

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

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

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ENGINEERING AND TECHNOLOGY PROGRAM

DEPARTMENT OF CIVIL ENGINEERING

(Program Accredited by NBA)

Semester III (SECOND YEAR)

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
2065301	BSC	Mathematics-III	3	0	0	30	70	100	3
2065302	PCC	Mechanics of Solids	3	0	0	30	70	100	3
2065303	PCC	Fluid Mechanics	3	0	0	30	70	100	3
2065304	PCC	Basic Geotechnical Engineering	3	0	0	30	70	100	3
2065305	PCC	Geomatics	3	0	0	30	70	100	3
2065306P	PCC	Strength of materials Lab	0	0	3	50	50	100	1.5
2065307P	PCC	Building Materials Lab	0	0	3	50	50	100	1.5
2065308P	PCC	Geomatics lab	0	0	3	50	50	100	1.5
2065309	SC(MC)	Computer Aided Drafting Tools	1	0	2	50	50	100	2
20653010	MC	Environmental Science	2	0	0	-	100	100	0
Total Credits									21.5

MATHEMATICS III

Subject code: 2065301	Credits : 3
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 ∇ applied to scalar point functions- gradient, ∇ 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 ∇ applied twice to point functions, ∇ 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*", 43rd 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.

MECHANICS OF SOLIDS

Subject code: 2065302	Credits : 3
Instruction : 3 Lectures/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, 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. 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 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*" 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

FLUID MECHANICS - I

Subject code: 2065303	Credits : 3
Instruction : 3 Lectures/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. Understand 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. Understand 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 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:

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. SethModi, "*Fluid Mechanics and Hydraulic Machinery*", Standard Book House, 22nd edition 2020.
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

BASIC GEOTECHNICAL ENGINEERING

Subject code: 2065404	Credits : 3
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 (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, 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*" 3rd Edition, New Age International Pvt. Ltd, 2016.
2. K.R. Arora, "*Soil Mechanics and Foundation Engineering*" 5th Edition, Standard Publishers and Distributors, Delhi, 2009.

REFERENCES:

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

GEOMATICS

Subject code: 2065305	Credits : 3
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 counterling.
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 Staion.

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.

STRENGTH OF MATERIALS LAB

Subject code: 2065306P	Credits : 1.5
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. Determination of young's modulus of elasticity of different materials: Bending test on beam with one end fixed and other 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 Mild steel using Brinell Hardness test.
5. Determination of Hardness of Mild steel using Rockwell Hardness test.
6. Determination of stiffness (spring constant) and modulus of rigidity of the helical spring in compression.
7. Determination of stiffness(spring constant) and modulus of rigidity of the helical spring in Tension.
8. Determination of Impact strength of given specimen by Izod test.
9. Determination of Impact strength of given specimen by Charpy test.
10. Tension test on Mild Steel / HYSD bars using Universal Testing Machine(U.T.M)

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.

BUILDING MATERIALS LABORATORY

Subject code: 2065408P	Credits : 1.5
Instruction : 3 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objectives:

The objective of this course is to:

1. Tests to identify the physical properties of Bricks, Tiles, wood, pipes and Glass.

Course Outcomes:

At the end of the course Students will be able to

1. Tests to identify the physical properties of Bricks, Tiles, wood, pipes and Glass.

List of Experiments:

Tests on Brick:

1. Shape and size test of brick (Red brick)
2. Determination of water absorption of brick (Red brick)
3. Determination of compressive strength of brick (Red brick)
- 4 Determination of Density of brick (Red brick, Fly ash brick, Flag brick)

Tests on Tiles:

5. Determination of water absorption of Mangalore type and ceramic type tiles
6. Determination of Density of Ceramic tiles, paver blocks, Red bricks.
7. Determination of strength of tile

Tests on wood:

8. Determination of Moisture content
9. Thickness swelling test
10. Absorbability test
11. Determination of thickness of paint.
12. Different fibers and its properties. Determination of Aspect Ratio of Steel fibers

TEXT BOOKS:

1. A.M. Neville, Properties of Concrete, Longman 2095.
2. P.K. Mehta, J.M. Monteiro, Concrete micro-structure, Properties and Materials, Printice Hall INC & McGraw hill, USA.
3. M.S. Shetty, Concrete Technology Theory and Practice, M.S. Shetty, S. Chand & Company Ltd.
4. IS:1237,IS:15658,IS:2380,IS4020,IS:2212-2091,ASTMA370

GEOMATICS LABORATORY

Subject code: 2065308 P	Credits : 1.5
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 principle of surveying for civil Engineering Applications
2. Calculation of areas, Drawing plans using different measuring equipment at field level
3. To survey an area by chain survey across obstacles and to calculate the obstructed lengths by using different methods
4. Apply the knowledge of Theodolite in different operations in civil engineering projects.
5. Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.

List of Experiments

1. Measurement of distance by ranging and chaining.
2. Locating various objects by chain & cross staff surveying.
3. Determination of area of polygon by chain and cross staff survey.
4. Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angle.
5. Levelling – H.I and Rise and fall method
6. Measurement of horizontal angles by method of repetition and method of reiteration.
7. To determine the height of a tower by Trigonometric Leveling.
8. To determine height of the object when a base is accessible and base is inaccessible.
9. To determine the tacheometric constants.
10. Heights and distance using Principles of tacheometric surveying.

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.

COMPUTER AIDED DRAFTING TOOLS

Subject code: 2065309	Credits : 2.0
Instruction : 1 lecture and 2 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objective:

To teach the students how to use computer aided drafting tools to produce 2D and 3D working drawings. The students will be shown how to create a new drawing, edit an existing drawing and also how to plot a drawing to a suitable printer or plotter.

Course outcomes:

- Sketching and taking field dimensions.
- Transform data it into graphic drawings.
- Know basic engineering drawing formats.
- Acquire skills to draw 2D and 3D drawings

Syllabus

Introduction: Introduction to computer drafting tools, Coordinate system, Setting up a drawing starting from scratch, Setting up a drawing using a Wizard, Using and creating a template file, Opening an existing drawing, saving a drawing file, Screen layout, Pull-down menus, Screen icons, Command line, Status bar, Dialogue boxes

2D Drawing: Point, Line, Ray, Construction Line, Multiline and Polylines, Rectangles, Arc, Circle and Ellipse, Polygon, Spline, etc. 2D Editing; Trim, Extend, Lengthen, Break, Move, Copy, Scale, Stretch, Mirror, Rotate, Fillet, Chamfer, Array, Hatch and gradient, Object snap, Direct distance entry, Polar tracking, Object snap tracking, Dynamic input, Properties, etc.

Layers and Text creation: Creating Layers, Text (multi-line & single line) and Formatting Text Styles Dimension Command Formatting Dimension Style and Multi-leader Style, Drawing Settings and Aids, Saving and Plotting

3D Drawing: Introduction, 3D Coordinate system, UCS, 3D Orbit, Box, Wedge, Cone, Sphere, Cylinder, Torus, Helix, Loft, Revolve Editing with 3D Space: Union, Subtract, Intersect, Extrude faces, Move faces, Rotate faces, Offset faces, Taper faces, Delete faces, Copy faces

ENVIRONMENTAL SCIENCE

Subject code: 20653010	Credits : 0
Instruction : 2 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

Semester IV (Second year)

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
2065401	ESC	Environmental Engg	3	0	0	30	70	100	3
2065402	BSC/ PCC	HHM	3	0	0	30	70	100	3
2065403	PCC	Highway Engineering	3	0	0	30	70	100	3
2065404	PCC	Structural Analysis	3	0	0	30	70	100	3
2065405	HSMC	Managerial Economics	3	0	0	30	70	100	3
2065406	ESC/PC LAB	Massive Open Online Course	0	0	3	50	50	100	1.5
2065407P	PCC LAB	Building Planning and Drawing	0	0	3	50	50	100	1.5
2065408P	PCC LAB	FM and HM Lab	0	0	3	50	50	100	1.5
2065409P	SC	Computer Aided Building Drawing lab	0	0	4	50	50	100	2
20654010	MC	Professional Ethics & Universal Human Values	0	0	0	30	70	100	0
	MC	NCC/NSS	0	0	2	-	-	-	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: 2065401	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. 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

HYDRAULICS & HYDRAULIC MACHINERY

Subject code: 2065402	Credits : 4
Instruction : 3 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. Understand 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. Modi, P.N. & Seth, S.M. (2009), “Fluid Mechanics and Hydraulic Machinery”, Standard Book House, New Delhi, 19th Edition.
2. Jain, A.K. (2008), “Fluid Mechanics”, Khanna Publishers, New Delhi, 4th Edition.

REFERENCES:

1. Kumar, K.L., Chand, S. & Co. (2008), “Engineering Fluid Mechanics”, Eurasia Publishing House (P) Ltd, New Delhi, 8 th Edition.
2. Subramanya, K. (2008), “Flow in Open Channels”, McGraw Hill Education, New Delhi, 3 rd Edition.
3. Chow, V.T. (2009), “Open-Channel Hydraulics”, The Blackburn Press, Caldwell, NJ USA, 1st Edition.

HIGHWAY ENGINEERING

Subject code: 2065403	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 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

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", 10th edition New Chand & Bro,2017
2. C . Venkataramaiah,. Transportation Engineering; Volume: I,: Highway Engineering, 1st Edition, University Press, 2016.

References:

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

STRUCTURAL ANALYSIS

Subject code: 2065404	Credits: 3
Instruction: 3 Lectures/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 and trusses.
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 and continuous 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

UNIT-I

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

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 Lamé's theory, Compound tubes.

TEXT BOOKS

1. Ramamrutham, “Theory of structures”, 9th edition, Dhanpat rai Publishing company.
2. Devadas Menon, “Structural Analysis” Alpha science international limited (21 Dec 2007).

REFERENCES

1. S.P. Timoshenko and D.H. Young, “Theory of structures”, 2nd Edition, McGraw Hill International Editions.
2. CS Reddy, “Basic Structural Analysis”, 3rd edition, Tata McGraw Hill Education.
3. Vazirani and Ratwani, “Analysis and Design of structures”, 17th edition, Vol 1, Khanna publishers.
4. BC Punmia and Arun Kumar Jain and AK Jain, “Theory of Structures”, 12th edition, Laxmi Publications.
5. R.C. Hibbeler, “Structural Analysis” 6th edition, Pearson Publications, 2012

MANAGERIAL ECONOMICS

Subject code: 2065405	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) 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.

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*", 7th 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.

BUILDING PLANNING AND DRAWING

Subject code: 2065407	Credits : 3
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 bedrooms 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.Trimurthy, "*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 and Hydraulic Machinery Lab

Subject code: 2065408P	Credits : 1.5
Instruction : 3 Practical / week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objectives:

The objective of this course is to:

1. To verify the principles of channel flow in laboratory by conducting experiments.
2. Calculate the discharge if various types of notches and weirs.

Course Outcomes:

At the end of the course Students will be able to

1. Illustrate Flow Measuring Devices used in pipes, channels and Tanks
2. Determine the characteristics of Notch.
3. Compare sharp crested full width and contracted weirs.

List of experiments

1. Study of Small orifice, mouthpiece by constant head method and variable head method.
2. Study of floating body and determination of Metacentric Height.
3. Study of Venturimeter & Orifice meter.
4. Study of Flow nozzle meter.
5. Study of Sharp – crested full width and contracted weirs.
6. Study of V-notch and Trapezoidal notch.
7. Analyze the flow through a pipe with friction and determine the friction factor in Darcy-Weisbach equation.
8. Determination of coefficient of impact on a flat plate and curved vane by comparing the theoretical and actual forces by impact.
9. Analyze the working of the centrifugal pump and reciprocating pump develop the characteristics of power input, head and efficiency under various discharges and plot the characteristic curves.
10. Determine the performance characteristics of Pelton wheel turbine and Francis turbine develop the characteristic curves of unit discharge, unit power and unit head under varying unit speed.
11. Reynold's experiment- demonstration of types of flows.
12. Performance of impact of jet on vanes.

References

1.Modi, P.N. & Seth, S.M. (2009), "Fluid Mechanics and Hydraulic Machinery", Standard Book House, New Delhi, 19th Edition

Universal Human Values

Subject code:20654010	Credits : 3
Instruction : 2 Lectures &1 Tutorial/ 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.
3. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991