOTAL: 45 HOURS

REFERENCES:

1. Strength of Materials Laboratory Manual, EGSPEC, Nagapattinam- 611 002.

2. IS1786-2008, Specification for cold worked steel high strength deformed bars for concrete reinforcement, 2008

3. https://karthikacivil.weebly.com/strength-of-materials.html