UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Mathematics-III
Course Code: M301
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

The goal of this mathematics course is to provide high school students and college freshmen an introduction to basic mathematics and especially show how mathematics is applied to solve fundamental engineering problems. The Topics to be covered (tentatively) include:

Fourier Series & Fourier Transform.

Introduction to Functions of a Complex Variable & Conformal Mapping.

Basic Probability Theory.

Partial Differential Equation (PDE) and Series solution of Ordinary Differential Equation (ODE).

Course Objectives:

In this course, the students will learn differentiation and integration of Complex functions and mappings in the complex plane. They are introduced to Fourier Transforms to stimulate interest in communications, control and signal processing to prepare them for follow up courses in these areas. They also learn to extend and formalize knowledge of the theory of probability and random variables and get motivated to use of statistical inference in practical data analysis. They are also introduced to Partial Differential Equations, their types and solutions.

Learning Outcomes:
Knowledge:

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

1. Understand and analyze analytic functions, evaluate line integrals of complex functions.
2. Apply fundamental mathematical properties of the Fourier transform including linearity, shift, symmetry, scaling, modulation and convolution and calculate the Fourier transform or inverse transform of periodic functions.
3. Construct probability distributions of a random variable based on real world situation and use it to compute the mean and variance; approximate a given data to fit a curve and analyze and interpret the correlation between two sets of data.
4. Form PDE by eliminating arbitrary constants / functions and solve linear PDEs by direct method and separation of variables.

Application:

1. Fourier transforms (FT) take a signal and express it in terms of the frequencies of the waves that make up that signal.
2. Probability is used in Weather forecasting, calculating and in many more engineering applications.
3. At the end of this course the student should be able to apply the above mentioned concepts to engineering problems.

Course Contents:

Unit 1: **Fourier Series & Fourier Transform:** Introduction, Periodic functions: Properties, Even & Odd functions: Properties, Euler's Formulae for Fourier Series, Fourier Series for functions of period 2π, Fourier Series for functions of period $2l$, Dirichlet's conditions, Sum of Fourier series. Theorem for the convergence of Fourier Series (statement only). Fourier Series of a function with its periodic extension. Half Range Fourier series: Construction of Half Range Sine Series, Construction of Half Range Cosine

Series. Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier, Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation. Fourier Transform of Derivatives. Convolution Theorem (statement only), Inverse of Fourier Transform.

Unit 2: **Introduction to Functions of a Complex Variable & Conformal Mapping:** Complex functions, Concept of Limit, Continuity and Differentiability. Analytic functions, Cauchy-Riemann Equations (statement only). Sufficient condition for a function to be analytic. Harmonic function and Conjugate Harmonic function, related problems. Construction of Analytic functions: Milne Thomson method, related problems.

Unit 3: Basic Probability Theory: Classical definition and its limitations. Axiomatic definition. Some elementary deduction: i) $P(O)=0$, ii) $0 \leq P(A) \leq 1$, iii) $P(A')=1-P(A)$ etc. where the symbols have their usual meanings. Frequency interpretation of probability. Addition rule for 2 events (proof) & its extension to more than 2 events (statement only). Related problems. Conditional probability & Independent events. Extension to more than 2 events (pairwise & mutual independence). Multiplication Rule. Examples. Baye's theorem (statement only) and related problems.

Definition of random variable. Continuous and discrete random variables. Probability density function & probability mass function for single variable only. Distribution function and its properties (without proof). Definitions of Expectation & Variance, properties & examples. Some important discrete distributions: Bernoulli, Binomial & Poisson distributions and related problems. Some important continuous distributions: Normal distributions and related problems.

Unit 4Partial Differential Equation (PDE) and Series solution of Ordinary Differential Equation (ODE): Basic concepts of PDE. Origin of PDE, its order and degree, concept of solution in PDE. Introduction to different methods of solution: Separation of variables, Laplace & Fourier transforms methods.

Solution of Initial Value & Boundary Value PDE's by Separation of variables, Laplace &Fourier transform methods.

PDE I: One dimensional Wave equation.
PDE II: One dimensional Heat equation.
PDE III: Two dimensional Laplace equation.

Text Books

1. Engineering Mathematics-III(B.K Pal and K.Das) [All course]

Reference Books:

1. Brown J.W and Churchill R.V: Complex Variables and Applications, McGraw-Hill.
2. Das N.G.: Statistical Methods, TMH.
3. Grewal B S: Higher Engineering Mathematics, Khanna Publishers.

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Course Description

Title of Course: Data Structure & Algorithm
Course Code: CS(ME)301
L-T Scheme: 3-1 **Course Credits: 3**

Introduction:

This course examines data structures and algorithms basics. The Topics to be covered (tentatively) include:

- Abstract Data Type and Data Type
- Time and space analysis of algorithms
- Linear Data structures
- Non-linear Data structures
- Sorting, Searching and Hashing

Objectives:

In this course we will study the basic components of data structure and algorithm.Students are expected to be capable of understanding the data structures, their advantages and drawbacks, how to implement them in C, how their drawbacks can be overcome and what the applications are and where they can be used. The way different modules in the operating system interact and work together to provide the basic services of an operating system.

Learning Outcomes:

Knowledge:

1. To learn about the data structures/ methods/algorithms mentioned in the course with a comparative perspective so as to make use of the most appropriate data structure/ method/algorithm in a program to enhance the efficiency (i.e. reduce the run-time) or for better memory utilization, based on the priority of the implementation.
2. To understand at least the efficiency aspects of the graph and sorting algorithms covered in this course.
3. To convert an inefficient program into an efficient one using the knowledge gathered from this course.

Application:

1. To implement different types of linked list.
2. To implement graph algorithm for any network
3. To implement sorting and searching.

Course Contents:

Unit 1: Introduction-Data and data structure, Abstract Data Type and Data Type. Algorithm efficiency and analysis, time and space analysis of algorithms – order notations.

Unit 2: Linear Data structures–Array, Linked List, Stack, Queue and Recursion with their types, different operations and applications

Unit 3: Nonlinear Data structures–Graph, Trees, Minimum spanning tree with their types, different operations and applications.

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Unit 4: Sorting, Searching and Hashing- Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap, application – priority queue), radix sort. Sequential search, binary search, interpolation search. Hashing functions, collision resolution techniques.

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Course Description

Text Books

1. YashavantKanetkar, Abduln A.P.J. Kalam," Data Structure Through C",2nd edition, BPB Publications
2. Seymour Lipschutz, "Data Structures",Revised First edition,McGraw Hill Education.

References

1. Langsam,Augestein, Tenenbaum:Data Structures using Cand C++, 2nd Edn, 2000,
2. Horowitz and Sahani:Fundamental ofData Structuresin C,2nd Edn, 2008
3. Kruse, Tonso, Leung: Data Structures and ProgramDesign in C, 2000
4. Richard F.Gilberg&BehrouzForouzan: Data Structures, APseudocodeApproach withC, 2001.
5. Weiss: DataStructures and AlgorithmAnalysis in C/C++, 3rd Edn, 2006

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Course Description

Title of Course: Basic Environmental Engineering
Course Code: CH301
L-T Scheme: 2-1 **Course Credits: 3**

Introduction:

This course introduces the basic principles behind the environmental phenomena and how anthropogenic activities are affecting those environmental processes. The different administrative measures taken to safeguard our environment are also discussed in this course. The Topics to be covered (tentatively) include:

- Ecology
- Air pollution and control
- Water Pollution and Control
- Land Pollution
- Noise Pollution
- Environmental Management

Objectives:

In this course we will study about the pattern of growing human population and its effect on the planet. We will be familiarizing with the consequences of anthropogenic activities and measures to mitigate their harmful effects. We will learn about the mechanism behind the global issues like global warming, acid rain, water pollution, etc.

Learning Outcomes:

Knowledge:

1. To introduce the patterns of population growth and associated problems.
2. To familiarize with the cause, effect and control measures of various human made degrading processes.
3. To enable the students to know the mechanism behind the devices to control pollution.
4. To familiarize with administrative laws to mitigate various environmental problems.

Application:

1. To understand the problems associated with pollution
2. To familiarize with the global environmental issues.
3. To understand the principles behind various control devices.
4. To understand and comply with the various government environmental laws.

Course Contents:

Unit 1: Introduction, Ecology, Air pollution and control

Unit 2: Water Pollution and Control

Unit 3: Land Pollution, Noise Pollution

Unit 4: Environmental Management

Text Books

1. Gourkrishna Damohapatra, Basic Environmental Engineering and Elementary Biology, Vikas publishing.

References

1. A.K. De, Environmental Chemistry, New Age International.

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UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Lecture-wise Plan

Subject Name: Applied Thermodynamics Subject Code-ME301
Year: 2nd Year Semester: Third

Course Objectives

- Be able to have the basic concepts of thermal sciences and their application to in formulating the thermal engineering problems.
- To understand the theory and applications of classical thermodynamics, thermodynamic properties, equations of state, methods used to describe and predict phase equilibrium.
- Have a good understanding of first and second laws of thermodynamics and will be in a position to fully understand the analysis to be taught at the higher levels.
- Be in a position to check the feasibility of proposed processes and cycles using the ideas of second law of thermodynamics and entropy.
- Have the understanding of basic principles of heat transfer and related simple problems.

Course outcomes:

After taking this course the students shall be able to:

- Define the basic concepts of thermodynamic systems (open and closed systems and control volumes) and its boundaries, properties, state, process, cycle, quasi-static process etc.- required as foundation for development of principles and laws of thermodynamics.
- Develop Intuitive problem solving technique Use & Practice two property rule and hence thermodynamic tables, thermodynamic diagrams and concept of equation of state, also their simple application.
- Explain heat, work and first law of thermodynamics. Application of energy balance.
- Discuss Second law of thermodynamics and its corollaries viz. absolute (thermodynamic) temperature scale, reversibility, entropy, feasibility of a process based on first law and second law, isentropic efficiency of adiabatic machines.
- Review introductory concept of power and refrigeration cycles. Their efficiencies and coefficients of performance.
- Apply fundamental concepts of thermodynamics to engineering applications
- Estimate thermodynamic properties of substances in gas and liquid states
- Determine thermodynamic efficiency of various energy related processes

Course Content :

Modue-1

Fundamentals of Thermodynamics

Review of fundamentals of thermodynamics, its definition and application in engineering. Heat and work, First law for unsteady flow system. Recapitulations of laws of thermodynamics, steady flow and non steady flow and its applications. Pure Substance and its example, Properties of pure substance; Phases of pure substances-Phase rule; Phase Change Processes of Pure Substances – triple point., critical point. Saturation temperature and pressure. Property diagrams of Phase change Processes of water on T-V, P-V, T-S and h-s plots ; P-V-T surface for phase change. Concept of dryness fraction or quality for liquid vapor mixture.

Module-2

2nd Law of Thermodynamics

The 2nd Law of Thermodynamics; the corollaries & their proofs; the property of entropy; entropy change of a pure substance. Energy analysis, Tds equations and calculation of entropy change; concept and uses of entropy; The second law of thermodynamics for an open system. Concept of entropy generation, Reversible work and irreversibility and its numerical

Module- 3

Joule Thompson Effect

Maxwell relations, T-ds equations and its derivations. Derivations of Joule Thompson co-efficient & Clapeyron Equation.

Module -4

Study of Thermodynamic Cycles

Introduction to I.C.Engine, Air Standard cycles. Otto cycle p-v and t-s diagram, efficiency . Diesel cycle p-v and t-s diagram , efficiency . Dual Combustion cycle p-v and t-s diagram. Different cycle performance comparison. Reciprocating air compressors; the compressor cycle with and without clearance. Efficiencies; volumetric efficiency & its effect on performance.

Module-5

Vapor power cycles

Vapor power cycles, Rankine cycle & its modifications its p-v,t-s, h-s diagram and efficiency calculations. Reheat & Regenerative cycle for steam. Binary cycle and cogeneration.

Module-6

Refrigeration system and carnot cycle

Introduction to Refrigeration systems, Refrigeration systems cycles. Belcolleman cycle, and its numerical. Reversed carnot cycle; components and analysis of simple vapour compression Refrigeration cycle. Actual Refrigeration cycles. Use of psychometric charts & processes for air conditioning. Vapour Absorption Refrigeration cycle.

Text Books:

1. Engineering Thermodynamics-4e by P.K .Nag, TMH
2. Engineering Thermodynamics - P.K Chattopadyay, OUP
3. Engineering Thermodynamics- by R.K RAJPUT

Reference Books:

1. Fundamentals of Thermodynamics - 6e by Sonntag, Borgnakke & Van Wylen, John Wily
2. Thermodynamics- an Engineering approach - 6e, Cengel & Boles,TMH

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Strength of Material **Course Code: ME 302**
L-T Scheme: 3-1 **Course Credits: 3**

Introduction:

The course is designed to cover the following subjects: History & Development of Automobile, **Auto Electrical Steering System, Transmission System, Suspension System, Power Requirement, Maintenance of Vehicle. Differential & Axle.**

Objectives:

- To know the method of finding slope and deflection of beams and trusses using energy theorems and to know the concept of analysing indeterminate beam
- To estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.

1. Learning Outcomes:

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

OUTCOMES:

- students will have through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- they will be in a position to assess the behaviour of columns, beams and failure of materials

Application:

- For Building Design
- For Machine Design
- For strength related problems

Course Contents:

UNIT I

Concept of mechanics of deformable solids; concept of stress developed against external force/pressure; brief review of normal and shearing stress and strain;
Deformation of axially loaded members, statically determinate and indeterminate problems. Strain energy in tension and compression

UNIT II

Analysis of Biaxial stresses-Mohr's circle for biaxial stress; concept of normal stress, principal stress and pure shear. Shear strain and shear strain energy. Stresses in thin walled pressure vessels- tangential and Hoop stress. Relation between shear modulus and Young's modulus

UNIT III

Stresses in beams; shear force (SF), axial force and bending moment (BM); differential relations for BM, SF and load; SF and BM diagrams; bending stresses in straight beams – symmetric loading; stresses in beams of various cross sections; stresses in built-up beams and beams of different materials.

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Course Description

UNIT IV

Torsion of a circular shaft, shear energy in torsion. Concept of closed and open coiled helical springs, Stresses and deflection of helical springs under axial pull.

UNIT V

Deflection of statically determinate and indeterminate beams due to bending moment, differential equation of elastic line, Area-moment method, Strain energy method- Catigliano's theorem, superposition method.

UNIT VI

Theory of columns; eccentric loading of short strut; column buckling: Euler load for columns with pinned ends and other end restraints; Euler's curve; emperical column formulae – straight line, (ii) parabolic and (iii) Rankine Gordon.

TEXT BOOKS:

1. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 2010.
2. Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2012

REFERENCES:

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum‟s Outline Series, Tata McGraw Hill Publishing company, 2007.
3. Punmia B.C."Theory of Structures" (SMTS) Vol 1&II, Laxmi Publishing Pvt Ltd, New Delhi 2004.
4. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Engineering Materials
Course Code: ME 303
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

The course is designed to cover the following subjects: classification of materials, atomic structure, periodic table, molecular structure, bonding in solid materials, structure of crystalline solids, mechanical properties of the materials, phase diagrams, thermal processing of metal alloys, corrosion, properties and introduction to ceramics, glasses and composites

Objectives:

1. To introduce the basic concepts of crystal structure, its different types and defects
2. To enable the student to visualize lattice atomic diffusion
3. To familiarize the students with mechanical behavior of metals, different types of mechanical testing and fracture behavior of metals
4. To enable the students to understand solid and liquid phase reactions and phase diagrams, under equilibrium and none equilibrium conditions
S. To provide an overview of different types of heat treatment processes of ferrous and non-ferrous metals

Learning Outcomes:

At the end of the course, the student will be able to
1. understand the importance of materials for various applications
2. identify and analyze the various crystal structures and defects responsible for change in the material properties
3. understand the processof diffusion, its types and mechanisms
4. relate the properties of the materials with their crystal structure
S. identify different phases in iron-carbon diagram for steels and cast-iron and non equilibrium phases
6. usethe phase diagrams effectively to identify the phase-state of the material for a given temperature condition
7. select.the best heat treatment process based on application
8. identify the composition, properties and application of various ferrous, non-ferrous & composite materials

Application:

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Course Description

1. In this syllabus, students will learn the applications of the about the Phase Diagram ,heat treatment.
2. In the section students will learn about Classification of the materials with their proper composition.
3. In this syllabus students will learn about the all Heat treatment Processes.
4. In this syllabus, students will learn about all the transformation of one phase to another phases.
5. In this syllabus students will learn about nano-particles and theirs details.

Course Contents:

Unit 1:

Engineering Materials: Effects of alloying elements in steel. Low alloy steels. Stainless , Magnetic materials for high and low temperature service. Brasses and bronzes; Aluminum base alloys. Bearing Materials. Atomic structure of METALS: Crystal structure, crystal lattice of (i) Body centred cubic (ii) Face centred cubic (iii) Closed packed hexagonal, crystallographic Notation of atomic planes and Directions (Miller Indices), polymorphism and allotropy, Crystal imperfection.

Unit 2:

Plastic Deformation of Metals and Alloys: Mechanism of plastic deformation, role of dislocation; slip and twining. Elementary treatment theory of work hardening, Theories of recrystallation and grain growth. Elementary treatment of creep; Fatigue and fracture

Unit 3:

Phase and Phase Equilibrium: Solidification of alloys, Phase Diagrams, relationship with structure and properties; Eutectic systems. Iron Carbon alloys, Iron-Carbon equilibrium diagram

Unit 4:

. **Heat Treatment of Alloys:** Phase transformation in steel. 'S' Curves Detailed study of various heat treatment Processes- hardening, annealing and tempering, case hardening. Hardenability, Precipification hardening. Heat treatment Furnaces.

Unit 5:

Classification of Metals and Alloys-compositions, general properties and uses, Ferrous alloys, Non-ferrous alloys, Polymers & Elastomers, Ceramic Materials ,Composite materials.

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Course Description

Text Book:

1. Donald RAskeland and Pradeep, P.Phule (2006), The Science
2. Engineering of Materials for Science and Engineering, 5th edition

References

1. MaterialsScienceand Engineeringby W.D.Callisterand adapted byR.Balasubramaniam,Willey India, 2010 Ed.
2. Engineering Materials:propertiesand selectionbyBudinski&Budinski,9thEd.,Prentice HallIndia
3. Engineering Materialsand Metallurgy byR.Srinivasan, 2ndEd.,TataMcGrawHill.
4. Materials&Processes inManufacturing byE.P.Degarmoand adapted byBlack&Kosher, 10thEd.,Wiley India.
5. MaterialsScienceand Engineeringby V.Raghavan, 5thEd.,Prentice HallIndia.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Technical Report Writing & Language Lab
Course Code: HU381
L-T-P scheme: 0-0-2 **Course Credit: 2**

Objectives:
1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.

Learning Outcomes:

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No.1: Report Types (Organizational/Commercial/Business/Project)

Exercise No. 2: Report Format & Organization of Writing Materials

Exercise No. 3: Report Writing (Practice Sessions &Workshops)

Exercise No. 4: Introductory Lecture to help the students get a clear idea of Technical Communication& the need of Language Laboratory Practice Sessions

Exercise No. 5: Conversation Practice Sessions: (To be done as real life interactions)
a) Training the students by using Language Lab Device/ Recommended Texts/cassettes / cd to get their Listening Skill & Speaking Skill honed
b) Introducing Role Play & honing overall Communicative Competence

Exercise No. 6: Group Discussion Sessions:
a) Teaching Strategies of Group Discussion
b) Introducing Different Models & Topics of Group Discussion
c) Exploring Live/Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure Interview Sessions;
d) Training students to face Job Interviews confidently and successfully
e) Arranging Mock interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in formal situation for effective communication

Exercise No. 7: Presentation:
a) Teaching Presentation as a skill
b) Strategies and Standard Practices of Individual/Group Presentation
c) Media & Means of Presentation: OHP/POWERPOINT/Other Audio-Visual Aids

Exercise No. 8: Competitive Examination:
a) Making thestudentsawareofProvincial/National/InternationalCompetitiveExaminations
b) Strategies/Tactics for success in Competitive Examinations
c) SWOT Analysis and its Application in fixing Target

Text Book:
1. NiraKonar: English Language Laboratory: A Comprehensive Manual
2. D. Sudharani: Advanced Manual for Communication Laboratories& Technical Report Writing Pearson Education (W.B. Edition), 2011 PHI Learning, 2011

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Data structure & algorithm Lab
Course Code: CS(ME)391
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. Develop problem solving ability using Programming.
2. Develop ability to design and analyze algorithms.
3. Introduce students to data abstraction and fundamental data structures.
4. Develop ability to design and evaluate Abstract Data Types and data structures.
5. Apply data structure concepts to various examples and real life applications

Learning Outcomes:

The course will use hands on practice and applying the knowledge gained in theory course to different day to day real world applications..Upon the completion of data structure and algorithm practical course, the student will be able to:

- **Understand** and implement different type of data structure techniques
- **Analyze** the hashing method..
- **Implement** different type os sorting searching techniques.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Implementation of array operations
Exercise No. 2: Stacks and Queues: adding, deleting elements
Exercise No. 3: Circular Queue: Adding & deleting elements
Exercise No. 4: Merging Problem: Evaluation of expressions operations on Multiple stacks & queues
Exercise No. 5: Implementation of linked lists: inserting, deleting, and inverting a linked list.
Exercise No. 6: Implementation of stacks & queues using linked lists, Polynomial addition, and Polynomial multiplication
Exercise No. 7: Sparse Matrices: Multiplication, addition.
Exercise No. 8: Recursive and Non-recursive traversal of Trees
Exercise No. 9: Threaded binary tree traversal. AVL tree implementation
Exercise No. 10: Application of Trees. Application of sorting and searching algorithms

Text Book:

1. Yashavant Kanetkar, Abduln A.P.J. Kalam," Data Structure Through C",2nd edition, BPB Publications
2. Seymour Lipschutz,"Data Structures",Revised First edition,McGraw Hill Education.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
2. Turbo C or TC3 complier in Windows XP or Linux Operating System.

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Course Description

Title of Course: Workshop Practice-II Lab
Course Code: ME392
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. The objective of the laboratory is learning. The experiments are designed to illustrate phenomena in different areas of Workshop and to expose you to uses of instruments.
2. To provide an understanding of the design aspects of machines.
3. To provide an efficient understanding of the equipments and their functioning.

Learning Outcomes: The students will have a detailed knowledge of the concepts of process of workshop equipments and their use in various areas of mechanical engineering. Upon the completion of practical course, the student will be able to:

- **Understand** and implement basic services and functionalities of the machines using tools and equipments.
- **Use** modern manufacturing technology to understand outlined process of production.
- **Understand** the benefits of newly manufactured parts and designs.
- **Analyze** the dimensions of job and measurements to be taken in account.
- **Implement** the manufacturing processes in competition of different jobs.
- **Understand** the concepts of all different operations conducted on lathe.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Threading, Drilling, Taper Turning
Exercise No. 2: Turning, Knurling, Chamfering
Exercise No. 3: Taper Turning by Tailstock Offset Method
Exercise No. 4: Cutting Metric Thread
Exercise No. 5: Prepare Mould and cast it in Aluminum

Experiment No. 1
To perform square threading, drilling and taper turning by compound rest as per drawing
Experiment No. 2

TO PERFORM STEP TURNING, KNURLING, AND CHAMFERING ON LATHE AS PER DRAWING
Experiment No. 3

Taper turning by tailstock offset method as per drawing.
Experiment No. 4

TO CUT METRIC THREAD AS PER DRAWING
Experiment No. 5

TO PREPARE MOULD OF GIVEN PATTERN REQUIRING CORE AND TO CAST IT IN ALUMINIUM

Text Book:

1. Hazra Choudhary, Media Promoters & Publishers Pvt Ltd.
2. Ashish Dutt Sharma, S. Chand

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Course Description

Title of Course: Applied Mechanics Lab
Course Code: ME-393
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
1. To learn and understand system of bodies to external forces, stress & strain in body.
2. Basic concept of statics, kinematics dynamics and material mechanics.
3. To provide an understanding of the design aspects of different materials.
4. To provide knowledge of the friction, torsion, pure bending, beam deflection.

Learning Outcomes: The students will have a detailed knowledge of the concepts of applied mechanics. Analyze kinematics, kinematics of both particles and rigid bodies systems and apply them to practical engineering system design and development. Analyze force system and apply them to practical engineering system design and development. Student can carry out stress and strain analysis of beams and simple structures apply them to practical engineering system. Student can carry out torsion, pure bending and shearing stress and apply them to practical engineering system. Upon the completion of Applied Mechanics Lab course, the student will be able to:

- **Understand** and implement basic concepts of applied mechanics.
- Analyze kinematics, kinematics of both particles and rigid bodies systems and apply them to practical engineering system design and development**.**
- **Understand** the force system and apply them to practical engineering system design and development
- **Analyze** and carry out stress and strain analysis of beams and simple structures apply them to practical engineering system
- Understand torsion, pure bending and shearing stress and apply them to practical engineering system.
- Deploy applied mechanics knowledge to solve the practical engineering problem of products and system design and development

Course Contents:
Experiments **that must be done in this course are listed below:**
Experiment No.1: Determining spring stiffness under tension and compressive loads.
Experiment No.2: To Study various types of Strain Gauges.
Experiment No 3: Torsion Test.
Experiment No.4: Brinnel Hardness Test.
Experiment No.5: Rockwell Hardness Test.
Experiment No.6: Experiments on friction. Determination of coefficient of friction
Experiment No.7: To Study The Universal Testing Machine (U.T.M.)
Experiment No.8: To determine tensile test on a metal.
Experiment No.9: Compression test of ductile and brittle materials on UTM

Text Book:
1. J.L. Meriam, L.G. Kraige, Engineering Mechanics, Wiley
2. Hannah J & Hillier M.J, Applied Mechanics, Longman

Recommended Equipments/Systems/Software Requirements:
1. U.T.M., Torsion testing machine, hardness testing machine.

2. Strain gauge, spring stiffness test apparatus, specimens.