GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)

Rushikonda, Visakhapatnam-530 045 | website: www.gvpcdpgc.edu.in

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PG-MBA and UG Engineering B. Tech (CE, CSE, ECE, ME) programs are Accredited by NBA

DEPARTMENT OF CIVIL ENGINEERING

Semester III (Second Year)

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
	BSC	Mathematics-III	3	0	0	30	70	100	3
	PCC	Mechanics of Solids	2	1	0	30	70	100	3
	PCC	Fluid Mechanics	2	1	0	30	70	100	3
	PCC	Concrete Technology	3	0	0	30	70	100	3
	PCC	Basic Geotechnical Engineering	2	1	0	30	70	100	3
	PCC lab	Building Drawing with CAD Laboratory	0	0	3	50	50	100	1.5
	PCC lab	Geotechnical Engineering Laboratory	0	0	3	50	50	100	1.5
	PCC lab	Geomatics Laboratory	0	0	3	50	50	100	1.5
	SC(MC)	Office Applications Laboratory	0	0	4	50	50	100	2
	MC	Environmental Science	2	0	0	30	70	100	0
Total Credits									**21.5**

MECHANICS OF SOLIDS

Subject code:	**Credits : 3**
Instruction : 2 Lectures & 1Tutorials/week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

Pre-requisites: Engineering Mathematics, Engineering Mechanics.

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, Shear stresses in beams and stresses in Circular shafts.
4. Understand the concepts of deflections
5. Familiarize with Stresses in oblique planes and crippling load for columns.

Course Outcomes:

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

1. Determine 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 and illustrate the effect of torsion on shafts.
4. Analyze the deflections in beams
5. Evaluate the Stresses in oblique planes and crippling load for columns with different end conditions

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 Elastic constants .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.

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

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

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.

Columns and Struts: Combined bending and direct stresses – kern of a section – Euler's theory– end conditions. Rankine – Gordon formula – Eccentrically loaded columns.

Text Books

1.S. Ramamrutam and R. Narayanan "*Strength of Materials*" 20th Edition, Dhanpat Rai publications, 2020.

2. S.S BhaviKatti, "*Strength of Materials",* 5th Edition, S Chand and Company Ltd., 2021.

References

1.S. Thimoshenko & Young, "*Strength of Materials",* 3rd Edition Tata McGraw hill, 2021.

2.R. Subramanian, "*Strength of Materials",* 3rd Edition, Oxford University Press, New Delhi, 2016.

3. Russell C. Hibbeler, "*Mechanics of Materials*", 8th Edition, Pearson publications, 2010.

FLUID MECHANICS

Subject code:	**Credits: 3**
Instruction: 2 Lectures & 1 Tutorials/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. Explain the various properties of fluid and fluid pressures.
2. Explain the concept of Fluid Kinematics.
3. Apply the principle of conservation of momentum on fluids systems.
4. Importance of friction losses in pipe flows and pipe sections.
5. Explain the concept of Boundary layer

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 Vaccum 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:

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. 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 Weir.

UNIT IV

Flow through Pipes: Reynolds's Experiment, Classification of Laminar &Turbulent flows, Flow through long pipes. Variation of Friction Factor with Reynold's number. Darcy-Welsbach Equation. Total Energy and Hydraulic Gradient Lines; Major losses and 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, Displacement thickness, momentum thickness, energy thickness and its Characteristics –Laminar and Turbulent boundary layers(no derivation), Boundary Layer Separation, Control of boundary layer separation.

Text Books:

1. P.N Modi, and S.M. Seth Modi, "*Fluid Mechanics and Hydraulic Machinery*", Standard Book House, 23rd edition 2021.
2. A.K. Jain, "*Fluid Mechanics including hydraulic machines*", 12th Edition, Khanna Publishers, New Delhi, 2014

References:

1 KR Arora, "*Fluid Mechanics, Hydraulics and Hydraulic Machines*", Standard Publishers Distributors, 2020.
2 Sadhu Singh, "*Fluid Mechanics*", Khanna Publishing House, 1st edition, 2016.
3 R. K. Bansal, "*A text of Fluid mechanics and hydraulic machines*", Laxmi Publications, 10th Edition, 2022.

CONCRETE TECHNOLOGY

Subject code:	**Credits : 3**
Instruction : 3 Lectures/week	Sessional Marks : 30
End Exam : 3 Hours	End Exam Marks : 70

Pre-requisites: Civil Engineering Materials and Construction.

Course Objectives:

The objective of this course is to

1. Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates,
2. Learn different types of aggregates, admixtures & know the mechanism of hydration of cement.
3. Comprehend the properties of Fresh Concrete, & manufacturing process of concrete
4. Understand the properties of hardened concrete, factors affecting Elasticity, creep & Shrinkage in concrete.
5. Understand the concept of mix design of concrete& its importance in estimation of composition of materials.
6. Know various types of special concretes & its application

Course Outcomes:

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

1. Explain the properties of the cement and admixtures of concrete.
2. Describe the physical & mechanical properties of aggregates
3. Explain the behavior of concrete at its fresh and hardened state
4. Explain factors affecting strength of concrete.
5. Explain the factors influencing concrete mix & know the BIS method of mix design, Define special concretes, their application for practical purpose.

SYLLABUS:

UNIT - I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement. Admixtures: Types of admixtures – mineral and chemical admixtures.

UNIT - II

Aggregates: Classification of aggregate – Particle shape & texture –, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali

aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – III

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT - IV

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.

Testing of Hardened Concrete: Compression tests – Tension tests– Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT. Elasticity, Creep & Shrinkage – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time

UNIT – V

Concrete Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by– BIS method and ACI mix design.

Special Concretes: Introduction to light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

Text Books:

1. A. M. Neville, "*Properties of Concrete*", Education ltd, 8th edition 2016.
2. M. S. Shetty, " *Concrete Technology*", S. Chand & Co., 8th edition, 2018

References:

1. M.L. Gambhir, "*Concrete Technology*", Tata Mc. Graw Hill Publishers, New Delhi, 5th edition, 2017
2. P. K. Mehta and Paulo J. M. Monteiro., "*Concrete: Micro structure, Properties and Materials*", McGraw Hill Publishers, 4th edition, 2017.
3. Job Thomas, "*Concrete Technology*" , Cengage learning India Pvt Ltd, 1st edition, 2015.

IS CODES:

1. IS:9103-1999 Specification for admixtures for concrete (first revision) quotes
2. IS:2386-1963 Methods of test for aggregates (Part-I to V)
3. IS 13311-1 (1992): Method of Non-destructive testing of concrete
4. IS:10262- 2019 Concrete mix proportioning Guidelines (2nd Version)

BASIC GEOTECHNICAL ENGINEERING

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

Pre-requisites: Engineering 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 (2070): 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, New marks 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",*4th Edition, New Age International Pvt. Ltd, 2022.

2. K.R. Arora, *"Soil Mechanics and Foundation Engineering",* 7th Edition, Standard Publishers and Distributors, Delhi, 2009.

REFERENCES:

1. B.C. Punmia, *"Soil Mechanics and Foundations"*, 17th Edition, Shree Hari Publications, 2021.

2. B.M. Das., *"Principles of Geotechnical Engineering"*, 8th Edition, Cengage Learning, 2017.

3. C. Venkataramiah., *"Geotechnical Engineering"*, 6th Edition, New Age International Pvt. Ltd, 2018.

BUILDING DRAWING WITH CAD LABORATORY

Subject code:	**Credits : 1.5**
Instruction: 3 Practicals / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Pre-requisites: Engineering Drawing.

Course Objectives:

1. To familiarize building components, principles, methods, software, and codes of practices for planning and design of the building
2. To impart knowledge about the elements of climate to the design and construction of buildings.
3. Prepare constructional detailed representation drawing of a building.
4. Analyze the planning laws and recommendations involved in planning, and building drawings concepts of buildings.
5. Design plan and elevation of different types of building with their functional and furniture requirements.

Course Outcomes: The students will be able to

1. Analyse the various types of residential buildings.
2. Assess different climatic elements to decide the orientation of the building for ventilation
3. Draw the complete drawing of plan of a residential building
4. Draw the plan, elevation, and sectional view of the building with functional requirements.
5. Draw the plan using computer drafting tools.

SYLLABUS:

Residential Building: Different types of Residential Buildings

Climatology: Elements of Climate: Sun, Wind, Relative Humidity, Temperature effects, Comfort Conditions for House, Various types of Macro Climatic Zones. Orientation of Buildings, Solar Charts, Ventilation.

Principles of Planning

Preliminary Drawing: (a) Conventional Signs of Materials, Various equipment used in a Residential Building (copying exercise) (b) Plan, Section, and Elevation of a Small House (one room and Verandah) (copying exercise) (c) Plan, Section and Elevation of Two Bed Room House (copying exercise) (d) Plan Section and Elevation of Three Bed Room House in Hot and Humid Zone. (copying exercise).

Design of individual Rooms with Particular Attention to Functional and Furniture requirements. Building Regulations and Bye-laws of Residential Buildings;

Drawing the plan, Elevation of Houses with given Functional Requirements and Climatic Data. (emphasis may be given to Hot and Humid zones.)

Drawing of Residential Building using CAD software.

Text Books:

1. N. Kumar Swamy and A. Kameswara Rao, "*Building Planning and Drawing*", Charotar Publication House 9th Edition, 2023.

2. Gurucharan singh and Jagadish Singh, "*Building planning Drawing and Scheduling",* Standard Publishers Distributors, 9th Edition, 2023

Reference Books:

1. Sharma and Gurucharan Singh , "Civil Engineering Drawing" Standard Publishers7th Edition, 2011.

2. R. S. Mallik and G.S. Meo, "*Civil Engineering Drawing*", Computech Publications Pvt. Ltd., New Revised Edition, 2023.

3. M.G.Shah, C.M.Kale and S.Y. Patki, "*Building Drawing with an integrated Approach to Built Environment*", McGraw-Hill Publishing Company Ltd., 5th Edition, 2017.

Codes for Reference

1.National Building Code, 2016

2. Building Bye laws of Andhra Pradesh, revised in 2017

GEOTECHNICAL ENGINEERING LABORATORY

Subject code:	**Credits : 1.5**
Instruction : 3 Practicals / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Pre-requisites: Engineering Geology.

Course Objectives:

To develop skills to identify and classify different types of soils

- To impart knowledge about different methods of determination of insitu density of soils
- To study the necessity of sedimentation analysis for classifying fine grained soils
- To assess the drainage capacity of different soils.
- To understand laboratory methods used for determining density of soil.

Course Outcomes:

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

1. Perform suitable tests for assessing grain size distribution and classify the soil accordingly.
2. Select appropriate method for determining field density of soil for a given soil.
3. Determine the shear strength parameters.
4. Compute the permeability, Swelling and compaction characteristics of soils using relevant laboratory tests.

List of Experiments:

1. Determination of Specific Gravity of Coarse Grained and Fine-Grained Soils.
2. Determination of Grain Size Distribution of Coarse-Grained Soil by Sieve Analysis.
3. Determination of Plastic Limit and shrinkage Limit.
4. Determination of Liquid Limit by Casagrande, Uppal's Cone Penetrometer.
5. Determination of Field density by Core Cutter method and Sand replacement method.
6. Determination of Relative density of sand.
7. Determination of Coefficient Permeability of Coarse-Grained Soil by Constant Head Permeability Test.
8. Determination of Coefficient Permeability of Fine-Grained Soil by Variable (Falling) Head Permeability Test.
9. Determination of Compaction Characteristics of Soil by IS Light Compaction Test.
10. Determination of Unconfined compression strength of soil.
11. Determination of shear parameters of soil by Direct shear test.
12. Determination of shear strength of soil clay by Vane shear test.
13. Determination of Differential Free swell Index and swell pressure test.
14. Demonstration Experiments:
    a. Determination of shear parameters of soil by Triaxial Compression test.
    b. Determination of California Bearing Ratio of Soil.

References:

1. Braja M. Das, "*Soil mechanics laboratory manual*", Oxford University Press, 7th Edition, 2009.
2. K.R. Arora, *"Soil Mechanics and Foundation Engineering",* 7th Edition, Standard Publishers and Distributors, Delhi, 2009.
3.B.C. Punmia, *"Soil Mechanics and Foundations"*, 17th Edition, Shree Hari Publications, 2021.

Codes:

1.IS 2720 (Various parts): Methods of Test for Soils, Bureau of Indian Standards.
2. IS 1498 (1970): Classification and identification of soils

GEOMATICS LABORATORY

Subject code:	**Credits : 1.5**
Instruction : 3 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Pre-requisite: Knowledge of Mathematics, Geomatics.

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. Calculation of areas, Drawing plans using different measuring equipment at field level
2. To survey an area by chain survey across obstacles and to calculate the obstructed lengths by using different methods
3. Apply the knowledge of Theodolite in different operations in civil engineering projects.
4. Apply the knowledge of principles and purpose of Tachometry in finding out the constants.
5. Develop skills in using Total Station instrument and analyze data.

List of Experiments

1. Locating various objects by chain & cross staff surveying.
2. Determination of area of polygon by chain and cross staff survey.
3. Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angle.
4. Levelling – Height of Instrument method
5. Measurement of horizontal angles by method of repetition.
6. To determine the height of a tower by Trigonometric Leveling.
7. To determine the tachometric constants.
8. Heights and distance using Principles of tachometric surveying.
9. Use of Total station to measure Horizontal Distance.
10. Use of Total station to measure Horizontal Angle.
11. Use of Total station to measure Vertical Angle.
12. Determination of area using total station.
13. Levelling Rise and fall method.
14. Measurement of horizontal angles by method of reiteration.

REFERENCES:

1. K R Arora ,"*Surveying*" (Vol - 1,2&3), 17th Edition, Standard Book House, New Delhi,2019.
2. M James Anderson and Edward M.Mikhail,"*Surveying theory and practice"*, 7th Edition, McGraw Hill, 2001.

OFFICE APPLICATIONS LAB

Subject code:	**Credits : 2**
Instruction : 4 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objectives:

1. Develop skills related to computing fundamentals and concepts involved in the use of common software applications.

Course Outcomes:

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

1. Demonstrate basic operations on word processor files
2. Explain about the use of various editing options available for documents
3. Interpret the charts using a spreadsheet
4. Discuss the use of various symbols to create effective presentations

List of Experiments:

Word processing software

1. Getting Started with the word processor - Creating a new blank document, working with non-printing characters and line spacing, saving a document, opening a document, navigating a document, go to, find and replace, editing a document
2. Character formatting -autocorrect options, selecting text, cut copy and paste, character formatting options, format painter, working with numbers, working with bullets, creating an outline
3. Paragraph formatting - alignment options, line spacing options, working with indents, working with tabs
4. Tables - working with tables, creating a table, adding rows and columns to a table, formatting table data, borders and shading, sorting in a table, drawing in a table, converting existing data to a table
5. Controlling page appearance - working with page breaks, working with columns, adding a water mark, headers and footers

Spreadsheet software

6. Overview of the spreadsheet software window - mouse-features, back stage view, creating workbooks, entering text and numbers, creating basic formulae, relative references, order of operations, working with ranges, saving workbooks- file extensions, share, export and publish files
7. Navigating workbooks - opening a file, working with larger files, freeze panes option, split screen option, working with rows, columns and cells, adding and deleting rows columns and cells, changing column and-row widths
8. Moving data - cut, copy and paste, copying formulas
9. Formulae & functions - overview of formulas, create formulas using functions

10. Formatting worksheets - formatting cells, formatting numbers, borders and shading, format as table,
using styles, using format painter, protecting sheets, fill handle and custom lists
11. Charts - creating charts, types of charts, editing charts, using graphics to enhance charts
12. Sorting and filtering - remove duplicates, sort data, filter data

Presentation software

13. Creating a new presentation, working with slides, saving a presentation, text and bullet editing options, formatting text, working with bullets and numbered lists
14. Adding graphics - inserting shapes, inserting graphics, inserting icons and 3D models, inserting pictures
15. Working with objects - selecting objects, editing objects, formatting objects, arranging objects, grouping objects
16. Using master slides - modifying master slides, adding media, adding video to a presentation, adding audio to a presentation, working with transitions, applying transitions, transition options, animating an object, effect options, working with the animation pane, motion paths, triggers

References:

1. Satish Jain, Geetha M., MS-Office 2010 Training Guide, BPB Publications, 1st Edition, 2010
2. Wallace Wang, Microsoft Office 2019 For Dummies, Wiley, 1st Edition, 2018

ENVIRONMENTAL SCIENCE

Subject code:	**Credits : 0**
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, 2095. "*Environmental Protection and Laws".* Himalaya Pub. House, Delhi 284

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)

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PG-MBA and UG Engineering B. Tech (CE, CSE, ECE, ME) programs are Accredited by NBA

DEPARTMENT OF CIVIL ENGINEERING

IV Semester (Second year)

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
	ESC	Environmental Engineering	3	0	0	30	70	100	3
	BSC/ PCC	Hydraulics and hydraulic machinery	2	1	0	30	70	100	3
	PCC	Reinforced Concrete Structures	3	0	0	30	70	100	3
	PCC	Structural Analysis	2	1	0	30	70	100	3
	HSMC	Professional Ethics & Universal Human Values	3	0	0	30	70	100	3
	ESC/PC LAB	Concrete Technology Laboratory	0	0	3	50	50	100	1.5
	PCC LAB	Strength of materials Laboratory	0	0	3	50	50	100	1.5
	PCC LAB	Fluid Mechanics Laboratory	0	0	3	50	50	100	1.5
	SC	Python Programing	0	0	4	50	50	100	2
	MC	NCC/NSS	2	0	0	-	-	-	0
Total credits									21.5
Summer Internship (Community Service)									

Title of the Program	L	T	P	C
Honors/Minor Courses (The hours distribution can be 3-0-2 or 3-1-0 also)	**3**	**1**	**0**	**4**

ENVIRONMENTAL ENGINEERING

Subject code:	**Credits : 3**
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. Provide theoretical and practical exposure in the field of water treatment and supply.
3. Increase the management skills with regard to collection, treatment and distribution of sustainable water.
4. Understand and explain the role of sanitation in the urban water cycle and its relation to public health and environment.

Course Outcomes:

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

1 Estimate demand for water supply and population studies.

2 Develop the skills in analysis of water and drinking water standards.

3 Design water treatment systems, operations, and working of different units.

4 Design elements of distribution systems and Understanding of various sewerage systems and their suitability

5. Explain sewer appurtenances and various drainage systems for communities.

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.

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.

UNIT-II

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

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-III

Treatment of Water: Flowchart of water treatment plant, Treatment methods - Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration and Chlorination and Disinfection method, Softening of Water, Defluorination, Removal of Odours.

UNIT IV

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

Introduction to Sanitation: Systems of Sanitation – Relative Merits and Demerits – Collection and Conveyance of Wastewater – Sewerage – Classification of Sewerage Systems– Estimation of Sewage Flow and Storm Water Drainage – Fluctuations– Hydraulics of Sewers and Storm Drains, Design of Sewers.

UNIT V

Sewer Appurtenances: Types of Sewers, Shapes, Materials for Sewers, Appurtenances in Sewerage, Cleaning and Ventilation of Sewers ,Safety of Sewer Workers.

House Plumbing: Plumbing Systems of Drainage – Sanitary Fittings and other Accessories – Single Stack System– One Pipe and Two Pipe Systems

Text Books:

1. S.K.Garg,"*Water Supply Engineering"*, 36th Edition , Khanna publications, 36th Edition 2022.
2. K.N. Duggal, "*Elements of Environmental Engineering*" , 7th Edition, S. Chand Publishers,2010

References:

1. P.N.Modi, " *Water Supply Engineering*", Rajsons Publications Pvt Ltd, 6th Edition, 2018.
2. B.C. Punmia, "*Water Supply Engineering*", Laxmi Publications, 2nd Edition,2008
3. G.S.Birdie and J.S.Birdie, "*Water Supply and Sanitary Engineering*", DhanpatRai & Sons Publisher, 8th Edition, 2010

HYDRAULICS & HYDRAULIC MACHINERY

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

Course Objectives:

The objective of this course is to:

1. Apply dimensional analysis to predict formulas, which connect particular variables in given circumstances.
2. Make use of the concepts of the working principles and design of hydraulic turbines.
3. Understand the performance of centrifugal and reciprocating pumps under different operating conditions.
4. Design most economical channel sections.

Course Outcomes:

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

1. Evaluate the similarities between model and prototype and their relations.
2. Analyze the performance of impact of jets.
3. Explain the functioning of various turbines and their design, analyse the performance under different operating conditions and governing of turbines.
4. Determine the performance of centrifugal under different operating conditions.
5. Determine discharge and design most economical channel section for uniform flow in open channels.

SYLLABUS:

UNIT I

Dimensional Analysis and Similitude:

Units and Dimensional Formulae for Various Engineering Quantities; Dimensional Homogeneity. Rayleigh's Method; Buckingham π method. Similarities– Geometric, Kinematic and Dynamic Similarities; Modeling Criteria; Similarity Laws – Important Dimensionless Numbers –Reynolds Number, Froude Number, Mach number, Euler Number, Weber Number. Distorted and undistorted Models.

UNIT II

Impact of jets:

Force exerted by fluid jet on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency, Torque and Work done by series of Moving Vanes.

UNIT III

Hydraulic Machines– Turbines:

Hydraulic Turbines: Introduction - Classification based on Head, Discharge, Hydraulic Action – Impulse and Reaction Turbines, Differences between Impulse and Reaction Turbine, Choice of Type of Turbine, Component Parts & Working principle of a Pelton Turbine, Francis Turbine - Velocity Triangles - Hydraulic and Overall efficiencies.

Performance of turbines: Performance under Unit head, power and speed – Performance under specific conditions - Specific Speed and its importance. Performance Characteristic Curves – Operating Characteristic Curves – Cavitation - Draft Tube (concept only).

UNIT IV

Hydraulic Machines –Pumps:

Centrifugal Pumps: Types of Pumps – Selection Criterion – Comparison between Centrifugal & Reciprocating Pumps - Centrifugal Pumps – Component Parts & Working Principle – Classification of Centrifugal pumps - Cavitation – Maximum Suction lift – NPSH. Specific Speed of pumps – Performance Characteristics of Centrifugal Pumps - Constant efficiency curves of Centrifugal Pumps**.**

UNIT V

Flow through Open Channels:

Flow through Open Channels: Classification of open channels, Uniform Flow: Chezy's and Manning's formula, Hydraulic mean depth, hydraulic radius. Most economical trapezoidal and rectangular channel section – Specific energy, Critical Flow.

TEXT BOOKS:

1. P.N Modi, and S.M. Seth Modi, "*Fluid Mechanics and Hydraulic Machinery*", Standard Book House, 23rd edition 2021.

2. A.K. Jain, "*Fluid Mechanics including hydraulic machines*", 12th Edition, Khanna Publishers, New Delhi, 2014

REFERENCES:

1. K.Subramanya, "*Flow in Open Channels*", McGraw Hill Education, New Delhi, 5th Edition, 2019.

2. V.T. Chow, "*Open-Channel Hydraulics*", The Blackburn Press, Caldwell, NJ USA, Illustrated Edition, 2009.

3.R. K. Bansal, "*A text of Fluid mechanics and hydraulic machines*", Laxmi Publications, 10th Edition, 2022.

REINFORCED CONCRETE STRUCTURES

Subject code:	**Credits : 3**
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. Learn IS: 456-2000 codal provisions, loading standards as per IS 875.
2. Understand the concepts of Working Stress Method, Ultimate Load Method and Limit State Method.
3. Learn design beams, columns, slabs and footings.

Course Outcomes:

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

1. Apply the concept of Limit State design to beams
2. Design the members subjected to shear, torsion and bond.
3. Design one-way and two-way slabs including dog-legged staircase
4. Design columns subjected to axial load, uniaxial and bi-axial bending.
5. Design the isolated footings.

UNIT – I: Singly and Doubly Reinforced Beams:

Introduction – Respective IS Code Provisions. Methods of reinforced concrete design, Introduction to limit state method: Limit state of collapse and limit state of serviceability. Failure of RCC beams in flexure. Design and Analysis of singly Reinforced beam and doubly Reinforced beam, Design of cantilever beam.

UNIT – II:

Shear, Torsion and Bond: Design of rectangular beam sections for shear and torsion. Design examples on simply supported and cantilever beams. Concept of bond, end anchorage and development length in beams with examples.

Flanged Beams: Introduction – Respective IS Code Provisions. Analysis of flanged beam sections: Position of neutral axis, moment of resistance of T and L beams.

UNIT – III Slabs:

Introduction – Respective IS Code Provisions. Design of simply supported one-way slabs with U.D.L. Design of cantilever slab with U.D.L. and end concentrated load. Design of simply supported two-way slab using IS code method. Design of Restrained two-way slabs using IS code method. Design of a dog-legged stair case – Flight slab supported on opposite beams / walls.

UNIT – IV Columns:

Introduction – Respective IS Code Provisions. Short and Long columns – Reinforcement requirements – Minimum eccentricity – Assumptions in design – Interaction charts. Design of short axially loaded tied columns. Design of short axially loaded spiral columns Design of short eccentrically loaded columns with Uniaxial bending

UNIT – V Footings:

Introduction – Respective IS Code Provisions. Aspects of soil design – structural design – considerations. Design of axially loaded square type pad footings. Design of axially loaded Rectangular type pad footings. Design of axially loaded square type sloped footings. Design of axially loaded Rectangular type sloped footings

Text Books :

1. P.C.Varghese, **"***Limit State Design of Reinforced Concrete*", Prentice Hall of India Private Limited", New Delhi, 2nd Edition, 2009
2. A.K. Jain , "*Reinforced Concrete Limit state Design*", Nem Chand and Brother Roorkee, 7th edition, 2012.

References

1. H.J. Shah, "*Reinforced Concrete*", Volume 1, Charotor Publishing House Pvt. Ltd., Anand, 11th Edition 2016.
2. S.U .Pillai & Devdas Menon, "*Reinforced concrete design*", Tata McGraw Hill. New Delhi, 4th Edition, 2021.
3. S. Ramamrutham, "*Design of Reinforced Concrete Structures*", Dhanpat Rai Publishing Company (P) Ltd. New Delhi, 17th Edition, 2016
4. Unnikrishnan Pillai and Vasudeva Menon, "*Reinforced Concrete Design*", McGraw Hill, 4th edition, 2021.

IS Codes:

1. IS: 456-2000 "Code of practice for Plain and Reinforced Concrete"
2. Sp 16:1980 Design Aids for Reinforced Concrete to IS :456-1978

STRUCTURAL ANALYSIS

Subject code:	**Credits: 3**
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:

1. Apply suitable methods for calculating deflections in statically determinate beams.
2. Apply suitable methods for analyzing statically indeterminate beams.
3. Analyze beams under moving loads.

Course Outcomes:

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

1.Determine strain energy due to different types of forces and deflections of statically determinate beams.

2.Analyze fixed beams under different loading and support conditions.

3.Analyze continuous beams Using three moments, Slope deflection, Moment distribution methods.

4.Compute shear force and bending moment varying with application of moving loads.

5.Calculate the stresses and strains developed in thin and thick cylinders

SYLLABUS:

UNIT-I

Strain energy due to (i) Axial load, (ii) Shear force, (iii) Bending Moment and (iv) Torque

Deflections of Beams using (i) Moment area method, (ii) Conjugate beam method, (iii) Unit load method.

UNIT-II

Fixed beams: Analysis for different load combinations, Draw SFD, BMD and deflection diagrams, Effect of sinking and rotation of supports.

UNIT-III

Three span continuous beams using (i) Theorem of three moments, (ii) Slope deflection method and (iii) Moment distribution method, Draw SFD, BMD and deflection diagrams, Effect of sinking and rotation of supports

UNIT- IV

Influence lines: Definition of Influence line for reactions, SF and BM at a given position of loading, Series of concentrated loads, UDL.

Moving loads: Introduction, Maximum Shear force and bending moment diagrams at a given section and absolute maximum Bending moment due to train of concentrated loads and uniformly distributed load, Position for maximum Shear force and bending moment at a given section.

UNIT-V

Thin Cylinders: Derivation of Longitudinal and Hoop stresses in thin cylinders subjected to internal pressure. Volumetric strain and circumferential strain, Wire wound thin cylinders. Thick cylinders: Introduction, Derivation of Lame's theory, Compound tubes.

TEXT BOOKS

1. S. Ramamrutham, "*Theory of structures*", Dhanpat rai Publishing company, 11th edition, 2020.
2. Devadas Menon, "*Structural Analysis*", Alpha science international limited, 3rd edition, 2010.

REFERENCES

1. Vazirani and Ratwani, "*Analysis and Design of structures*", Khanna publishers, 17th edition, 2000.
2. C.S.Reddy, "*Basic Structural Analysis*", 3rd edition, Tata McGraw Hill Education.
3. B.C. Punmia and Arun Kumar Jain and AK Jain, "*Theory of Structures*", Laxmi Publications 13th edition, 2017.
4. R.C. Hibbeler, "*Structural Analysis*", Pearson Publications, 10th edition, 2022.

PROFESSIONAL ETHICS AND UNIVERSAL HUMAN VALUES

Subject code:	**Credits : 3**
Instruction : **3 Lectures / week**	Sessional Marks : 30
End Exam : 3 Hours	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.

CONCRETE TECHNOLOGY LABORATORY

Subject code:	**Credits : 1.5**
Instruction : 3 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Prerequisites: Concrete Technology

Course Objectives: **The objective of this course is to:**

1. Tests to identify the physical properties of cement, sand and aggregate.
2. Tests to identify the initial and final setting of cement.
3. Tests to identify workability of concrete.
4. Tests to identify mechanical characteristics of concrete.

Course Outcomes: **At the end of the course Students will be able to**

1. Determine physical properties of cement, sand and aggregate.
2. Classify fine aggregate and coarse aggregate as per IS 383
3. Determine workability of concrete.
4. Determine mechanical properties of concrete
5. Perform Mix Design for different concrete mixes

List of Experiments

1. Specific gravity and unit weight of cement
2. Specific gravity and unit weight of fine aggregates.
3. Specific gravity and unit weight of coarse aggregates.
4. Determination of normal consistency of cement
5. Determination of initial and final setting time of cement
6. Determination of Fineness of cement.
7. Determination of compressive strength of cement (for different grades of cement).
8. Determination of Bulking characteristics of sand.
9. Sieve analysis of coarse and fine aggregates and classification as per IS 383.
10. Design of concrete mix by using IS code method
11. Workability tests on green concrete by using
    a) Slump cone
    b) Compaction factor apparatus
    c) Vee-Bee Consistometer
12. Determination of compressive strength of concrete
13. Determination of Split tensile strength of concrete
14. Determination of Modulus of rupture of concrete

References:

1. A. M. Neville, "*Properties of Concrete*", Education ltd, 8th edition 2016.

2. M. S. Shetty, " *Concrete Technology*", S. Chand & Co., 8th edition, 2018

3. M.L. Gambhir, "*Concrete Technology*", Tata Mc. Graw Hill Publishers, New Delhi, 5th edition, 2017

IS Codes:

1. IS: 516:1959 Methods of test for the strength of concrete.
2. IS: 456:2000 Code of practice for plain and reinforced concrete
3. IS: 10262 (2019): Guidelines for concrete mix design proportioning.
4. IS: 383:1970 Specification for Coarse and Fine aggregate for use in mass concrete
5. IS: 2386 (Part-I) 1963 Test for Aggregates for concrete
6. IS 2386:1963 Part-3 Methods of test for aggregates for concrete: Part 3 Specific gravity, density, voids, absorption, and bulking

STRENGTH OF MATERIALS LABORATORY

Subject code:	**Credits : 1.5**
Instruction : 3 Practicals / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Prerequisites: Mechanics of solids

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

1. Determine the Engineering and mechanical properties of materials.
2. Interpret the test results of rigidity modulus, hardness and Rockwell's no of different materials.
3. Interpret the test results of impact strength and tensile strength of different materials.
4. Determine the deflection and Young's Modulus of different materials.
5. Determine the mechanical properties of bricks, tiles and paint thickness.

List of Experiments

1. Determination of Young's Modulus of elasticity of different materials: Bending test on beam with one end fixed and another end free.
2. Determination of young's modulus of elasticity of different materials: Bending test on beam with simply supported ends.
3. Determination of Compressive strength of wood (parallel to grains and perpendicular to grains).
4. Determination of hardness of different materials using Brinell's and Rockwell Hardness test.
5. Determination of stiffness (spring constant) and modulus of rigidity of the helical spring in compression and tension.
6. Determination of Impact strength of given specimen by Izod test
7. Determination of Impact strength of given specimen by Charpy test.
8. Tension test on Mild Steel / HYSD bars using Universal Testing Machine (U.T.M)
9. Shape and size test of given brick
10. Determination of water absorption and density of given brick
11. Determination of compressive strength of given brick
12. Determination of wear and tear by tile abrasion test
13. Determination of thickness of paint.
14. Different fibers and its properties. Determination of Aspect Ratio of Steel fibers

References:

1. .S. Ramamrutam and R. Narayanan "*Strength of Materials*" 20th Edition, Dhanpat Rai publications, 2020.
2. S.S BhaviKatti, "*Strength of Materials",* 5th Edition, S Chand and Company Ltd., 2021.

IS Codes:

1. IS : 432 (Part I) - Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement
2. ASTMA370: Mechanical Testing of Steel Products
3. IS:2380, Method of test for wood particle boards and boards from other lignocellulosic materials, (Part XXII) - 1981
4. IS:2212-2091, Code of practice for brickworks
5. IS:1237, Cement Concrete Flooring Tiles - Specification

PYTHON PROGRAMMING LABORATORY

Subject code:	**Credits : 2**
Instruction : 4 Practicals/ week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Pre-requisites: Basics of C Programming.

Course Objectives:

The objective of this course is to:

1. To become familiar with the basics of Python programming.
2. To become acclimatized with the usage of Python in various applications.
3. To get accustomed to the various operators and data types in Python.
4. To learn how to use lists, tuples, and dictionaries in Python programs.

Course Outcomes:

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

1. Students Will Be Able To: Install, Debug and Run A Python Program,
2. Differentiate Between Brackets, Braces, And Parentheses,
3. Define Variables, Identify Keywords, Operators and Operands, Expressions,
4. Perform Type Conversion, Use If, If-Else, For, While Loops

SYLLABUS:

Python Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Python IDE, python variable declaration, Keywords, Indents in Python, Python input/output operations

Python's Operators Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator Precedence.

Python's Built-In Data Types String, List, Tuple, Set, Dictionary (Characteristics And Methods)

Conditional Statements & Loop Conditional Statements (If, If-Else, If-Elif-Else, Nested-If Etc.) And Loop Control Statements (For, While, Nested Loops, Break, Continue, Pass Statements)

LIST OF PROGRAMS:

1. Input and Output

a. Write a program to find the largest element among three Numbers.

b. Write a program to print the sum of all the even numbers in the range 1 - 50 and print the even sum.

c. Write a Program to display all prime numbers within an interval of given X_1 & X_2.

2. Variables and Functions

a. Write a program to swap two numbers without using a temporary variable.

b. Write a program to define a function with multiple return values.

c. Write a program to define a function using default arguments.

3. Loops and conditionals

a. Write a program to print the following patterns using loop:

```
*
**
***
****
```

b. Write a program to print multiplication table of a given number X_1 to range X_2.

4. Strings

a. Write a program to find the length of the string without using any library functions.

b. Write a program to check if two strings are anagrams or not.

c. Write a program to check if the substring is present in a given string or not.

5. Lists

a. Write a program to perform the given operations on a list:

i. add ii. insert iii. slicing

b. Write a program to perform any 5 built-in functions by taking any list.

c. Write a program to get a list of the even numbers from a given list of numbers. (use only comprehensions)

6. Tuples

a. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.

b. Write a program to return the top 'n' most frequently occurring chars and their respective counts. e.g. aaaaabbbbcccc, 2 should return [(a 5) (b 4)]

7. Sets

a. Write a program to count the number of vowels in a string (No control flow allowed).

b. Write a program that displays which letters are present in both strings.

c. Write a program to sort a given list of strings in the order of their vowel counts.

8. Dictionaries

a. Write a program to check if a given key exists in a dictionary or not.

b. Write a program to add a new key-value pair to an existing dictionary.

c. Write a program to sum all the items in a given dictionary.

Text Books:

1. A Krishna Mohan, T Murali Mohan & Karunakar, *Python with Machine Learning,* 1st Edition, S Chand Publications, 2019.
2. Y. Daniel Liang, *Introduction to programming using Python,* 1st Edition, Pearson Publications, 2017.

References:

1. Sheetal Taneja, *Python Programming A Modular Approach* ,1st Edition Pearson Publications, 2017.
2. Brett Slatkin (C), *Effective Python: 59 Specific Ways to Write Better Python,* I/C, 1st

Edition Pearson Publications, 2015.
3. Ashok Namdev Kamathane and Amit Ashok Kamathane, *Programming and Problem Solving with Python*, 1st Edition, McGraw Hill Education (India) Private Limited, 2017.

Web References:

1. https://onlinecourses.nptel.ac.in/noc21_cs78/preview
2. https://www.coursera.org/learn/python?specialization=python#syllabus
3. https://www.coursera.org/learn/python-data?specialization=python#syllabus
4. https://www.coursera.org/learn/python-databases?specialization=python#syllabus