

### Semester III

#### (Second year) Branch/Course Civil Engineering

S.No	Sub Code	Category	Subject Name	L	T	P	C	I	E	TM
1	1909301	BSC	Mathematics-IV	3	-	-	3	30	70	100
2	1965302	ESC	Engineering Geology	2	1	-	3	30	70	100
3	1965303	PCC	Environmental Engineering	3	-	-	3	30	70	100
4	1965304	PCC	Surveying	3	-	-	3	30	70	100
5	1965305	ESC	Engineering Mechanics	3	1	-	4	30	70	100
6	1965306	HSC	Managerial Economics	3	0	0	3	30	70	100
7	1965307	MC	Environmental Studies	3	-	-	-	30	70	100
8	1965308P	PCC	Surveying Field work	-	-	3	1.5	50	50	100
9	1965309P	PCC	Environmental Engineering Lab			3	1.5	50	50	100
Total				20	2	6	22	280	520	900

#### Semester IV (Second year) Branch/Course Civil Engineering

S.No	Sub Code	Category	Subject Name	L	T	P	C	I	E	TM
1	1965401	ESC	Building Planning and Drawing	2	-	2	3	30	70	100
2	1965402	PCC	Fluid Mechanics	2	1	-	3	30	70	100
3	1965403	PCC	Strength of Materials	2	1	-	3	30	70	100
4	1965404	PCC	Transportation Engineering	3	-	-	3	30	70	100
5	1965405	PCC	Geotechnical Engineering	2	1	-	3	30	70	100
6	1965406	PCC	Civil Engineering Materials	3	-	-	3	30	70	100
7	1965407	HSMC	Universal Human values	2	1	0	3	30	70	100
8	1965408P	PCC	Strength of Materials Lab	-	-	3	1.5	50	50	100
9	1909409P	PCC	Geotechnical Engineering Lab	-	-	3	1.5	50	50	100
Total				17	3	8	24	310	590	900

## MATHEMATICS IV

<b>Subject code: 1909301</b>	<b>Credits : 3</b>
Instruction : 3 Lectures/week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objective:

The objective of this course is to:

In general, the students are introduced with knowledge on - Vector Calculus, Partial differential equations, their applications and Integral Transforms(Fourier transforms, FST,FCT) to facilitate them to use these concepts in their core subjects.

### Course Outcomes:

At the end of this course student will be able to:

- 1 Evaluate the multiple integrals and apply the concept to find areas, volumes, Centre of mass and Gravity for cubes, sphere and rectangular parallelepiped.
- 2 Evaluate the line, surface and volume integrals and converting them from one to another.
- 3 Identify solution methods for partial differential equations that model physical process and find the general solution of the Partial Differential Equations bearing applications.
- 4 Ability to analyze displacements of one dimensional wave and distribution of one dimensional heat equation.
- 5 Ability to express any periodic function by using Fourier series and a non-periodic function by using Fourier transforms.

### SYLLABUS:

#### UNIT-I

##### VECTOR CALCULUS-1

Differentiation of vectors, curves in space, velocity and acceleration, relative velocity and relative acceleration, scalar and vector point functions, vector operator  $\tilde{\nabla}$  applied to scalar point functions- gradient,  $\tilde{\nabla}$  applied to vector point functions- divergence and curl. Physical interpretation of gradient, divergence and curl (i.e.), Irrotational and Solenoidal fields, the relations obtained after  $\tilde{\nabla}$  applied twice to point functions,  $\tilde{\nabla}$  applied to products of two functions.

#### UNIT-II

##### VECTOR CALCULUS-2

Integration of vectors, line integral, circulation, work done, surface integral-flux, Green's theorem in the plane,

Stoke's theorem, volume integral, Gauss Divergence theorem.

Introduction of orthogonal curvilinear coordinates, cylindrical and spherical polar coordinates

### **UNIT-III**

#### **INTRODUCTION OF PARTIAL DIFFERENTIAL EQUATIONS**

Formation of partial differential equations, solutions of partial differential equations- equations solvable by direct integration, linear equations of first order: Lagrange's Linear equation, non-linear equations of first order, Charpit's method.

Homogeneous linear equations with constant coefficients- rules for finding the complementary function, rules for finding the particular integral (working procedure), non-homogeneous linear equations.

### **UNIT-IV**

#### **APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS:**

Method of separation of variables, One dimensional wave equation-vibrations of a stretched string, one dimensional Heat flow equation, Two dimensional heat flow in steady state - solution of Laplace's equation in Cartesian and polar coordinates (two dimensional).

### **UNIT-V**

#### **INTEGRAL TRANSFORMS:**

Introduction, definition, Fourier integral, Sine and Cosine integrals, Complex form of Fourier integral, Fourier transform, Fourier Sine and Cosine transforms, Finite Fourier Sine and Cosine transforms, properties of Fourier transforms.

Convolution theorem for Fourier transforms, Parseval's identity for Fourier transforms, Fourier transforms of the derivatives of a function, simple applications to Boundary value problems.

#### **TEXT BOOKS:**

1. B.S. Grewal, "*Higher Engineering Mathematics*", 43<sup>rd</sup> Edition, Khanna Publishers, 2017.

#### **REFERENCE BOOKS:**

1. N.P. Bali and Dr. Manish Goyal "*Engineering Mathematics*", Lakshmi Publications Pvt Limited, 2011.

2. Erwin Kreyszig, "*Advanced Engineering Mathematics*" 10th Edition, John Wiley & Son, INC, 2011.

3. B. V. Ramana, "*Higher Engineering Mathematics*", Tata McGraw Hill Company, New Delhi, 2008.

4. H.K. Dass, "*Advanced Engineering Mathematics*", S.Chand & Company Pvt Ltd, 2014.

## ENGINEERING GEOLOGY

<b>Subject code: 1909302</b>	<b>Credits : 3</b>
Instruction : 2 Lectures & 1 Tutorial/ week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objectives:

The objective of this course is to:

1. Explain the fundamental geomorphic and dynamic processes on the Earth System
2. Illustrate the material present i.e. minerals and rocks, structural deformations and impacts
3. Prioritize hazardous effects, causes and various zones.
4. Rephrase subsurface exploration methods.
5. Elaborate certain geological investigations on site selection for civil engineering projects.

### Course Outcomes:

At the end of this course student will be able to:

1. Rephrase the global vision of Earth processes, groundwater availability and its importance.
2. Identify and list the subsurface material, mechanical properties of rocks, formation of minerals and their types.
3. Categorize different structural deformations taking place within the earth's crust, their classifications and causes, natural hazards like Earthquakes, Tsunamis, landslides etc.
4. Perceive the applications of remote sensing and GIS and their current scenarios.
5. Examine several civil engineering problems encountered in any of the structural components like, dams, tunnels, bridges etc.

### SYLLABUS:

#### UNIT-I

##### General Geology:

Importance of geology from civil engineering point of view. Branches of geology. Weathering and soils: Soil profile, Erosion and soil formation, types of Indian soils. Ground water: origin, groundwater table, porosity and permeability. Aquifers and groundwater moment and water bearing properties of rocks.

#### UNIT -II

##### Petrology & Mineralogy:

Petrology: Definition of rock and rock formation. Rocks- classification, Structure, texture and mineralogical composition. Types of rocks- Igneous rocks: Granite, syenite, dolerite, gabbro, diorite, basalt. Sedimentary rocks, dykes and sills: Breccia, conglomerate, Sandstone, Shale, limestone. Metamorphic rocks: Gneiss, khondalite,

schist, slate, marble, quartzite, charnokite. Engineering properties of rocks. Weathering of rocks. Mineralogy: physical properties: form, color, luster, cleavage, fracture, hardness and specific gravity. Study of important rock forming minerals: Silicate structures, Quartz, feldspars, pyroxenes, amphiboles, micas and clays.

### **UNIT-III**

#### **Structural geology:**

Elements of structural geology- Strike, dip, plunge. Clinometer compass and Brunton Compass. Classification of folds, faults and joints. Geological methods of Investigations: Geological formations, preparation of geological maps, structural features and groundwater parameters. Natural Hazards: Earthquakes origin and distribution. Volcanoes, Landslides and mass movement. Tsunamis.

### **UNIT-IV**

#### **Geophysical methods and remote sensing:**

Remote sensing: Introduction, electromagnetic spectrum, aerial photo, types of aerial photos and flight planning. Aerial mosaics. Elements of photo interpretation. Satellite remote sensing. Satellites, sensors and data products. Principles of GIS. RS and GIS applications to Civil Engineering -Town planning, dams and reservoirs, linear structures and environmental monitoring. Geophysical methods: principles of geophysical methods, electrical, Seismic, Gravity and magnetic. Principle of Resistivity method and configurations. Applications of Resistivity method in prediction of soil profile, hard rock and ground water table. Principles of Seismic refraction and reflections methods and their applications to Civil Engineering problems. Geological applications to Civil Engineering Structures.

### **UNIT-V**

#### **Geological Investigations:**

Role of engineering geologist in planning, design and construction stages in Civil Engineering works. Geological investigations for dams and reservoirs. Geological investigations for bridges and Multi-storied structures. Geological investigations for highways, air fields and railway lines. Geological investigations for tunnels and coastal structures (Seawalls, groins and bulkheads). Environmental geology.

#### **TEXT BOOKS:**

1. N.Chennakesavulu, “*Engineering Geology*”, Trinity Press, 2<sup>nd</sup> Edition, 2014.
2. Parbin Singh, “*Engineering and General Geology*”, 6<sup>th</sup> Edition, Sm K Kataria & Sons, 2012.

#### **REFERENCES:**

1. George Joseph, “*Fundamentals of Remote Sensing*”, 3<sup>rd</sup> Edition, University Press (India) Private Limited, 2017.
2. Gokhale KVGK, “*Principles of Engineering Geology*”, 6<sup>th</sup> Edition, B.S. Publications, Hyderabad, 2010.
3. M.Anji Reddy, “*Textbook of Remote Sensing and Geographical Information Systems*”, 3<sup>rd</sup> Edition, B.S. Publications, 2006.
4. F.G.Bell, “*Fundamentals of Engineering Geology*”, 2<sup>nd</sup> Edition, Butterworths, Publications, New Delhi, 1992.

#### **WEB MATERIALS:**

1. <https://nptel.ac.in/courses/105/105/105105106/>
2. <https://nptel.ac.in/courses/105/104/105104191/>
3. <https://nptel.ac.in/courses/105/104/105104200/>

## ENVIRONMENTAL ENGINEERING

<b>Subject code: 1965303</b>	<b>Credits : 3</b>
Instruction : 3 Lecture / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

**Pre-requisites:** Chemistry,

### **Course Objective:**

1. The principal objective of the course is to develop the technical knowledge for better understanding the concepts of water supply and its characteristics and enabling them to use these technical skills in solving the problems in industries.
2. Impart the knowledge in planning, design, construction, operation and maintenance aspects of water supply systems.
3. Provide theoretical and practical exposure in the field of water treatment and supply.
4. Increase the management skills with regard to collection, treatment and distribution of sustainable water.

### **Course Outcomes:**

At the end of the course, the student will be able to:

- 1 Explain basic knowledge on sources and hydrological concepts of water.
- 2 Estimate demand for water supply and population studies.
- 3 Develop the skills in analysis of water and drinking water standards.
- 4 Design water treatment systems, operations, and working of different units.
- 5 Design elements of public water systems and distribution systems.

## **SYLLABUS:**

### **UNIT-I**

Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities. **Hydrological Concepts:** Hydrological Cycle, Types of Precipitation, Measurement of Rainfall. Surface sources of water: Lakes, Rivers, Impounding Reservoirs, Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries.

### **UNIT-II**

**Water Demand and Quantity studies:** Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies. **Collection of Water:** Factors

governing the selection of the intake structure, Types of Intakes .Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipelines, laying of pipe lines.

### **UNIT-III**

**Quality and Analysis of Water:** Characteristics of water – Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological. Impurities in water, Water borne diseases. Drinking water quality standards.

### **UNIT-IV**

**Treatment of Water :** Flowchart of water treatment plant, Treatment methods (Theory and Design) - Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration, Chlorination and other Disinfection methods, Softening of Water, Defluoridation, Removal of Odours.

### **UNIT-V**

**Distribution of Water:** Methods of Distribution system, Components of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks, Water connection to the houses.

### **Text Books:**

1. S.K.Garg, "Water Supply Engineering" Vol-I, 33rd Edition , Khanna publications,2010.
- 2.K.N. Duggal, "Elements of Environmental Engineering" , 7th Edition, S.chand Publishers,2010

### **References:**

1. P.N.Modi, "Water Supply Engineering" Vol-I,3rd Edition,Rajsons Publications Pvt Ltd,2016
2. B.C. Punmia, "Water Supply Engineering", Vol-I, 2nd Edition, Laxmi Publications,2008
3. Peavy, Rowe, "Environmental Engineering", Tchenobolus, Vol-1 Mc Graw Hill publication, 2017
4. G.S.Birdie and J.S.Birdie, "Water Supply and Sanitary Engineering" –,8th Edition,DhanpatRai & Sons Publisher,2010

## SURVEYING

<b>Subject code: 1965304</b>	<b>Credits : 3</b>
Instruction : 3 Lectures /week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objectives:

The objective if the course is to:

1. Provide theoretical and practical exposure to measure the area by chaining.
2. Familiarize to measure the area and distance between the points by compass.
3. Impart the knowledge to measure the elevation of points and importance of counteracting.
4. Study the different techniques of measurements of distances, directions and elevations.
5. Learn about the principles involved in the advanced surveying instrument i.e Total Station.

### Course Outcomes:

At the end of the course the student will be able to:

- 1 Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering
- 2 Students are able to calculate angular measurements using compass.
- 3 Understand the basics and elements of levelling.
- 4 Perform trigonometric and tacheometric surveying for distance and height measurements.
- 5 Invoke advanced surveying techniques over conventional methods in the field of civil engineering.

## SYLLABUS:

### UNIT I

Definition of Surveying, Overview of plane surveying (chain and compass), Objectives, Principles and Classifications.

#### Chain surveying:

Instrumentation for chaining – Errors due to incorrect chain-Errors in chaining-Tape corrections –Problems:

### UNIT II

**(a) Compass Survey:** Introduction to compass survey Definitions of Bearing. True bearing, True meridian, Magnetic Meridian, Magnetic bearing – Arbitrary Meridian, R.B & B.B of lines – Designation of bearing – W.C.B. & R.B. – Conversion of bearings – from one systems to the other Related problems – Calculation of angles for bearings, Calculation of bearings for angles, Related problems – Theory of Magnetic compass (i.e. Prismatic compass) – Magnetic dip Description of Prismatic compass. Temporary adjustments of compass-Magnetic Declination – Local attraction-Related problems –Errors in compass survey.

**(b) Traverse Surveying:** Chain and compass traversing-Free or loose needle method – Fast needle method-Checks in closed and open traverse-Plotting methods of traverse Survey-Closing error-Balancing the traverse-Bowditch's method-Transit method, gale's Traverse table.



### UNIT III

**Levelling:** Definitions of terms-Methods of levelling-Uses and adjustments of dumpy level Temporary and permanent adjustments of dumpy level levelling staves-Differential levelling, Profile levelling-Cross sections-Reciprocal levelling. Precise levelling-Definition of BS, IS, FS, HI, TP-Booking and reduction of levels, H.I. methods-Rise and fall method-Checks-Related problems-Curvature and refraction Related Problems-Correction-Reciprocal levelling-Related problems-L.S & C.S Leveling-Problems in levelling-Errors in levelling.

**Contouring:** Definitions-Interval, Characteristics of contours-methods of locating contours Direct and indirect methods -Contour gradient-Uses of contour maps.

### UNIT IV

**Theodolite**-Types of theodolites – Temporary Adjustments, Measurements of horizontal angle –Method of repetition, Method of reiteration – Uses of theodolites – Errors in theodolite or Permanent adjustments of a theodolite – Identification – Rectifying the errors. Theodolite traversing

**Tacheometry** – Principle of tachometry – Stadia methods – Fixed hair method – Movable hair method – Tangential method, Triangulation – Classification-intervisibility of station- Signals and towers-base line measurements

### UNIT V

**Total Station Surveying:** Electronic Theodolite, Electronic Distance Measurements, Total Station, Errors in measurements, Advantages, Disadvantages, Applications; Contour mapping, determination of height of remote point, position of hidden point, free station, Area measurement, volume measurement.

### TEXT BOOKS

1. S K Duggal, “*Surveying*” (Vol - 1&2), 10th Edition, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
2. B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, “*Surveying*” (Vol - 1,2&3), 18th Edition, Laxmi Publications (P) Ltd., New Delhi, 2011.

### REFERENCES:

- 1.K R Arora ,“*Surveying*” (Vol - 1,2&3), 9th Edition, Standard Book House, New Delhi,2008.
2. C.Venkatramaiah,“*Surveying*”, 2nd edition, Universities Press (India) Private Ltd., 2011.
3. N N Basak, “*Surveying & Levelling*”, 16th Edition, McGraw Hill Education (India) Private Ltd., New Delhi, 2015.

## ENGINEERING MECHANICS

<b>Subject code: 1965305</b>	<b>Credits : 4</b>
Instruction : 3 Lecture & 1 Tutorial / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

Pre-requisites: Engineering Mathematics, Engineering Physics.

### Course Objectives:

The objective of this course is to:

1. Study and describe static equilibrium of particles and rigid bodies.
2. Write the appropriate equilibrium equations from the free-body diagram and determine the connection forces in trusses.
3. Analyze effect of friction on equilibrium and compute centroid of given plane areas.
4. Calculate the second moment of an area and study dynamic equilibrium of particles.
5. Learn about the kinetics of particle and rigid body, related principles

### Course Outcomes:

At the end of this course student will be able to:

1. Determine the resultant forces and moments for a given system of forces.
2. Calculate the motion characteristics of a body subjected to a given force system and analyze planar and spatial systems to determine the forces in members of trusses
3. Analyze problems related to friction and locate the centroid and center of gravity.
4. Calculate moment of inertia and the displacement, velocity and acceleration of a moving particle.
5. Apply the work energy, D'Alembert's principle to particles and connected systems.

### SYLLABUS:

#### UNIT-I

##### BASIC CONCEPTS

Basic Concepts : Introduction to Engineering Mechanics – Scalar and Vector quantities – Forces – Characteristics of a force – Definitions and examples of various types of force systems – Definition of resultant – Composition and resolution of forces – Moment of a force – Principles of moments of force – Couples – characteristics of a couple – on Transformations of a couple – Resolution of a force into a force and couple. Resultants of Force Systems, Possible resultants of different types of force systems

#### UNIT-II

##### Equilibrium of Bodies

Equilibrium: Free body diagrams – Equations of equilibrium for a concurrent coplanar force system – Equilibrium of Bodies acted on by two or three forces – Equilibrium of bodies acted on by non-concurrent coplanar force system – Equilibrium of bodies acted on by parallel, non-coplanar force system – Equilibrium

of non-concurrent, non-coplanar non-parallel force system.

Analysis of statically determinate trusses by (a) Method of joints and (b) Method of sections.

### **UNIT-III**

#### **FRICTION**

Friction: Nature of friction – Laws of friction – Coefficient of friction – Angle of friction – Cone of friction – Problems involving frictional forces Method of Virtual Work: Principle of virtual work – Equilibrium of ideal system – Stability of equilibrium.

### **UNIT-IV**

**CENTROID AND CENTRE OF GRAVITY:** Centre of gravity of parallel forces in a plane – Centre of gravity of parallel forces in space – centroids and centers of gravity of composite bodies – Theorems of Pappus.

#### **MOMENT OF INERTIA**

Moments of Inertia, Definition – Parallel axis theorem for areas – Second moments of areas by integration – Radius of gyration of areas – Moments of inertia of composite areas – Parallel axis and parallel plane theorems for masses – Moments of inertia of masses by integration – Radius of gyration of mass – Moments of inertia of composite masses.

### **UNIT-V**

**KINEMATICS:** Absolute Motion : Introduction – Recapitulation of basic terminology of mechanics – Newton's Laws – Introduction to Kinematics of Absolute Motion – Rectilinear motion of a particle – Angular motion of a line .

**KINETICS: Introduction** to Kinetics – Newton's Laws of motion – Equation of motion for a particle. Motion of the mass center of a system of particles – D'Alembert's principle – Rectilinear translation of a rigid body – Work and Energy approach – Work done by a force – Work done by a couple – Work done by a force system – Energy: Potential energy – Kinetic energy of a particle – Kinetic energy of a rigid body – Principle of Work – energy and application to particle and rigid body in planar motion – Conservation of energy

#### **TEXT BOOKS:**

1. S.Ramamrutham, "*Engineering Mechanics*", Dhanapathirai publishing company,2008.
2. S.Timoshenko and D.H.Young,"*Engineering Mechanics*", Tata Mcgrawhill,2002.

#### **REFERENCES:**

1. S.Singer,"*Engineering Mechanics*" BS Publications.2011
2. J.L. Meriam, "*Engineering Mechanics*", John Wiley & Sons (Asia) Pvt.Ltd. 2000
3. S.Bhavikatti,"*Engineering Mechanics*",New Age International Publishers.2019
- 4.R.C.Hibbler,"*Engineering Mechanics*",14th Edition, Pearson Publications,2015.

## MANAGERIAL ECONOMICS

<b>Subject code: 1965306</b>	<b>Credits : 3</b>
Instruction : 3 Lecture / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objectives:

The objective of this course is to:

- 1) To understand the concepts of managerial economics and familiar with demand concepts, types of methods or techniques of demand those are used by the entrepreneur or producer.
- 2) To have a thorough knowledge on the production theories and cost while dealing with the production and factors of production. To introduce the concepts of cost and significance, limitation of Break even analysis.
- 3) To understand how to start a business by using different forms of business organizations.
- 4) To have a knowledge about how to record business transactions and books by using Accounting concepts and conventions, journal, ledger and other accounting records.
- 5) To assess the sources of funds and the financial position of the business by using common and comparative balance sheets.

### Course Outcomes:

At the end of this course student will be able to:

1. Adopt the Managerial Economic concepts for decision making and forward planning. Also know law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.
2. To assess the functional relationship between Production and factors of production and list out various costs associated with production and able to compute breakeven point to illustrate the various uses of breakeven analysis.
3. To outline the different types of business organizations and their registration process.
4. To adopt the principles of accounting to record, classify and summarize the accounts.
5. To plan about the sources of funds for business and the implementation of common size and comparative balance sheets for assessing the financial position of the business.

## SYLLABUS:

### UNIT-I

#### INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND

Definition, Nature and Scope of Managerial Economics. Demand Analysis: Definition-types of demand – Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Significance of Elasticity of Demand. Demand Forecasting: definition, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

## **UNIT-II**

### **THEORY OF PRODUCTION AND COST ANALYSIS**

Production Function – Law of Variable Proportion, Isoquants and Isocosts, MRTS, Cobb-Douglas Production function, Laws of Returns.

Cost Analysis: Types of Cost, Break-even Analysis (BEA)- Determination of Break-Even Point (Simple numerical problems) - Managerial Significance and limitations of BEA.

## **UNIT-III**

### **BUSINESS ENVIRONMENT**

Features of Business Organization, Sole Proprietorship, Partnership and Joint Stock Company, Steps for formation and Registration of the company.

## **UNIT-IV**

### **INTRODUCTION TO FINANCIAL ACCOUNTING**

Introduction to Accounting: Accounting Principles, Concepts & conventions, Double-Entry Book Keeping, Journal, Ledger and Trial Balance.

## **UNIT-V**

### **PREPARATION AND ANALYSIS OF FINANCIAL STATEMENTS**

Introduction to Sources of Finance: Equity shares, Preference shares, debentures , long term loans and Retained Earnings: Financial statement Analysis: advantages , Comparative and Common Size Balance Sheets Statements,

### **TEXT BOOKS**

1. A R Aryasri, “*Managerial Economics and Financial Analysis*”, 4th Edition, TMH Publication, 2012.
2. S A Siddiqui & A. S. Siddiqui “*Managerial Economics and Financial Analysis*”, 1st Edition, New Age Publishers, 2012.

### **REFERENCES**

1. Dominick Salvatore, “*Managerial Economics: Principles and Worldwide Applications*”, 7<sup>th</sup> edition, Oxford University Press, 2012.
2. N Ramachandran, Ram Kumar Kakani, “*Financial Accounting for Management*”, 2nd Edition, Pearson Education, 2007.
3. D N Dwivedi, “*Managerial Economics*”, 8th Edition, PHI Publication, 2010.

## ENVIRONMENTAL STUDIES

<b>Subject code: 1965307</b>	<b>Credits : 0</b>
Instruction : 3 Lecture / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objectives:

The objective of this course is to:

1. Recognize the interconnectedness of multiple factors in environmental challenges.
2. Work productively with those within and beyond the academy on interdisciplinary collaborative projects.

### Course Outcomes:

At the end of this course student will be able to:

1. Learn the scope and importance of Environmental studies. The students understand about different kinds of ecosystems.
2. The students learn about biodiversity and its conservation. They also learn about types of biodiversity, values of biodiversity and threats to biodiversity.
3. The students understand about the types of natural resources and problems associated with them.
4. In this unit the students gain knowledge about different types of environmental pollutions, their causes, effects and control measures.
5. In this unit the students gain knowledge about characteristics of human population growth and its impact on environment. The students develop deep understanding about the environmental legislation.

### SYLLABUS:

#### UNIT-I

##### Introduction to Environmental studies and Ecosystems

Definition, Scope and importance of environmental studies. Concept of an Eco system, Biotic and Abiotic components of ecosystem, structure and function of an ecosystem. Food Chains, Food webs and Ecological Pyramids. Forest ecosystem, Grassland ecosystem, Desert ecosystem, Pond ecosystem and Marine ecosystem.

#### UNIT – II

##### Bio-Diversity and its Conservation

Introduction – Definition and types of biodiversity – value of biodiversity - India as mega diversity nation – Hot spots of biodiversity – Threats to biodiversity – Conservation methods of biodiversity – In-situ & Ex – situ methods of conservation - Concept of sustainable development.

#### UNIT – III

##### Environment and Natural Resources Management

Soil erosion and desertification, Effects of modern agriculture, fertilizer-pesticide problems, Forest Resources : Use and over-exploitation, Mining and dams – their effects on forest and tribal people, Water resources : Use and over-utilization of surface and ground water, Floods, droughts, Water logging and salinity, Dams – benefits and costs, Conflicts over water, Energy Resources : Energy needs, Renewable and non-renewable energy sources.

## **UNIT – IV**

### **Environmental Pollution – climate change and environmental problems**

Definition, causes, effects and control measures of (a) air pollution (b) water pollution (c) soil pollution (d) noise pollution. Global Warming – Acid Rain – Ozone depletion – Photochemical smog. Drinking water, Sanitation and public health, Effect of activities of the quality of environment Urbanization, transportation, Industrialization. Water scarcity and ground water depletion, Controversies on major dams –resettlement and rehabilitation of people problems and concerns.

## **UNIT – V**

### **Human Population and Environmental legislations**

Population Explosion – characteristics of population explosion. Impact of population growth on Environment – Role of Information technology in Environment and Human Health, Environmental Ethics.

Environmental acts: Water (Prevention and control of pollution) act, air (Prevention and control of pollution) act, Environmental Protection Act, Wild life protection act, Forest conservation act.

#### **Textbooks:**

1. Anubha Kaushik and C. P. Kaushik, “*Environmental Studies*” Fourth Edition, New Age International Publishers, 2016.

#### **Reference:**

1. Deswal & Deswal, Raja Gopal, “*Concepts of Environment and Ecology*” Dharmaraj Publishers.
2. Bharucha Erach, “*The Biodiversity of India*”, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India.
3. H Jadhav, & V.M. Bhosale, 1995. “*Environmental Protection and Laws*”. Himalaya Pub. House, Delhi 284

## SURVEYING FIELD WORK

<b>Subject code: 1965308 P</b>	<b>Credits : 1.5</b>
Instruction : 3 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

**Pre requisite:** Knowledge of Surveying Practice – I & Surveying-II

### **Course Objectives:**

1. Develop an ability to apply knowledge of mathematics, Engineering to understand the measurement techniques and equipment used in land surveying.
2. Develop skills in using modern surveying instruments.

### **Course Outcomes:**

1. Apply the knowledge of Theodolite in different operations in civil engineering projects.
2. Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.
3. Develop skills in using Total Station instrument and analyse data
4. Summarize the basic principles of GPS and GIS in civil engineering.

### **List of Experiments**

1. Survey of an area by chain survey (closed traverse) & plotting
2. Levelling – H.I and Rise and fall method
3. Measurement of horizontal angles by method of repetition and method of reiteration.
4. To determine the height of a tower by Trigonometric Leveling.
5. To determine height of the object when a base is accessible and base is inaccessible.
6. To determine the tacheometric constants.
7. Heights and distance using Principles of tacheometric surveying.
8. Determine of area using total station.
9. Traversing using total station.
10. Contouring using total station.
11. Determination of remote height using total station.
12. Stake out using total station.

### **REFERENCES:**

1. K R Arora ,“*Surveying*” (Vol - 1,2&3), 9th Edition, Standard Book House, New Delhi,2008.
2. M James Anderson and Edward M.Mikhail,“*Surveying theory and practice*”, 7th Edition, McGraw Hill, 2001.



## ENVIRONMENTAL ENGINEERING LABORATORY

<b>Subject code: 1965309 P</b>	<b>Credits : 1.5</b>
Instruction : 3 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

**Pre-requisites:** Chemistry, Environmental Engineering

### **Course Objectives:**

The objective of this course is:

1. Tests to identify the physical properties of water.
2. Tests to identify the pH and conductivity of water.
3. Tests to identify concentration of acidity and alkalinity of water.
4. Tests to identify COD and BOD of water.

### **Course Outcomes:**

At the end of the course, the students will be able to:

1. Determine physical properties of water.
2. Determine the turbidity and hardness of water.
3. Determine COD and BOD of water.
4. Estimate concentration of acidity and alkalinity and chloride content of water

### **List of Experiments:**

1. (a) Determination of pH value of a given sample .  
(b) Determination of Conductivity of a given sample.
2. (a) Determination of Turbidity of a given sample.  
(b) Determination of optimum dosage of coagulant by using Jar Test.
3. Determination of Hardness of a given sample.
4. Determination of Acidity of a given sample.
5. Determination of Alkalinity of a given sample.
6. Determination of Available Chlorine & Residual Chlorine of a given sample..
7. Determination of Total Solids : Settleable Solids : Suspended solids, dissolved solids of a given sample.
8. Determination of Dissolved Oxygen(D.O) of a given sample.
9. Determination of Biological Oxygen Demand(B. O. D.) of a given sample.
10. Determination of Chemical Oxygen Demand(C.O.D) of a given sample.
11. Determination of Chlorides of a given sample.

### **References:**

- 1 Lab Manual, ISO 14001” *Environmental Management*,” Regulatory Standards for Drinking Water and Sewage disposal
- 2 Clair Sawyer and Perry McCarty and Gene Parkin, “*Chemistry for Environmental Engineering and Science*” , McGraw-Hill Series in Civil and Environmental Engineering

## **BUILDING PLANNING AND DRAWING**

<b>Subject code: 1965401</b>	<b>Credits : 3</b>
Instruction : 2 Lecture,2 Practicals / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### **Course Objectives**

The Course Objectives of this course are:

1. Acquaint students with basics of residential design and drawing.
2. Engage them in applying climatic factors on safety, comfort, convenience and functional requirements of residential buildings
3. Impart drawing skills using drawing board/mini drafter and using AutoCAD

### **Course Outcomes**

At the end of the course the student should be able to

1. Identify and illustrate types of residential buildings, outline National Building Code and Municipal Bye laws.
2. Classify Macro Climatic Zones in India and apply climatic factors to residential design.
3. Design of Individual rooms with particular attention to functional and furniture requirements
4. Design houses for Hot and Humid zones and draw one, two and three bedroom single family house floor plans, elevations and sections
5. Design and draw dog legged staircase using architectural design concepts

### **SYLLABUS:**

#### **UNIT I**

##### **RESIDENTIAL BUILDINGS**

Different types of Residential Buildings, Selection of Site, various sizes of plots based on income, Housing concepts, National Building Code and local Municipal bye laws for residential buildings

#### **UNIT II**

##### **CLIMATIC FACTORS**

Elements of Climate- Sun, Wind, Relative Humidity, Temperature; Comfort Conditions for House - Orientation of Buildings, Solar Charts and Ventilation; Various types of Macro Climatic Zones. Application of climatic factors

#### **UNIT III**

##### **ANTHROPOMETRY (DRAWING)**

Principles of Anthropometric Data; Designing and drawing of individual rooms with furniture and functional requirements; Minimum 2 sheets with conventional signs

## **UNIT IV**

### **CLIMATIC DESIGN**

Design of Houses and Layouts with reference to Climatic Conditions; Plan section and Elevation of one, two and three bedroom houses following Building byelaws and climatic data; (Emphasis may be given to Hot and Humid zones) Minimum 5 sheets in varying plot sizes – manual and AutoCAD

## **UNIT V**

### **STAIRCASES**

Types of staircases, design parameters for stair case design, architectural emphasis on staircase design. Safety and construction details of staircases

### **TEXTBOOKS**

1. N. Kumara Swamy and A.Kameswara Rao, *Building Planning and Drawing*, Seventh Edition, Charotar Publishing House, 2013
2. Gurucharansingh and Jagadish Singh, *Building Planning Drawing and Scheduling*, Standard Publishers Distributors, 2009

### **REFERENCES**

1. R.Trimurty, “*Civil Engineering Drawing Series*” ‘B’, M/S Premier Publishing House
2. M.G.Shah, C.M.Kale and S.Y.Patki, “*Building Drawing with an integrated approach to Built environment*”, Fifth Edition, McGraw-Hill Publishing Company Limited, New Delhi
3. Sharma & Gurucharan Singh, “*Civil Engineering Drawing*”, Standard Publishers

### **CODES FOR REFERENCE**

National Building Code, 2016

Building Bye laws of Andhra Pradesh, revised in 2017

# FLUID MECHANICS

<b>Subject code: 1965402</b>	<b>Credits : 3</b>
Instruction : 2 Lecture & 1 Tutorial / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

Pre-requisites: Engineering Mechanics.

## Course Objectives:

1. Understand the various properties of fluid and fluid pressures.
2. Solve the problems of static pressures on different shape of surfaces and kinematic problems on different paths.
3. Understand the various flow measuring devices.
4. Derive the equation of conservation of mass and its application.
5. Importance of friction losses in pipe flows and pipe sections.

## Course Outcomes:

At the end of the Course, the Student will be able to:

1. Understand the various properties of fluid and fluid pressures.
2. Compute hydrostatic and hydrodynamic forces.
3. Apply the principle of conservation of momentum on fluids systems.
4. Apply the principle of conservation of momentum on fluids systems to derive governing equations of fluid flows.
5. Importance of friction losses in pipe flows and pipe sections.

## SYLLABUS:

### UNIT I

#### Fluid Properties and Fluid Pressures:

**Fluid Properties:** Definition of Fluid, basic properties of fluid, Viscosity - Newton's Law of Viscosity, Capillarity and Surface Tension.

**Fluid Pressure:** Fluid Pressure at a point, Pascal's law, Hydrostatic law, Absolute Pressure, Gauge Pressure and Vacuum Pressure. Pressure measurement – Piezometers, Manometers and Pressure Gauges. Centre of Pressure, Forces on submerged surfaces.

### UNIT II Buoyancy and Fluid Kinematics:

**Buoyancy & Floatation** – Archimedes Principle- Buoyancy & Floatation - Stability of Floating Bodies- Centre of Buoyancy - Metacentric Height(concept only).

**Fluid Kinematics:** Types of Flows; Description of fluid flow-Streamline, Path line, Streak line and Stream tube, Local, Convective and Total Accelerations; One and Two Dimensional Analysis of Flows- Stream and Velocity Potential functions, Flow Nets. Principle of Conservation of Mass.

### UNIT III

#### Fluid Dynamics and Measurements of Flows:

**Fluid Dynamics:**

Principle of Conservation of Energy, Euler's and Bernoulli's Equations for 2D- flow, Energy Correction Factor. Principle of Conservation of Momentum, Momentum Equation and its applications. Forces on Pipe Bends.

**Measurements of Flows:**

Flow measuring devices –Pitot tube, Venturimeter, Nozzle meter and Orifice meter. Classification of orifices and mouthpieces, flow over rectangular, triangular, trapezoidal, and stepped notches, Sharp Crested and Broad Crested Weirs.

**UNIT IV**

**Viscous Flow:** Reynolds's Experiment, Classification of Laminar & Turbulent flows, Flow between two parallel plates, Flow through long pipes. Variation of Friction Factor with Reynold's number-Moody diagram.

**Flow through Pipes:** Laws of Fluid Friction, Darcy-Weisbach Equation. Total Energy and Hydraulic Gradient Lines; Minor Losses in Pipes; Pipes in Series and Parallel – Equivalent Length of Pipe, Siphon pipe.

**UNIT V**

**Boundary Layer Theory:** Theory of Boundary Layer – Characteristics of Boundary Layer growth over a Flat Plate, Boundary Layer Thickness and its Characteristics –Laminar and Turbulent boundary layers(no derivation), Boundary Layer Separation, Control of boundary layer separation. Flow around submerged objects-drag and lift-Magnus effect.

**Text Books:**

1. P.N Modi,. and S.M. SethModi, "*Fluid Mechanics and Hydraulic Machinery*", Standard Book House,22nd edition 2019.
2. A.K. Jain, "*Fluid Mechanics including hydraulic machines*", 8th Edition, Khanna Publishers,New Delhi,,2003

**References:**

- 1 KR Arora, "Fluid Mechanics, Hydraulics and Hydraulic Machines", Standard Publishers Distributors.
- 2 Sadhu singh, "Fluid Mechanics", Khanna Publishing House.2016
- 3 R. K. Bansal, "A text of Fluid mechanics and hydraulic machines", Laxmi Publications New Delhi.2011

## STRENGTH OF MATERIALS

<b>Subject code: 1965403</b>	<b>Credits : 3</b>
Instruction : 2 Lecture & 1 Tutorial / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

Pre-requisites: Engineering Maths.

### **Course Objectives:**

The objective of this course is to:

1. Introduce concepts of stresses, strains and elastic constants and their relations.
2. Develop the ability to draw shear force and bending moment diagrams for beams.
3. Learn the concepts of Flexural stresses and Shear stresses in beams.
4. Understand the knowledge of stresses in circular shafts and thin cylinders
5. Familiarize with stresses and strains induced in columns and Impart knowledge on the Principal stresses and strains.

### **Course Outcomes:**

At the end of this course student will be able to:

1. Examine the stresses, strains, displacements in structures and their components due to the loads acting on them and strain energy.
2. Analyze the diagrams indicating the variation of the key performance features like bending moment and Shear forces.
3. Evaluate the flexural stresses and shear stresses in beams.
4. Illustrate the effect of torsion on shafts and Asses the stresses across section of the thin cylinders
5. Evaluate the crippling load for columns with different end conditions and analyse stresses on oblique planes

## **SYLLABUS:**

### **INTRODUCTION**

Duties / obligations accountability of a structural engineer for the design of a structure:

a)economy b)safety: (i) strength consideration (ii) stiffness consideration. Need for assessment of strength of a material – analysis for strength requirement for design purposes – Review of IS code provisions.

### **UNIT I**

**Simple Stresses & Strains:** Effects of force: tension, compression and shear. Stress as internally elastic resistance of a material – strain – property of elasticity – Hook’s law – stress-strain diagrams. Characteristic strengths, Factors of safety and working stresses for materials and various types of application of load. Elastic strain – energy, stress due to gradually applied load, sudden load, impact load and shock load. Lateral strain, Poisson’s ratio, shear strain, shear modulus. Relation between modulus of elasticity, modulus of rigidity and bulk modulus. Stresses in composite assemblies due to axial load and temperature change.

### **UNIT II**

**Shear force and bending moment:** Effect of transverse force, Shear force, Bending moment and Axial thrust

diagrams for a) Cantilever b) Simply supported and c) Over hanging beams for various patterns of loading. Relation between (i) intensity of loading (ii) Shear force and (iii) Bending moment at a section.

### UNIT III

**Flexural and Shear stresses:** 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, I, T, Angle and Channel sections – Design of simple beam sections.

Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

### UNIT IV

**Deflections of Beams:** (i) Cantilever (ii) simply supported and (iii) over hanging beams, using double integration and (b) Macaulay's method.

### UNIT V

**Torsion of Circular Shafts:** Theory of pure torsion for solid and hollow circular sections – torsional shear stress distribution, effect of combined torsion bending and axial thrust – equivalent B.M and T.M

**Stresses on oblique plane** – Resultant stress – Principle stress and maximum shear stress and location of their planes. Mohr's circle for various cases of stresses.

### TEXT BOOKS

- 1.S.Ramamrutam and R.Narayanan “*Strength of Materials*” 11th Edition, Dhanpat Rai publications, 2009.
2. Russell C. Hibbeler, “*Mechanics of Materials*”, 8th Edition, Pearson publications, 2011

### REFERENCES

1. S.S BhaviKatti, “*Strength of Materials*”, 7th Edition, New age international publications, 2011.
- 2.S.Thimoshenko & Young, “*Strength of Materials*”, 4th Edition Tata McGraw hill, 2003.
- 3.R.Subramanian, “*Strength of Materials*”, 1st Edition, Oxford University Press, New Delhi, 2011.

## TRANSPORTATION ENGINEERING

<b>Subject code: 1965404</b>	<b>Credits : 3</b>
Instruction : 3 Lecture / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### Course Objectives:

The objective of this course is to Introduce Highway Engineering and various concepts

1. Highway developments plans in India and highway alignment and engineering surveys
2. Geometric design of highway elements for ensuring safety
3. Highway pavement materials and their desirable properties and tests
4. Highway pavement design and salient features of Indian Road Congress (IRC) method of pavement design
5. Basic concepts in Traffic engineering, traffic surveys and analysis

### Course Outcomes:

At the end of the Course, the Student will be able to know:

1. Highway development process and Highway finance models
2. Geometric Design of Highways and Indian Roads Congress (IRC) standards
3. Highway Materials and Properties of highway materials
4. Design of Highway Pavements and Design of bituminous paving mix
5. Traffic Engineering: Traffic flow characteristics, traffic surveys and analysis

### SYLLABUS:

#### UNIT-I

**Highway Development and Planning:** Introduction to Transportation Engineering and different modes , Classifications of roads, Salient features of Highway development plans in India, Highway Alignment and Project Preparation : Factors affecting Highway alignment, engineering surveys for highway alignment, Preparation of detailed project report (DPR), Highway Finance: Highway finance models, merits and demerits of highway finance models

#### UNIT-II

**Geometric Design of Highways:** Introduction, Factors affecting Geometric Design of highways, Highway cross section elements: Camber, Skid resistance, roughness, Sight distance: Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD); Design of horizontal alignment: Superelevation, Radius of horizontal curve, Transition curve, Set back distance, extra widening; Design of vertical alignment: Design of summit curves and



valley curves, Geometric design Standards as per Indian Road Congress (IRC)

### **UNIT-III**

**Highway Materials and Properties:** Introduction, Soil: Desirable properties of soils for embankment and subgrade, CBR Method; Road Aggregates: Desirable properties and test on aggregates; Bitumen: Types of bitumen, Desirable properties of bitumen and Tests as per IS:73-2013, Modified bitumen: Types and advantages of modified bitumen ; Bituminous mix Design: Desirable properties , Design of bituminous paving mixes by Marshall Method

### **UNIT-IV**

**Design of Highway Pavements:** Introduction, Types of pavement and differences, Flexible pavements: Various layers their functions, Parameters for design of Flexible Pavement as per IRC:37-2018 ; Salient features of IRC: 37-2018 method for design of flexible pavements; Rigid pavements: Various layers and their functions, Parameters for design of Rigid Pavements and stresses in jointed plain concrete Pavement (JPCP); Distresses in bituminous and concrete pavements

### **UNIT-V**

**Traffic Engineering :** Introduction, Traffic flow Characteristics : Speed, Density, Volume and their relationship; Passenger car Unit (PCU) , Peak hour factor (PHF); Traffic studies and analysis : Speed, Volume, Origin and Destination (O-D), Parking, Accident studies and analysis,, Traffic control devices: Traffic signs, Traffic signal design by Webster's method, Types of intersections and channelization

#### **Text Books:**

1. S.K. Khanna, , Justo, C.E.G and Veeraragavan, A, ” Highway Engineering”, 10<sup>th</sup> edition New Chand & Bro,2017
2. C . Venkataramaiah,. Transportation Engineering; Volume: I,: Highway Engineering, 1<sup>st</sup> Edition, University Press, 2016.

#### **References:**

1. Partha Chakraborty and Animesh Das , “ Principles of Transportation Engineering”, PHI Learning, , 2<sup>nd</sup> Edition, 2017
2. L.R. Kadiyali,, “Traffic Engineering and Transport Planning”, Khanna Publishers, 1999
3. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski, ”Principles of Highway Engineering and Traffic Analysis”, 4<sup>th</sup> Edition, John Wiley, 2004.

## GEOTECHNICAL ENGINEERING

<b>Subject code: 1965405</b>	<b>Credits : 3</b>
Instruction : 2 Lecture & 1 Tutorial / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

**Pre-requisites:** Engineering Mechanics, Fluid Mechanics, Engineering Geology.

Course learning objectives:

The objective of this course is to:

1. Provide civil engineering students with a basic knowledge of soil Mechanics in geotechnical engineering practice.
2. Ability to understand, formulate, and solve the problems related to geotechnical engineering.
3. Ability to conduct experiments, analyze and interpret results for various geotechnical engineering properties.

**Course Outcomes:** At the end of the Course, the Student will be able to:

1. Identify Soil properties and soil classification.
2. Analyze soil permeability characteristics.
3. Analyze compaction and consolidation settlement.
4. Estimate the stresses in soil at different levels.
5. Evaluate shear strength principles.

### SYLLABUS:

Introduction: Historical development, Soil Formation, Minerals in clays and sand, Soil Structure.

### UNIT I

**Physical properties of Soil:** Void ratio, Porosity, Degree of Saturation, Water content, Unit Weights, Specific Gravity, weight –volume Relationships, Relative density, Consistency limits: Determination and consistency indices, Activity.

**Soil Classification:** Sieve analysis, stoke’s law, hydrometer and Pipette Analysis, Structural Classification based on size, IS 1498 (1970): Classification and identification of soils, Field Identification of Soils

### UNIT II

**Soil Hydraulics:** Types of soil water, capillary rise and surface tension, Darcy’s law and its limitations, constant head and variable head permeability tests, pumping tests, Factors effecting coefficient of permeability, permeability of stratified deposits. Total, neutral and effective stresses, Effective Stress Principle, Upward flow conditions, quick sand condition and critical hydraulic gradient.

### UNIT III

**Compaction:** Mechanism of compaction, Factors affecting compaction, IS Light and IS Heavy compaction tests, Effect of compaction on soil Properties, Field compaction: compaction Equipment and Evaluation of field compaction.

**Consolidation:** Compression index, coefficient of compressibility and coefficient of volume decrease.

Terzaghi's one dimensional consolidation theory - Oedometer Test, Determination of coefficient of consolidation, graphical methods, initial compression, primary compression and secondary compression, determination of preconsolidation pressure. Normally consolidated and over consolidated clays.

#### **UNIT IV**

**Stress Distribution in Soils:** Boussinesq's theory for determination of vertical stress, assumptions and validity, extension to Line, Strip, rectangular and circular loaded areas, Pressure Bulb and Influence diagrams, Westergaard's theory, Newmarks influence chart - construction and use, 2:1 approximate method, contact pressure distribution beneath footings.

#### **UNIT V**

**Shear Strength of Soils:** Stress at a point, Mohr Coulomb failure theory, laboratory shear tests, Sensitivity of clays, Types of shear tests based on drainage conditions, shear strength of sands, critical void ratio and dilatancy, Factors affecting shear strength of clays and sands.

#### **TEXT BOOKS:**

1. Gopal Ranjan, A S R Rao "*Basic and Applied Soil Mechanics*" 3<sup>rd</sup> Edition, New Age International Pvt. Ltd, 2016.
2. K.R. Arora, "*Soil Mechanics and Foundation Engineering*" 5<sup>th</sup> Edition, Standard Publishers and Distributors, Delhi, 2009.

#### **REFERENCES:**

1. Muni Budhu, "*Soil Mechanics and Foundations*", 3<sup>rd</sup> Edition, John Wiley and Sons, 2011
2. B.M. Das. , "*Principles of Geotechnical Engineering*", 7<sup>th</sup> Edition, Cengage Learning, 2010.
3. C.Venkataramiah., "*Geotechnical Engineering*", 6<sup>th</sup> Edition, New Age International Pvt. Ltd, 2018.

## **CIVIL ENGINEERING MATERIALS**

<b>Subject code: 1965406</b>	<b>Credits : 3</b>
Instruction : 3 Lecture / week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

### **Course Objectives**

The Objectives of this course are:

1. To introduce students to important building materials, their properties and uses
2. To educate about manufacturing processes of materials and to increase ability to judge quality of materials by IS standards
3. To impart knowledge on basic construction techniques and to encourage exploration of modern material innovations.

### **Course Outcomes**

At the end of the course the student should be able to:

1. Identify and recognize characteristics and uses of Timber and wood products
2. Explain manufacturing processes of various materials, their uses, related IS Codes, testing, transport and storage.
3. Describe and compare different types of flooring and roofs
4. Demonstrate knowledge on steel, structural steel and their uses.
5. Develop understanding of modern concepts in Cement concrete technology and
6. mix design

### **SYLLABUS:**

#### **UNIT I**

##### **TIMBER**

Classification of common Indian trees and their uses, their general and mechanical properties, types of defects in wood and timber, methods of seasoning and their importance, felling and conversion, decay of timber, preservation methods; Classification of wood based products Veneers, types of plywood, merits and demerits of plywood and laminated wood.

#### **UNIT II**

##### **MASONRY AND PAINTS**

Manufacture of bricks, qualities of Bricks and tests as per IS code, transport and storage of bricks; Different types of Brick bonds and Stone Masonry, Plan, Elevation, Sections of brick and stone masonry; Partition walls.

Constituents and characteristics of paints, types of paint and their uses; constituents of varnishes, types and uses of varnishes and polishes. Interior and exterior wall painting, doors and window painting process. Painting defects, causes and remedies.

### **UNIT III**

#### **FLOORING AND ROOFING MATERIALS**

Different types of tiles for roofing and flooring; Manufacturing of tiles, Materials used for flooring (Stone, tiles, terrazzo)

Types of roofs and their uses (Flat RCC, Sloped mangalore tiles, domes), types of materials used in roofing, types of trusses and Steel truss roofs for large spans

### **UNIT IV**

#### **STEEL**

Steel Making, Metallurgy of Steel, Heat Treatment of Steel, Chemical Composition of Steel, Types of Structural Steel, Mechanical Properties of Steel, Structural Steel Products, Reinforcing Steel Bars, Protection of Structural Steel from Corrosion, Stainless Steel, Storage and Handling of Steel, Advantages and Disadvantages of Steel

### **UNIT V**

#### **CONCRETE**

Introduction of concrete, Composition of concrete, Concrete grades, properties and relevant tests, storage, batching, mixing & transporting, Process of Concrete laying, Advantages of concrete over other materials, Advances and future trends in concrete, Overview of Sustainability and Concrete development.

Cement: Wet and dry process of manufacturing Ordinary Portland cement (OPC), Hydration and structure of cement, chemical and physical analysis, various field and laboratory tests on OPC as per IS code. Transport and Storage of Cement, special cement and admixtures.

Aggregates: Classification IS specifications, Properties, Grading, Methods of combining aggregates, specified grading, Testing of aggregates.

Water: General requirements & limiting values of impurities.

#### **TEXTBOOKS**

1. S.C. Rangwala, "*Engineering Materials*", Charotar Publishing House, Anand, 1993
2. Dr N. Subramanian, "*Building Materials Testing and Sustainability*", Oxford University Press, New Delhi, 2019

#### **REFERENCES**

1. S.K. Sharma, "*Civil Engineering Construction Materials*", KBP House, 2019
2. S.K. Duggal, "*Building Materials*", Fourth Edition, New Age International Publishers, 2008.
3. B.C. Punmia, "*Building Construction*", Eleventh Edition, Laxmi Publications, 1984
4. IS Codes

## Universal Human Values

<b>Subject code:1965407</b>	<b>Credits : 3</b>
<b>Instruction : 2 Lectures &amp;1 Tutorial/ week</b>	Sessional Marks : 30
<b>End Exam : 3 Hours</b>	End Exam Marks : 70

### Course Objective:

1. To create an awareness on Engineering Ethics and Human Values.
2. To understand social responsibility of an engineer.
3. To appreciate ethical dilemma while discharging duties in professional life.

### Course Outcomes:

By the end of the course, the student will be able to

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the role of a human being in ensuring harmony in society and nature.
4. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

### SYLLABUS:

#### UNIT I

##### Introduction - for Value Education

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration—what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

#### UNIT II

##### Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha, Understanding the body as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body: Sanyam and Swasthya;correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

## **UNIT III**

### **Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**

Understanding harmony in the Family- the basic unit of human interaction ,Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha ) - from family to world family!

## **UNIT IV**

### **Understanding Harmony in the Nature and Existence – Whole existence as Co-existence**

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

## **UNIT V**

### **Implications of the above Holistic Understanding of Harmony on Professional Ethics**

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

### **TEXT BOOKS**

1. R R Gaur, R Sangal, G P Bagaria, 2009, "*A Foundation Course in Human Values and Professional Ethics*".

### **REFERENCE BOOKS**

1. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
3. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991

## STRENGTH OF MATERIALS LAB

<b>Subject code: 1965408P</b>	<b>Credits : 1.5</b>
Instruction : 3 Practicals / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

### Course Objectives:

The objective of this course is to:

1. The stress – strain characteristics of mild steel bar.
2. The methods of determining modulus of elasticity, modulus of rigidity of spring and shaft materials.
3. The concepts of hardness, compressive strength, shear strength, impact strength and tensile strength of different materials.

### Course Outcomes:

At the end of this course student will be able to

- CO1 Determine the Engineering and mechanical properties of materials.
- CO2 Interpret the test results of rigidity modulus, hardness and Rockwell's no of different materials.
- CO3 Interpret the test results of impact strength and tensile strength of different materials.
- CO4 Determine the deflection and Young's Modulus of different materials.

### LIST OF EXPERIMENTS

1. Tension test on Mild Steel / HYSD bars.
2. Compression test on wood (parallel to grains and perpendicular to grains)
3. Test on close coiled helical spring for the determination of rigidity modulus and spring constant
4. Brinell's & Rockwell's Hardness tests..
- 5 Charpy and Izod Impact tests.
6. Torsion test.
7. (i) Determination of deflection of a loaded simply supported beam and cantilever beam made of wood and steel.  
(ii) Determination of Young's Modulus of wood and steel.

### REFERENCES

1. P.N. Singer and P.K. Jha, "*Elementary mechanics of solids*", New Age International Pvt.Ltd.
2. S.P. Timoshenko "*History of Strength of Materials*" Dover Publications, 1953.



## GEOTECHNICAL ENGINEERING LAB

<b>Subject code: 1909409P</b>	<b>Credits : 1.5</b>
Instruction : 3 Practicals / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

### Course Objectives:

The objectives of this course are to make the student aware of the tests to identify the:

1. Soil types by using index properties.
2. Characteristics of compaction.
3. Densities and permeability of soils.
4. Soil shear strength.
5. Characteristics of consolidation and compression of the soils.

### Course Outcomes:

At the end of the Course, the Student will be able to:

- CO1 Determine index properties of Soils and Classify Soils.
- CO2 Determine the densities by using different methods.
- CO3 Determine the shear strength parameters.
- CO4 Compute the permeability, Swelling and compression characteristics of soils.

### Experiments

1. Specific gravity by pycnometer/density bottle method.
2. Grain size analysis.
3. Atterberg limits.
4. Field density by Core Cutter and Sand replacement method.
5. Relative density.
6. Permeability of soil.
7. IS light compaction.
8. Unconfined compression test.
9. Direct shear test.
10. Vane shear test.
11. Triaxial compression test.
12. Consolidation test.
13. Differential free swell and swell pressure test.

### References:

1. Braja M. Das “*Soil mechanics laboratory manual*”Oxford University Press, 2009, Seventh Edition.
2. IS 2720 all parts, IS 1498 (1970) and other relevant IS codes, special publications and handbooks.