B.Tech & B.Tech. +M.Tech
II Year - I Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV2101	ES	Python Programming	4	0	30	70	100	3
CV2102	PC	Mechanics of Solids	4	0	30	70	100	3
CV2103	PC	Fluid Mechanics-I	4	0	30	70	100	3
CV2104	PC	Structural Analysis-I	4	0	30	70	100	3
CV2105	HSS	Managerial Economics	4	0	30	70	100	3
CV2106	PC	Mechanics of Solids Lab	0	3	50	50	100	1.5
CV2107	PC	Fluid Mechanics -I Lab	0	3	50	50	100	1.5
CV2108	ES	Python Programming Lab	0	3	50	50	100	1.5
CV2109	SC	Computer Aided Drafting	1	2	50	50	100	2
CV2110	MC	Professional Ethics & Universal Human Values	0	0	00	100	100	0
CV2111	MC	NCC/NSS	0	2	-	-	-	0
							Total credits	21.5

B.Tech & B.Tech. +M.Tech
II Year - I Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV2101	ES	Python Programming	4	0	30	70	100	3
CV2102	PC	Mechanics of Solids	4	0	30	70	100	3
CV2103	PC	Fluid Mechanics-I	4	0	30	70	100	3
CV2104	PC	Structural Analysis-I	4	0	30	70	100	3
CV2105	HSS	Managerial Economics	4	0	30	70	100	3
CV2106	PC	Mechanics of Solids Lab	0	3	50	50	100	1.5
CV2107	PC	Fluid Mechanics -I Lab	0	3	50	50	100	1.5
CV2108	ES	Python Programming Lab	0	3	50	50	100	1.5
CV2109	SC	Computer Aided Drafting	1	2	50	50	100	2
CV2110	MC	Professional Ethics & Universal Human Values	0	0	00	100	100	0
CV2111	MC	NCC/NSS	0	2	-	-	-	0
							Total credits	21.5

B.Tech & B.Tech. +M.Tech
II Year - I Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
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CV2102	PC	Mechanics of Solids	4	0	30	70	100	3
CV2103	PC	Fluid Mechanics-I	4	0	30	70	100	3
CV2104	PC	Structural Analysis-I	4	0	30	70	100	3
CV2105	HSS	Managerial Economics	4	0	30	70	100	3
CV2106	PC	Mechanics of Solids Lab	0	3	50	50	100	1.5
CV2107	PC	Fluid Mechanics -I Lab	0	3	50	50	100	1.5
CV2108	ES	Python Programming Lab	0	3	50	50	100	1.5
CV2109	SC	Computer Aided Drafting	1	2	50	50	100	2
CV2110	MC	Professional Ethics & Universal Human Values	0	0	00	100	100	0
CV2111	MC	NCC/NSS	0	2	-	-	-	0
							Total credits	21.5

B.Tech & B.Tech. +M.Tech
II Year - I Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV2101	ES	Python Programming	4	0	30	70	100	3
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CV2103	PC	Fluid Mechanics-I	4	0	30	70	100	3
CV2104	PC	Structural Analysis-I	4	0	30	70	100	3
CV2105	HSS	Managerial Economics	4	0	30	70	100	3
CV2106	PC	Mechanics of Solids Lab	0	3	50	50	100	1.5
CV2107	PC	Fluid Mechanics -I Lab	0	3	50	50	100	1.5
CV2108	ES	Python Programming Lab	0	3	50	50	100	1.5
CV2109	SC	Computer Aided Drafting	1	2	50	50	100	2
CV2110	MC	Professional Ethics & Universal Human Values	0	0	00	100	100	0
CV2111	MC	NCC/NSS	0	2	-	-	-	0
							Total credits	21.5

B.Tech II Year - I Semester

CV2101 PYTHON PROGRAMMING

Course Objectives

1. To develop skills on procedural oriented and object oriented programming in Python
2. To understand and apply different data wrangling techniques using Python.
3. To perform data analysis using python libraries like NumPy, Pandas and exploratory data analysis using Matplotlib

Course Outcomes

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

1. acquire programming knowledge on Basics of Python
2. acquire programming knowledge on Text and File Handling
3. develop Python programs to Mean, Median, Mode, Correlation
4. acquire programming knowledge on NumPy, Pandas Library
5. acquire programming knowledge on Graph Visualizations in Python and Data Analysis using Python

Syllabus

1. **Introduction to Python: Rapid Introduction to Procedular Programming, Data Types**: Identifiers and Keywords, Integral Types, Floating Point Types

   Strings: Strings, Comparing Strings, Slicing and Striding Strings, String Operators and Methods, String formatting with str.format

   Collections Data Types: Tuples, Lists, Sets, dictionaries, Iterating and copyingcollections

2. **Python Control Structures, Functions and OOP:Control Structures and Functions**: Conditional Branching, Looping, Exception Handling, Custom Fuctions

   Python Library Modules: random, math, time, os, shutil, sys, glob, re, statistics,creatinga custom module

   Object Oriented Programming: Object Oriented Concepts and Terminology, Custom Classes, Attributes and Methods, Inheritance and Polymorphism, Using Properties to Control Attribute Access

   File Handling: Writing and Reading Binary Data, Writing and Parsing Text Files

3. **NumPy Arrays and Vectorized Computation**: NumPy arrays, Array creation, Indexing and slicing, Fancy indexing, Numerical operations on arrays, Array functions, Data processing using arrays, Loading and saving data, Saving an array, Loading an array, Linear algebra with NumPy, NumPy random numbers

4. **Data Analysis with Pandas**: An overview of the Pandas package, The Pandas data structure-Series, The DataFrame, The Essential Basic Functionality: Reindexing and altering labels , Head and tail, Binary operations, Functional statistics , Function

application Sorting, Indexing and selecting data, Computational tools, Working with Missing Data, Advanced Uses of Pandas for Data Analysis - Hierarchical indexing, The Panel data

5. **Data Analysis Application Examples**: Data munging,Cleaning data, Filtering, Merging data, Reshaping data, Data aggregation, Grouping data
6. **Data Visualization**: The matplotlib API primer-Line properties, Figures and subplots, Exploring plot types-Scatter plots, Bar plots, Histogram plots, Legends and annotations, Plotting functions with Pandas

Text Books

1. Programming in Python 3: A Complete Introduction to Python Language, Mark Summerfield, Second Edition, Addison-Wesley Publications
2. Python: End-to-End Data Analysis Learning Path, Module 1: Getting Started with Python Data Analysis , Phuong VothiHong , Martin Czygan, , Packt Publishing Ltd

Reference Books

1. Learning Python, 5th Edition, Mark Lutz, Orielly Publications
2. Python for Data Analysis, Wes McKinney, Orielly Publications
3. How to Think Like a Computer Scientist: Learning with Python 3 Documentation 3rd Edition, Peter Wentworth, Jeffrey Elkner, Allen B. Downey, Chris Meyers
4. Core Python Programming, Second Edition, Wesley J. Chun, Prentice Hall
5. Python Cookbook – Recipes for Mastering Python 3,3rdEdition, David Beazley, Brian K. Jones, Oreilly

CV2102 MECHANICS OF SOLIDS

Course Objectives:

- The student can understand the concepts of stress and strain by analysis of solids.
- The student can understand the engineering properties of materials, force-deformation, and stress-strain relationships.
- The student can understand the determinate and indeterminate members, and beams, torque, shear forces, and bending moments.
- The student can understand the combined bending and direct stresses on column and strut members, axial load on open and closed coiled helical spring subjected to axial load.

Course Outcomes:

The student will be able to:

- Understand the basic concepts of stresses and strain along with their relations.

- Determine the shear force and bending moments of the simply supported, cantilever and over hanging beams under various loads.
- Assess the flexural normal and shear stresses of various cross sections.
- Analyse the stresses on oblique plane and torsional shear stress distribution of solid and hollow circular sections.
- Analyse the stresses on columns and struts using various theories.
- Analyse open and closed coiled helical springs subjected to axial load.

SYLLABUS

Duties/Obligations Accountability ofStructural Engineer for the Design of a Structure:

a) Economy b) Safety: (i) Strength Consideration (ii) Stiffness Consideration. Need for Assessment ofStrength of a Material – Analysis for Strength Requirement for Design Purposes – Review of IS Code Provisions.

Effects ofForce: Tension, Compression and Shear. Stress as Internally Elastic Resistance of a Material – Strain – Property ofElasticity – Hooke's Law – Stress-Strain Diagrams. Characteristic Strengths, Factors ofSafety and Working Stresses for Materials and Various Types ofApplicationofLoad. Elastic Strain – Energy, Stress due to Gradually Applied Load, Sudden Load, Impact Load and Shock Load. Lateral Strain, Poisson's Ratio. Complementary Shear Stress, Shear Strain, Shear Modulus. Relation between Modulus of Elasticity, Modulus of Rigidity and Bulk Modulus.Stresses in Composite Assemblies due to Axial Load and Temperature Change.

Effect of Transverse Force, Shear Force, BendingMoment 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. Theory of Simple Bending: Flexural Normal Stress Distribution; Flexural Shear Stress Distribution for Various Shapes of Cross Section.

Stresses on Oblique Plane – Resultant Stress – Principal Stress and Maximum Shear Stress and Location of their Planes. Mohr's Circle for Various Cases ofStresses; Theory ofPure 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.

Longitudinal and Hoop stresses in Thin Cylinders subjected to Internal Pressure. Wire Wound Thin Cylinders.Thick Cylinders –Lamme's Theory, Compound Tubes – Theory of Failure (i) Principal Stress Theory, (ii) Principal Strain Theory, (iii) Maximum Shear Stress Theory and (iv) Maximum Strain Energy Theory.

Columns and Struts: Combined Bending and Direct Stresses – Kern of a Section – Euler's Theory – End Conditions. Rankine-Gordon Formula – Eccentrically Loaded Columns. Open and Closed Coiled Helical Springs subjected to Axial Load.

Text Books

1. Strength of materials by S.Ramamrutham and R.Narayanan, Dhanpat Rai Publishing Company, New Delhi.
2. Mechanics of Materials by B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
3. Analysis of Structures, Vol. I, 1993 edition, by V.N.Vazirani and M.M.Ratwani, Khanna Publishers Books.

Reference Books

1. Strength of Materials (Elementary Theory and Problems) by S.Timoshenko and D.H.Young, CBS Publishers & Distributors Pvt. Ltd.
2. Introduction to Mechanics of Solids by Popov, Prentice-Hall.
3. Strength of Materials by Hyder, Universities Press.
4. Elementary Mechanics of Solids by P.N. Singer and P.K.Jha, New Age International Publishers.

CV2103 FLUID MECHANICS-I

Course Objectives

- To familiarize students with the fundamentals and basic concepts of fluid mechanics.
- To impart knowledge to the students about fluid statics and kinematics which are prerequisite to comprehend fluid dynamics and other more advanced aspects.
- To enable students to understand one-dimensional applications of energy equation and to impart the concepts of flow measuring devices.
- To develop insight in the application of momentum principle to closed conduits.
- To impart knowledge on fluid flow through pipes and pipe network analysis.

Course Outcomes

Students will be able to

- Understand the significant properties of fluids and pressure measurement, and analyze hydrostatic forces on plane and curved surfaces.
- Comprehend kinematics of fluid flow and further derive and apply continuity equation which is useful in analyzing more complex field problems such as seepage analysis.
- Understand the theory of flow measuring devices in pipes and open channel flows using Bernoulli's equation.
- Compute forces on pipe bends using linear impulse momentum application and understand the basics of angular momentum principle which is essential to understand the concepts of hydraulic turbines.
- Perform analysis of pipes and hydraulic design of pipe networks.

SYLLABUS

Fluid Properties: Introduction & Physical Properties of Fluids –Newton's Law of Viscosity. Fluid Statics: Forces acting on a fluid element – Pascal'slaw; Variation of Pressure in Static Fluid; Absolute, Gauge and Total Pressure; Pressure Measurement, Forces on Immersed Bodies in Static Fluids – Force on a Plane Surface and curved surfaces.

Fluid Kinematics: Types of Flow, Streamline, Path line, Streak line; Stream Tube, Translation, Deformation and Rotation of a Fluid Element in Motion; Local, Convective and Total Accelerations; One, Two and Three Dimensional Analysis of Flows. Ideal Fluid Flow – Stream Function, Velocity Potential; Rotational& Irrotational Flows–Vorticity and Circulation; Laplace Equation in terms of Stream Function and Velocity Potential; Flow Nets. Principle of Conservation of Mass – Concepts of System and Control Volume; Continuity Equation in three dimensional Cartesian coordinates; Continuity Equation for flow through a Stream tube.

Fluid Dynamics: Principle of Conservation of Energy – Equation of Motion for Ideal Fluids, Euler's Equation in Streamline Coordinates, Derivation of Energy Equation through integration of Euler's Equation, Bernoulli's Equation, Energy Correction Factor.
Flow measuring devices – Flow Measurement in Pipes – Measurement of Static, Stagnation and Dynamic Pressures and Velocity – Pitot Tube, Prandtl Pitot Tube; Measurement of Discharge through a Pipe using Flow Meters – Venturimeter, Flow Nozzle meter and Orifice meter.

Flow through Tanks and Reservoirs – Measurement of Discharge from Tanks and Reservoirs – Steady and Unsteady Flow through Orifices and Mouthpieces – Small & Large Orifices – Different types of Mouthpieces; Discharge from tanks through Drowned Orifices, Time of Emptying Tanks, Discharge from a Tank with Inflow. Flow Measurement in Channels – Flow Measurement in Open Channels, Flow Past Weirs and Notches, Sharp Crested and Broad Crested Weirs, Weirs with and without end contractions, Ventilation of Weirs, Triangular Notches, Cipolletti Weir.

Principle of Conservation of Momentum – Momentum of Fluids in Motion, Impulse Momentum Equation, Momentum Correction Factor, Application of Momentum Principle – Forces on Pipe Bends and Reducers, Flow through a Nozzle; Angular Momentum of Fluid Flow – Sprinkler Problems.

Flow through Pipes: Introduction to Pipe Flow and Laws of Friction – Reynolds Experiment; Steady Turbulent Flow through Pipes; Laws of Friction; Darcy-WeisbachEquation;Total Energy and Hydraulic Gradient – Energy and Hydraulic Gradient Lines; Minor Losses in Pipes; Pipes in Series and Parallel – Equivalent Length of Pipe; Flow Between Two Reservoirs; Siphon; Pipe Network Analysis by Hardy–Cross Method; Hydraulic Power Transmission through Pipes and Nozzles, Water Hammer (Only Concept).

Text Books

1. Fluid Mechanics and Hydraulic Machinery by P.N.Modi and S.M. Seth, Standard Book House.
2. Fluid Mechanics by A.K.Jain, Khanna Publishers.

Reference Books

1. Engineering Fluid Mechanics by K.L.Kumar, S. Chand &Co.Ltd.
2. Engineering Hydraulics, H.Rouse, John Wiley & Sons Inc.
3. Mechanics of Fluids, I.H.Shames,McGraw-Hill Professional.
4. Fluid Mechanics and Its Applications, Vijay Gupta and Santosh K Gupta, New Academic Science Ltd

CV2104 STRUCTURAL ANALYSIS-I

Course Objectives:

- Familiarise students to the various methods of determining deflections of beams
- Improve student's ability in understanding strain – energy due to Axial load, Shear force, Bending Moment and Torque.
- Impart skills of analysing the fixed beams, three span continuous beams subjected to different types of loads.
- Enable students understand the concept of moving loads and draw maximum Shear force and Bending moment diagrams for different types of loads
- Expose students to understand Lamme's theory in analyzing thick cylinders and know the concept of theories of failure.

Course Outcomes:

the student will be able to:

- Understand behavior of beams and determine slope and deflections of a beams , trusses (having 9 members or less) using various methods.
- Differentiate determinate and indeterminate structures and determine deflections of statically determinate structures.
- Apply strain energy principle to determine the deflections of beams using various methods.
- Understand the concept of moving loads and draw the maximum Shear force and Bending moment diagrams for different types of moving loads.
- Gain knowledge on thick cylinders and compound cylinders. Learns basic concepts of theories of failure.

SYLLABUS

Deflections of Beams: (i) Cantilever (ii) Simply Supported and (iii) Over Hanging Beams, using (a) Double Integration and (b) Macaulay's Method.

Deflections of Beams Using (i) Moment Area Method, (ii) Conjugate Beam Method, (iii) Unit Load Method (iv) Castigliano's Theorem – 1.

Strain – Energy due to (i) Axial Load, (ii) Shear Force, (iii) Bending Moment and (iv) Torque;
Deflections of Statically Determinate Structures: (A) Single Storey, Single Bay Rectangular Portal Frames using (i) Unit Load Method,(ii) Castigliano's Theorem –1. (B) Trusses (Having 9 Members or less) using (i) Unit Load Method and (ii) Castigliano's Theorem-1.

Analysis of (A) Fixed Beams, (B) Three Span Continuous Beams using (i) Theorem of Three Moments, (ii) Slope Deflection Method and (iii) Moment Distribution Method

Moving Loads: Maximum Shear Force and Bending Moment Diagrams for Different types of Loads. Maximum Bending Moment at a Section under a Wheel Load and Absolute Maximum Bending Moment in the case ofseveral Wheel Loads. Equivalent Uniformly Distributed Live Load for Shear Force and Bending Moment. Reversal of Nature of Shear Force, Focal Length, Counter Bracing for Truss Panels, Influence Lines for (i) Beams and (ii) Members of Warren and Pratt Trusses.

Text Books

1. Theory of Structures, Vol- I,byG.S.Pundit, S.P.GuptaandR.Gupta,,McGraw-Hill Education India.
2. Mechanics of structures Vol- I byH.J.Shah and S.B.Junnarkar, Charotar Publishing House.
3. Strength of Materials by S.RamamruthamandR.Narayanan, Dhanpat Rai Publishing House.

Reference Books

1. Elementary Strength ofMaterialsbyS.Timoshenko and D.H.Young, Affiliated East-West Press.
2. Analysis and Design ofStructures Vol-I by V.N.Vazirani and M.M.Ratwani, Khanna Publishers.
3. Intermediate Structural Analysis by C.K.Wang, McGraw-Hill.
4. Strength ofMaterialsbyB.C.Punmia, Laxmi Publications.

CV2105 MANAGERIAL ECONOMICS

(Common for all Branches)

Course Objectives:

- To introduce micro as well as macro, financial concepts that can be used in business decision making
- To analyze various business situations with the help of different economic concepts.
- To assist in a better understanding of the application of modern principles and methods of microeconomics to real-world business issues in different contexts.
- To master the basic tools of microeconomics: supply and demand analysis; firms' production and pricing decisions, market equilibrium, and market structure analysis.
- To enable the students to understand how organizations make important investment and financing decisions.

Course Outcomes:

The student will be able to

- Understand the concepts of cost, nature of production, and its relationship to Business operations.
- Apply marginal analysis to the "firm" under different market conditions.
- Use the tools of marginal analysis to explain the optimal allocation of resources within the firm.
- Analyze the causes and consequences of different market conditions.
- Integrate the concept of price and output decisions of firms under the various market structure.

SYLLABUS

Significance of Economics and Managerial Economics:

Economics: Definitions of Economics- Wealth, Welfare and Scarcity definitions Classification of Economics- Micro and Macro Economics.

Managerial Economics: Definition, Nature and Scope of Managerial Economics, Differences between Economics and Managerial Economics, Main areas of Managerial Economics, Managerial Economics with other disciplines.

Demand and Utility Analysis: Demand - Definition, Meaning, Nature and types of demand, Demand function, Law of demand - Assumptions and limitations. Exceptional demand curve.

Elasticity of demand - Definition, Measurement of elasticity, Types of Elasticity (Price, Income, Cross and Advertisement), Practical importance of Price elasticity of demand, Role of income elasticity in business decisions, Factors governing Price Elasticity of demand.

Utility Analysis: Utility- Meaning, Types of Economic Utilities, Cardinal and Ordinal Utility, Total Utility, Marginal Utility, The law of Diminishing Marginal Utility and its Limitations.

Theory of Production and Cost analysis:

Production - Meaning, Production function and its assumptions, use of production function in decision making;

Cost analysis - Nature of cost, Classification of costs - Fixed vs. Variable costs, Marginal cost, Controllable vs. Non - Controllable costs, Opportunity cost, Incremental vs. Sunk costs, Explicit vs. Implicit costs, Replacement costs, Historical costs, Urgent vs. Postponable costs, Escapable vs. Unavoidable costs, Economies and Diseconomies of scale.

Market Structures: Definition of Market, Classification of markets; Salient features or conditions of different markets - Perfect Competition, Monopoly, Duopoly, Oligopoly, Importance of kinked demand curve; Monopolistic Competition.

Pricing and Business Cycles:

Pricing Analysis : Pricing – Significance; Different Pricing methods- Cost plus pricing, Target pricing, Marginal cost pricing, Going -rate pricing, Average cost pricing, Peak load pricing , Pricing of joint Products, Pricing over the life cycle of a Product, Skimming pricing Penetration pricing, Mark- up and Mark- down pricing of retailers.

Business cycles - Definition, Characteristics, Phases, Causes and Consequences; Measures to solve problems arising from Business cycles.

Text Books:

1. Sankaran,S., Managerial Economics,Marghan Publications, 2015, Chennai.
2. Aryasri, A.R., Managerial Economics and Financial Analysis, MC Graw Hill Education, New Delhi,2015.

Reference Books:

1. Dwivedi, D.N., Managerial Economics,Vikhas Publishing House Pvt. Ltd. 6th Edition, New Delhi,2004.
2. Dewett, K.K., Modern Economic Theory, S.Chand& Company Ltd., New Delhi, 2005.

CV2106 MECHANICS OF SOLIDS LAB

Course Objectives:

- To impart knowledge about behaviour of materials under the action of loads.
- To explain about various kinds of loads that are going to act on materials.
- To understand about various kinds of stress and strain measuring machinery that is used in laboratory.
- To familiarize he students with various physical, mechanical properties of various engineering materials.
- To explain about various deformations of materials under the action of loads.

Course Outcomes:

The student will be able to:

- Understand strength and quality of materials through laboratory tests.
- Understand about properties of elastic materials.
- Find deformation of materials after the respective experiment.
- Apply the knowledge of mathematics to find the properties of materials.

LIST OF EXPERIMENTS

1. Tension test on Mild/HYSD bars
2. Compression test on wood (parallel and perpendicular to grains)
3. Tests on springs for the determination of rigidity modulus and spring constant.
4. Brinell's and Rockwell hardness tests.
5. Charpy and Izod impact tests.
6. Double shear test on mild steel specimen.
7. Bending test.: Load deflection test for the determination of young's modulus on simply supported and cantilever beam for wood and steel.
8. Buckling of Wooden column

CV2107 FLUID MECHANICS-I LAB

Course Objectives:

- To impart knowledge in measuring pressure, discharge and velocity of fluid flow.
- To understand the flow measurement in tanks.
- To determine the metacentric height of a floating body.
- To determine the flow measurement in pipe flow.
- To measure the discharge in a open channel flow.
- To learn and practice writing technical reports.

Course Outcomes:

The student will be able to:

- Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.
- Analyze a variety of practical fluid-flow devices and utilize fluid mechanics principles in design.
- Provide exposure to modern computational techniques in fluid mechanics.

LIST OF EXPERIMENTS:

1. Study of Small Orifice by Constant Head Method and Time of Emptying a Tank through a Small Orifice.
2. Study of Cylindrical Mouthpiece by Constant Head Method and Time of Emptying a Tank through a Cylindrical Mouthpiece.
3. Determination of Metacentric Height of Floating Body.
4. Study of Surface Profiles in Free and Forced Vortex Motions.
5. Study of Venturimeter.
6. Study of Orifice meter.
7. Study of Flow Nozzle Meter.
8. Study of Sharp-crested Full Width and Contracted Weirs.
9. Study of V-Notch and Trapezoidal Notch.
10. Study of Broad-crested Weir.

CV2108 PYTHON PROGRAMMING LAB

Course Objectives

1. familiarize students with key data structures in Python including lists and dictionaries and apply them in context of searching, sorting, text and file handling
2. introduce students to calculation of statistical measures using Python such as measures of central tendency, correlation
3. familiarize students with important Python data related libraries such as Numpy and Pandas and use them to manipulate arrays and dataframes
4. introduce students to data visualization in Python through creation of line plots, histograms, scatter plots, box plots and others
5. implementation of basic machine learning tasks in Python including pre-processing data, dimensionality reduction of data using PCA, clustering, classification and cross-validation.

Course Outcomes

After completion of the course the student should be able to:

1. implement searching, sorting and handle text and files using Python data structures such as lists and dictionaries

2. calculate statistical measures using Python such as measures of central tendency, correlation
3. use Python data related libraries such as Numpy and Pandas and create data visualizations
4. implement basic machine learning tasks pre-processing data, compressing data, clustering, classification and cross-validation.

Syllabus

1. Python Programs on lists & Dictionaries
2. Python Programs on Searching and sorting
3. Python Programs on Text Handling
4. Python Programs on File Handling
5. Python Programs for calculating Mean, Mode, Median, Variance, Standard Deviation
6. Python Programs for Karl Pearson Coefficient of Correlation, Rank Correlation
7. Python Programs on NumPy Arrays, Linear algebra with NumPy
8. Python Programs for creation and manipulation of DataFrames using Pandas Library
9. Write a Python program for the following**.**
    - Simple Line Plots,
    - Adjusting the Plot: Line Colors and Styles, Axes Limits, Labeling Plots,
    - Simple Scatter Plots,
    - Histograms,
    - Customizing Plot Legends,
    - Choosing Elements for the Legend,
    - Boxplot
    - Multiple Legends,
    - Customizing Colorbars,
    - Multiple Subplots,
    - Text and Annotation,
    - Customizing Ticks
10. Python Programs for Data preprocessing: Handling missing values, handling categorical data, bringing features to same scale, selecting meaningful features
11. Python Program for Compressing data via dimensionality reduction: PCA
12. Python Programs for Data Clustering
13. Python Programs for Classification
14. Python Programs for Model Evaluation: K-fold cross validation

Reference Books

1. Core Python Programming, Second Edition, Wesley J. Chun, Prentice Hall

2. Chris Albon, “Machine Learning with Python Cookbook-practical solutions from preprocessing to Deep learning”, O’REILLY Publisher,2018
3. Mark Summerfield, Programming in Python 3--A Complete Introduction to the Python Language, Second Edition, Additson Wesley
4. Phuong Vo.T.H , Martin Czygan, Getting Started with Python Data Analysis, Packt Publishing Ltd
5. Armando Fandango, Python Data Analysis, Packt Publishing Ltd
6. Magnus Vilhelm Persson and Luiz Felipe Martins, Mastering Python Data Analysis, Packt Publishing Ltd
7. Sebastian Raschka& Vahid Mirjalili, “Python Machine Learning”, Packt Publisher, 2017

CV2109 COMPUTER-AIDED DRAFTING

Course Objectives:

- Use computer aided drafting tools to produce 2D and 3D working drawings.
- Develop 2D civil engineering drawings of simple building elements and 3D drawings of simple objects.
- Familiarize with creating layers, formatting text styles and dimension styles.
- Create a new drawing and edit an existing drawing.
- Draw different 3D elements and edit them with 3D space.

Course Outcomes:

The student will be able to:

- Know basic commands used in computer drafting.
- Acquire skills to draw 2D and 3D drawings.
- Use geometric tools such as lines, circles, polylines, and rectangles in AutoCAD to create and modify geometry.
- Use dimension and annotation tools such as dimensions, tolerances, hatch, and text in AutoCAD to annotate drawings.
- Draw different 3D elements along with editing.

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

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CV2110 PROFESSIONAL ETHICS AND UNIVERSAL HUMAN VALUES

Course Objectives:

- To recognize the moral values that should guide the Engineering profession.
- To resolve moral issues concerning one's profession.
- To develop and exhibit a set of moral beliefs and attitudes that engineers should inculcate.
- To inculcate social values and morality in one's life.
- To develop awareness about Professional/Engineering Ethics and Human Values.

Learning Outcomes:

Students will be able to:

- Apply the conceptual understanding of ethics and values into everyday practice.
- Understand the importance of moral awareness and reasoning in life.
- Acquire professional and moral etiquette that an engineer requires.
- Develop the acumen for self-awareness and self-development.
- Develop cultural tolerance and integrity.
- Tackle real-life challenges with empathy.

CONTENTS

Unit - I: HUMAN VALUES

Values - Respect - Caring - Sharing - Honesty- Courage - Self confidence - Communal Harmony
Morals - Virtues

Unit –II PROFESSIONAL VALUES

Integrity - Discipline - Valuing time - Cooperation - Commitment - Code of conduct - Challenges in the workplace

Unit – III PROFESSIONAL ETHICS

Overview - Engineering ethics - Moral issues - Profession - Models of professional roles - Responsibility

Unit – IV RESPONSIBILITIES AND RIGHTS

Safety and risk - Collegiality and loyalty - Confidentiality - Occupational crime - Human rights - Employee rights - Intellectual property rights

Unit – V GLOBAL ISSUES

Globalization - Environmental ethics - Computer ethics - Code of ethics - Multinational corporations - Engineers as advisors in Planning and Policy making

Suggested Textbook:

R.S. Nagarazan. *A Textbook on Professional Ethics and Human Values.* New Age International Publishers. 2006.

Reference Books:

Premvir Kapoor. *Professional Ethics and Human Values.* Khanna Publishing House. 2019.

B.S. Raghavan. *Human Values and Professional Ethics*. S.Chand Publications. 2012.

R.R. Gaur & Others. *A Foundation Course in Human Values and Proff. Ethics*. Excel Books. 2009.

A. N. Tripathi. *Human Values*. New Age International (P) Limited. 2009

R. Subramanian. *Professional Ethics*. OUP India. 2013.

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