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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
KAKINADA
B.TECH. MECHANICAL ENGINEERING

### II YEAR

#### SEMESTER I

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### II Year

#### Semester II

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2
### JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
#### KAKINADA
#### B.TECH. MECHANICAL ENGINEERING

#### III Year

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#### Semester I

#### III Year

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### JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

#### KAKINADA.

#### B.TECH. MECHANICAL ENGINEERING

#### IV Year

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### JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

#### KAKINADA.

#### MECHANICAL ENGINEERING

#### B.Tech – IV

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**Note**: All End Examinations (Theory and Practical) are of three hours duration.

* - Tutorial  
T - Theory  
P – Practical Drawing  
C - Credits
1. INTRODUCTION:
In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of Engineering students. The prescribed books and the exercises are meant to serve broadly as students’ handbooks.
In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.
The text for non-detailed study is for extensive reading/reading for pleasure by the students. Hence, it is suggested that they read it on their own with topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc. However, the stress in this syllabus is on skill development and practice of language skills.

2. OBJECTIVES:
a. To improve the language proficiency of the students in English with emphasis on LSRW skills.
b. To equip the students to study academic subjects with greater facility through the theoretical and practical components of the English syllabus.
c. To develop the study skills and communication skills in formal and informal situations.

3. SYLLABUS:
   Listening Skills:
   Objectives
   1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
   2. To equip students with necessary training in listening so that can comprehend the speech of people of different backgrounds and regions
   Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.
   - Listening for general content
   - Listening to fill up information
   - Intensive listening
   - Listening for specific information

   Speaking Skills:
   Objectives
   1. To make students aware of the role of speaking in English and its contribution to their success.
   2. To enable students to express themselves fluently and appropriately in social and professional contexts.
   - Oral practice
   - Describing objects/situations/people
   - Role play – Individual/Group activities (Using exercises from all the nine units of the prescribed text: *Learning English: A Communicative Approach.*)
   - Just A Minute(JAM) Sessions

   Reading Skills:
   Objectives
1. To develop an awareness in the students about the significance of silent reading and comprehension.

2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

**NOTE**: The students will be trained in reading skills using the prescribed text for detailed study.

They will be examined in reading and answering questions using 'unseen' passages which may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.

**Writing Skills**:

Objectives
1. To develop an awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Editing a passage

**4. TEXTBOOKS PRESCRIBED:**

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into **Eight Units**, are prescribed:

**For Detailed study**


**For Non-detailed study**


**A. STUDY MATERIAL:**

**Unit –I**


**Unit –II**


**Unit –III**


**Unit –IV**


Unit – V


Unit – VI


* Exercises from the lessons not prescribed shall also be used for classroom tasks.

Unit – VII

Exercises on
- Reading and Writing Skills
- Reading Comprehension
- Situational dialogues
- Letter writing
- Essay writing

Unit – VIII

Practice Exercises on Remedial Grammar covering
- Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions,
- Tense and aspect

Vocabulary development covering
- Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

REFERENCES:

1. Strengthen Your English, Bhaskaran & Horsburgh, Oxford University Press
3. Murphy’s English Grammar with CD, Murphy, Cambridge University Press
4. English Skills for Technical Students by Orient Longman
7. A Handbook of English for Engineers & Technologists by Dr. P. Eliah, B. S. Publications.
8. Developing Communication Skills by Krishna Mohan & Meera Benerji (Macmillan)
10. The Oxford Guide to Writing and Speaking, John Seely, Oxford
UNIT – I

UNIT – II
Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type \( e^{ax} \), \( \sin ax \), \( \cos ax \), polynomials in \( x \), \( e^{ax} V(x) \), \( xV(x) \), method of variation of parameters.

UNIT – III
Rolle’s Theorem – Lagrange’s Mean Value Theorem – Cauchy’s mean value Theorem – Generalized Mean Value theorem (all theorems without proof) Functions of several variables – Functional dependence- Jacobian- Maxima and Minima of functions of two variables without constraints

UNIT – IV
Radius, Centre and Circle of Curvature – Evolutes and Envelopes Curve tracing – Cartesian, polar and Parametric curves.

UNIT – V
Applications of integration to lengths, volumes and surface areas in Cartesian and polar coordinates multiple integrals - double and triple integrals – change of variables – change of order of integration.

UNIT – VI
Sequences – series – Convergences and divergence – Ratio test – Comparison test – Integral test – Cauchy’s root test – Raabe’s test – Absolute and conditional convergence

UNIT – VII

UNIT – VIII

TEXT BOOKS:

REFERENCES:
MATHEMATICAL METHODS

UNIT – I

UNIT – II

UNIT – III

UNIT – IV


UNIT – V

UNIT – VI

UNIT – VII

UNIT – VIII

TEXT BOOKS:


REFERENCES:

UNIT I

UNIT II

ACOUSTICS OF BUILDINGS: Basic requirement of acoustically good hall - Reverberation and time of reverberation – Sabine’s formula for reverberation time - Measurement of absorption coefficient of a material - Factors affecting the architectural acoustics and their remedy.

UNIT III

SUPERCONDUCTIVITY: General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization – DC and AC Josephson effect – BCS Theory - Applications of superconductors.

UNIT IV

UNIT V

UNIT VI

UNIT VII


UNIT VIII
TEXT BOOKS:

REFERENCES:
1. Nanotechnology by Mark Ratner and Daniel Ratner, Pearson Education.
2. Introduction to solid state physics by C. Kittel; Wiley Eastern Ltd.
3. Materials Science and Engineering by V. Raghavan; Prentice-Hall India.
4. Engineering Physics by Dr. M. Arumugam; Anuradha Agencies.
UNIT I


UNIT II


UNIT III


UNIT IV

Protective Coatings and their applications:

UNIT V


UNIT VI

Refractories and Insulators: Refractories – Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material; Insulators – Definition and Classification with Examples; Characteristics of Insulating Materials; Thermal Insulators, Electrical Insulators – Their Characteristics and Engineering Applications.

UNIT VII

LUBRICANTS: Principles and function of lubricants - Types of Lubrication and Mechanism – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants – Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralisation Number and Mechanical Strength.

UNIT VIII
**Fuels and Combustion**: Definition and Classification.
4. Combustion – Analysis of Flue Gas by Orsat’s Apparatus ; Problems.

**TEXT BOOKS**:


**REFERENCES**:

UNIT – I


UNIT – II

UNIT – III
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

UNIT – IV
Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Analysis of perfect frames (Analytical Method) – Types of Frames – Assumptions for forces in members of a perfect frame, Method of joints, Method of sections, Force table, Cantilever Trusses, Structures with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

UNIT – VI
Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.
Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VII

UNIT – VIII
Mechanical Vibrations: Definitions, Concepts – Simple Harmonic Motion – Free vibrations, simple and Compound Pendulums and its Applications –

TEXT BOOKS:

REFERENCES:
UNIT - I
Algorithm / pseudo code, flowchart, program development steps, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation.

UNIT – II
Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, programming examples.

UNIT – III
Designing structured programs, Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor, example c programs.

UNIT – IV
Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays. pointers- concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments, c program examples.

UNIT – V
Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bitfields, C program examples.

UNIT – VI
Input and output – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling, C program examples.

UNIT – VII
Introduction to data structures-Stacks and Queues, representing stacks and queues in C using arrays and linked lists.
Implementation of Searching and sorting in C– Linear and binary search methods, sorting – Bubble sort, Quick Sort, merge sort.

UNIT - VIII
Trees- Binary trees, representation, traversals (Recursive) implemented in C, graphs- terminology, representation and basic operations on graphs.

TEXT BOOKS :

REFERENCES :
1. C & Data structures – P. Padmanabham, B.S. Publications,
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
ENGINEERING GRAPHICS

UNIT – I
INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their
Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.
Curves used in Engineering Practice & their Constructions:
a) Conic Sections including the Rectangular Hyperbola – General method only.
b) Cycloid, Epicycloid and Hypocycloid
c) Involute.
d) Helices

UNIT – II
DRAWING OF PROJECTIONS OR VIEWS ORTHOGRAPHIC PROJECTION IN FIRST ANGLE
PROJECTION ONLY: Principles of Orthographic Projections – Conventions – First and Third Angle
Projections, Projections of Points and Lines inclined to both planes, True lengths, traces.

UNIT – III
PROJECTIONS OF PLANES & SOLIDS: Projections of regular Planes, auxiliary planes and Auxiliary
projection inclined to both planes. Projections of Regular Solids inclined to both planes – Auxiliary Views.
Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

UNIT – IV
DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right
Regular Solids – Prisms, Cylinder, Pyramid, Cone and their parts. Interpenetration of Right Regular Solids
– Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT – V
ISOMETRIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views
– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric
Projection of objects having non-isometric lines. Isometric Projection of Spherical Parts.

UNIT – VI
TRANSFORMATION OF PROJECTIONS: Conversion of Isometric Views to Orthographic Views –
Conventions.

UNIT – VII
PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids,
Vanishing Point Methods (General Method only).

UNIT – VIII
Introduction to Computer aided Drafting: Generation of points, lines, curves, polygons, simple solids,
dimensioning.

TEXT BOOK:
1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering graphics with Auto CAD, R.B. Choudary/Anuradha Publishers

REFERENCES:
2. Engineering Drawing, Johle/Tata Macgraw Hill.
ENGINEERING PHYSICS AND FUELS AND LUBRICANTS LAB

(A) ENGINEERING PHYSICS LAB:
Any Ten of the following experiments are to be performed during the Academic year.

SL.No. Name of the Experiment
1. Determination of Refractive Index of the material of a Prism - Spectrometer.
2. Dispensive power of the material of a Prism - Spectrometer.
6. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
7. Melde’s Experiment - Transverse and Longitudinal modes.
8. Time constant of R-C Circuit.
9. L-C-R Circuit.
10. Verification of laws of stretched string - Sonometer.
12. Magnetic field along the axis of a current carrying coil - Stewart and Gee’s method.

(B) FUELS AND LUBRICANTS LAB:
1. Determination of Flash and Fire points of Liquid Fuels / Lubricants: Abels apparatus, Pensky martens apparatus
2. Carbon Residue Test: Solid/Liquid Fuels
5. Grease Penetration Test: Junker Calorimeter.
The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

**Objectives:**
- To make students recognise the sounds of English through Audio-Visual aids and Computer Software.
- To help them overcome their inhibitions and self-consciousness while speaking in English and to build their confidence. *The focus shall be on fluency rather than accuracy.*
- To enable them to speak English correctly with focus on stress and intonation.

**SYLLABUS:**
The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
10. Giving Directions.

**Minimum Requirement:**
The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T.V., a digital stereo-audio & video system and camcorder etc.

**System Requirement (Hardware component):**
*Computer network with Lan with minimum 60 multimedia systems with the following specifications:*

i) 
   - P - IV Processor
   - a) Speed – 2.8 GHZ.
   - b) RAM – 512 MB Minimum
   - c) Hard Disk – 80 GB

ii) Headphones of High quality

iii) Internet connectivity

**Suggested Software:**
- Cambridge Advanced Learners' English Dictionary with CD.
- The Rosetta Stone English Library
- Clarity Pronunciation Power
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd with CD.
- Learning to Speak English - 4 CDs
- Microsoft Encarta with CD
- Murphy's English Grammar, Cambridge with CD

**Books to be procured for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):**

1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
5. A text book of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)
6. English Skills for Technical Students, WBSCTE with British Council, OL.
DISTRIBUTION AND WEIGHTAGE OF MARKS

*English Language Laboratory Practical Paper:*

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.
2007-08
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
KAKINADA

1 Year B.Tech. M.E. T P C

COMPUTER PROGRAMMING LAB

Objectives:
To make the student learn a programming language.
To teach the student to write programs in C solve the problems
To Introduce the student to simple linear and non linear data structures such as lists, stacks, queues, trees and graphs.

Recommended Systems/Software Requirements:

Intel based desktop PC
ANSI C Compiler with Supporting Editors

UNIT- I:
a) Write a C program to find the sum of individual digits of a positive integer.
b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

UNIT- II:
a) Write a C program to calculate the following Sum:
Sum = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^10/10!
b) Write a C program to find the roots of a quadratic equation.

UNIT- III:
a) Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To solve Tower of Hanoi problem.

UNIT- IV:
a) The total distance travelled by vehicle in ‘t’ seconds is given by distance = ut + 1/2at^2 where ‘u’ and ‘a’ are the initial velocity (m/sec.) and acceleration (m/sec^2). Write C program to find the distance travelled at regular intervals of time given the values of ‘u’ and ‘a’. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of ‘u’ and ‘a’.
b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators *,+, % and use Switch Statement)

UNIT- V:
a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices

UNIT- VI:
a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not

UNIT- VII:
a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn’t contain T.
b) Write a C program to count the lines, words and characters in a given text.

UNIT- VIII:
a) Write a C program to generate Pascal’s triangle.
b) Write a C program to construct a pyramid of numbers.

UNIT- IX:
Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:
1+x+x^2+……….+x^n
For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
Print x,n, the sum
Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers without computing the sum. Are any values of x also illegal?. If so, test for them too.

UNIT- X:
a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 1100 is 00100. Write a C program to find the 2's complement of a binary number.
b) Write a C program to convert a Roman numeral to its decimal equivalent.

UNIT- XI:
Write a C program that uses functions to perform the following operations:
   i)Reading a complex number
   ii)Writing a complex number
   iii)Addition of two complex numbers
   iv)Multiplication of two complex numbers
(Note: represent complex number using a structure.)

UNIT- XII:
a) Write a C program which copies one file to another.
b) Write a C program to reverse the first n characters in a file.
   (Note : The file name and n are specified on the command line.)

UNIT- XIII:
Write a C program that uses functions to perform the following operations on singly linked list:
   i)Creation  ii)Insertion  iii)Deletion  iv)Traversal

UNIT- XVI:
Write a C program that uses functions to perform the following operations on doubly linked list:
   i)Creation  ii)Insertion  iii)Deletion  iv)Traversal in both ways

UNIT- XV:
Write C programs that implement stack (its operations) using
   i)Arrays  ii)Pointers

UNIT- XVI:
Write C programs that implement Queue (its operations) using
   i)Arrays  ii)Pointers

UNIT- XVII:
Write a C program that uses Stack operations to perform the following:
   i)Converting infix expression into postfix expression
   ii)Evaluating the postfix expression

UNIT- XVIII:
Write a C program that uses functions to perform the following:
   i)Creating a Binary Tree of integers
   ii)Traversing the above binary tree in preorder, inorder and postorder.

UNIT- XIX:
Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i)Linear search  ii)Binary search

UNIT- XX:
Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
   i)Bubble sort  ii)Quick sort
UNIT- XXI:
Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
i) Insertion sort  ii) Merge sort

UNIT- XXII:
Write C programs to implement the Lagrange interpolation and Newton- Gregory forward interpolation.

UNIT- XXIII:
Write C programs to implement the linear regression and polynomial regression algorithms.

UNIT- XXIV:
Write C programs to implement Trapezoidal and Simpson methods.

Text Books
1. TRADES FOR EXERCISES:
   At least two exercises from each trade:
   1. Carpentry
   2. Fitting
   3. Tin-Smithy and Development of jobs carried out and soldering.
   4. Black Smithy
   5. House-wiring
   6. Foundry
   7. IT Workshop-I: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, Simple diagnostic exercises.
   8. IT workshop-II: Installation of Operating system windows and Linux, simple diagnostic exercises.
   9. Welding

2. TRADES FOR DEMONSTRATION & EXPOSURE:
   1. Plumbing
   2. Machine Shop
   3. Metal Cutting (Water Plasma)

TEXT BOOK:
UNIT – I
CASTING : Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II
Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys.
Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2) (Die, 3) Investment.
Methods of Melting : Crucible melting and cupola operation, steel making processes, special.

UNIT – III
A) Welding : Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding.
B) Cutting of Metals: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.

UNIT – IV

UNIT – V
Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth. Comparison of properties of Cold and Hot worked parts. Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.

UNIT - VI

UNIT- VII
EXTRUSION OF METALS : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion.

UNIT - VIII
Processing of Plastics: Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection modeling)

TEXT BOOKS :
2. Manufacturing Technology / P.N. Rao/TMH

REFERENCES :
1. Production Technology / R.K. Jain
4. Welding Process / Paramar /
5. Production Technology/Sarma P C /
**UNIT-I**

Object oriented thinking :- Need for oop paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

**UNIT-II:-**

Java Basics History of Java, Java buzzwords, datatypes, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

**UNIT-III:-**

Inheritance – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance, Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes.

**UNIT-IV:-**

Packages and interfaces : Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

Exploring packages – Java.io, java.util.

**UNIT-V:-**

Exception handling and multithreading - Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

**UNIT-VI:-**

Event Handling : Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes.

The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grib bag.

**UNIT-VII:-**

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.


**UNIT-VIII:-**

Networking – Basics of network programming, addresses, ports, sockets, simple client server program, multiple clients, Java .net package

Packages – java.util,

**TEXT BOOKS :**

1. Java; the complete reference, 7th edition, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Baud, pearson eduction.
REFERENCES :

2. An Introduction to OOP, second edition, T. Budd, pearson education.
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**ELECTRICAL AND ELECTRONICS ENGINEERING**

**UNIT - I**

**ELECTRICAL CIRCUITS**: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

**UNIT - II**

**DC MACHINES**: Principle of operation of DC Generator – emf equation - types – DC motor types – torque equation – applications – three point starter.

**UNIT - III**

**TRANSFORMERS**: Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

**UNIT - IV**


**UNIT - V**

**INSTRUMENTS**: Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

**UNIT - VI**

**DIODE AND IT’S CHARACTERISTICS**: P-n junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)

**UNIT - VII**

**TRANSISTORS**: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications

**UNIT - VIII**

**CATHODE RAY OSCILLOSCOPE**: Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

**TEXT BOOKS:**

2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.

**REFERENCES:**

UNIT – I

UNIT – II
SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.L, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

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

UNIT – V
ANALYSIS OF PIN-JOINTED PLANE FRAMES: Determination of Forces in members of plane, pinjointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever & simply supported trusses-by method of joints, method of sections & tension coefficient methods.

UNIT – VI
DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

UNIT – VII

UNIT – VIII
Thick cylinders – lame’s equation – cylinders subjected to inside & out side pressures – compound cylinders.

TEXT BOOKS:
2. Solid Mechanics, by Popov

REFERENCES:
4. Strength of Materials by S.Timshenko
UNIT – I

UNIT II

UNIT – III

UNIT IV

UNIT - V

UNIT – VI

UNIT - VII

UNIT VIII

TEXT BOOKS:
1. Engineering Thermodynamics / PK Nag /TMH, III Edition

REFERENCES:
1. Engineering Thermodynamics – Jones & Dugan
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
3. Thermodynamics – J.P.Holman / McGrawHill
4. An introduction to Thermodynamics / YVC Rao / New Age
UNIT – I
Structure of Metals: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

UNIT - II
Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT -III
Equilibrium of Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cus-Sn and Fe-Fe3C.

UNIT -IV
Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron. Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT – V

UNIT - VI

UNIT – VII
Ceramic materials: Crystalline ceramics, glasses, cermaets, abrasive materials, nanomaterials – definition, properties and applications of the above.

UNIT - VIII

TEXT BOOKS:
1. Introduction to Physical Metallurgy / Sidney H. Avener.

REFERENCES:
1. Material Science and Metallurgy/kodgire.
2. Science of Engineering Materials / Agarwal
4. elements of Material science / V. Rahghavan
5. An introduction to materials science / W.g.vinas & HL Mancini
6. Material science & material / C.D.Yesudian & harris Samuel
Section A: Electrical Engineering:
The following experiments are required to be conducted as compulsory experiments:
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
   In addition to the above four experiments, any one of the experiments from the following list is required to be conducted:
5. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method
6. Brake test on D.C Shunt Motor

Section B: Electronics Engineering:
1. Transistor CE Characteristics (Input and Output)
2. Full wave Rectifier with and without filters.
3. CE Amplifiers.
4. RC Phase Shift Oscillator
5. Class A Power Amplifier
6. Micro Processor
2007-08

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
KAKINADA

II Year B.Tech. M.E. I-Sem

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OBJECT ORIENTED PROGRAMMING LAB

Objectives:
To make the student learn a object oriented way of solving problems.
To teach the student to write programs in Java to solve the problems.

Recommended Systems/Software Requirements:
Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and
100 MB free disk space
JDK Kit. Recommended

Week 1
a) Write a Java program that prints all real solutions to the quadratic equation \( ax^2 + bx + c = 0 \). Read
in a, b, c and use the quadratic formula. If the discriminant \( b^2 - 4ac \) is negative, display a message stating
that there are no real solutions.
b) The Fibonacci sequence is defined by the following rule:
The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values
preceding it. Write a Java program that uses both recursive and non
recursive functions to print the nth value in the Fibonacci sequence.

Week 2
a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to
that integer.
b) Write a Java program to multiply two given matrices.
c) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the
integers (Use StringTokenizer class of java.util)

Week 3
a) Write a Java program that checks whether a given string is a palindrome or not.
   Ex: MADAM is a palindrome.
b) Write a Java program for sorting a given list of names in ascending order.
c) Write a Java program to make frequency count of words in a given text.

Week 4
a) Write a Java program that reads a file name from the user, then displays information
   about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the
   length of the file in bytes.
b) Write a Java program that reads a file and displays the file on the screen, with a line
   number before each line.
c) Write a Java program that displays the number of characters, lines and words in a text file.

Week 5
a) Write a Java program that:
   i) Implements stack ADT.
   ii) Converts infix expression into Postfix form
   iii) Evaluates the postfix expression

Week 6
a) Develop an applet that displays a simple message.
b) Develop an applet that receives an integer in one text field, and computes its factorial value and returns it
   in another text field, when the button named “Compute” is clicked.

Week 7
a) Write a Java program that works as a simple calculator. Use a grid layout to arrange
   buttons for the digits and for the +, -, *, % operations. Add a text field to display the
   result.

Week 8
a) Write a Java program for handling mouse events.

Week 9
a) Write a Java program that creates three threads. First thread displays “Good Morning” every one second,
   the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three
   seconds.
b) Write a Java program that correctly implements producer consumer problem using the concept of inter
   thread communication.
Week 10
a) Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the textfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were zero, the program would throw an ArithmeticException Display the exception in a message dialog box.

Week 11
a) Write a Java program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console.
   For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle. (Use java.net)

Week 12
a) Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time. No light is on when the program starts.
b) Write a Java program that allows the user to draw lines, rectangles, and ovals.

Week 13
a) Write a Java program to create an abstract class named Shape that contains an empty method named numberOfSides(). Provide three classes named Trapezoid, Triangle, and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides() that shows the number of sides in the given geometrical figures.
b) Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a Java program to display the table using JTable component.

TEXT BOOKS:
2. Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education
UNIT-I

Probability: Sample space and events – Probability – The axioms of probability – Some Elementary theorems - Conditional probability – Baye’s theorem.

UNIT-II

UNIT-III
Binomial and poison distributions Normal distribution – related properties.

UNIT-IV
Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) proportions, sums and differences.

UNIT-V
Estimation: Point estimation – interval estimation - Bayesian estimation.

UNIT-VI
Test of Hypothesis – Means– Hypothesis concerning one and two means– Type I and Type II errors. One tail, two-tail tests.

UNIT-VII
Tests of significance – Student’s t-test, F-test, \(^2\) test. Estimation of proportions.

UNIT-VIII
Queueing Theory: Pure Birth and Death Process M/M/1 Model and Simple Problems.

Text Books:


References:

**KINEMATICS OF MACHINERY**

**UNIT – I**
**MECHANISMS** : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .


**UNIT - II**

**UNIT – III**
**KINEMATICS** : Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

**Analysis of Mechanisms** : Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

**Plane motion of body** : Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

**UNIT – IV**


**UNIT – V**
**CAMS** : Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

**Analysis of motion of followers** : Roller follower – circular cam with straight, concave and convex flanks.

**UNIT – VI**

Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

**UNIT – VII**
**Belt Rope and Chain Drives** : Introduction, Belt and rope drives, selection of belt drive- types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

**UNIT – VIII**

**TEXT BOOKS** :
REFERENCES:
1. Theory of Machines by Thomas Bevan/CBS
2. Theory of Machines/R.K Bansal
3. Theory of Machines Sadhu Singh Pearson Edn
5. The theory of Machines/Shigley/Oxford.
UNIT – I

UNIT-II

UNIT – III
Combustion in S.I. Engines: Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

UNIT IV

UNIT – V

UNIT – VI
COMPRESSORS – Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

UNIT VII


UNIT-VIII
Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

TEXT BOOKS:
1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES:
2. Engineering fundamentals of IC Engines – Pulkrbek / Pearson /PHI
3. Thermal Engineering / Rudramoorthy - TMH
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
5. I.C. Engines / Heywood /McGrawHill.
7. IC Engines/ Ramalingam/ Sciotech publishers
UNIT I
Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Pirzometer, U-tube and differential manometers.

UNIT II
Fluid kinematics: Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

Fluid dynamics: Surface and body forces –Euler’s and Bernoulli’s equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT III
Closed conduit flow: Reynold’s experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.
Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter (Ref.4)

UNIT IV
Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT V
Hydroelectric power stations: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT VI
Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design- draft tube theory- functions and efficiency.

UNIT VII
Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT VIII
Centrifugal pumps: Classification, working, work done – manometric head- losses and efficiencies-specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:
1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES:
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
Machine Drawing Conventions:
Need for drawing conventions – introduction to IS conventions
a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
d) Title boxes, their size, location and details - common abbreviations & their liberal usage
e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts
Selection of Views, additional views for the following machine elements and parts with every drawing proportions.
a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
b) Keys, cottered joints and knuckle joint.
c) Rivetted joints for plates
d) Shaft coupling, spigot and socket pipe joint.
e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:
Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.
a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.
c) Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

REFERENCES:
UNIT - I
Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

UNIT - II
Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III
Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:
   a. Forest ecosystem
   b. Grassland ecosystem
   c. Desert ecosystem
   d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - IV

UNIT - V
Environmental Pollution: Definition, Cause, effects and control measures of:
   a. Air pollution
   b. Water pollution
   c. Soil pollution
   d. Marine pollution
   e. Noise pollution
   f. Thermal pollution
   g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT - VI
UNIT - VII

UNIT - VIII
**Field work**: Visit to a local area to document environmental assets River/forest/grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/industrial/Agricultural Study of common plants, insects, birds. - Study of simple ecosystems-pond, river, hill slopes, etc.

**TEXT BOOK:**
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE:**
1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BP Publication.
Minimum of 12 Exercises need to be performed

I. METAL CASTING LAB:
1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - Exercise -for strengths, and permeability – 1
3. Moulding Melting and Casting - 1 Exercise

II. WELDING LAB:
1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Plasma welding and Brazing - 2 Exercises
   (Water Plasma Device)

III. MECHANICAL PRESS WORKING:
3. Bending and other operations

IV. PROCESSING OF PLASTICS
1. Injection Moulding
2. Blow Moulding
(A) METALLURGY LAB:
1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

(B) MECHANICS OF SOLIDS LAB:
1. Direct tension test
2. Bending test on
   a) Simple supported
   b) Cantilever beam
3. Torsion test
4. Hardness test
   a) Brinells hardness test
   b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test
Unit I Introduction to Managerial Economics:

Unit II Elasticity of Demand:
Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting).

Unit III Theory of Production and Cost Analysis:
Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Unit IV Introduction to Markets & Pricing Policies:
Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Unit V Business & New Economic Environment:

Unit VI Capital and Capital Budgeting:
Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.
Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit VII Introduction to Financial Accounting:

Unit VIII Financial Analysis through ratios:
Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

REFERENCES:
3. Suma Damodaran, Managerial Economics, Oxford University Press.

**Prerequisites:** Nil

**Objective:** To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

**Codes/Tables:** Present Value Tables need to be permitted into the examinations Hall.

**Question Paper Pattern:** 5 Questions to be answered out of 8 questions.
Each question should not have more than 3 bits.
UNIT – I

UNIT – II
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps.

UNIT – III
Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit – IV

UNIT – V
Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – VI

UNIT – VII
Steering System: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT – VIII
Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.
Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXT BOOKS:
2. Automobile Engineering / William Crouse

REFERENCES:
1. Automotive Engineering / Newton Steeds & Garrett
2. Automotive Mechanics / G.B.S. Narang
3. Automotive Mechanics / Heitner
4. Automotive Engines / Srinivasan
5. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT. LTD.
UNIT – I
PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships. Static and dynamic force analysis of planar mechanisms.

UNIT – II
FRICION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

UNIT – III
Clutches: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

UNIT – IV
TURNING MOMENT DIAGRAM AND FLY WHEELS: Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

UNIT – V

UNIT – VI
BALANCING: Balancing of rotating masses Single and multiple – single and different planes.

UNIT – VII

UNIT – VIII
VIBRATION: Free Vibration of mass attached to vertical spring – oscillation of pendulums, centers of oscillation and suspension. Transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly’s methods, Raleigh’s method. Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems. Simple problems on forced damped vibration Vibration Isolation & Transmissibility

TEXT BOOKS:

REFERENCES:
1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shigley / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
UNIT – I
Kinematic schemes of machine tools – Constructional features of speed gear box and feed gear box.

UNIT – II
Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout.
Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes – tool layout and cam design.

UNIT – III
Shaping slotting and planing machines – Principles of working – Principal parts – specification classification, operations performed. Kinematic scheme of the shaping slotting and planning machines, machining time calculations.

UNIT – IV

UNIT – V

UNIT – VI
Kinematic scheme of grinding machines.

UNIT - VII
Lapping, honing and broaching machines – comparison to grinding – lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations

UNIT - VIII

TEXT BOOKS :

REFERENCES:
2. Workshop Technology – B.S.Raghu Vamshi – Vol II
UNIT – I


UNIT – II

UNIT – III
Riveted and welded joints – Design of joints with initial stresses – eccentric loading

UNIT – IV
Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – locking devices – both of uniform strength, different seals

UNIT – V
KEYS, COTTERS AND KNuckle JOINTS:
Design of Keys-stresses in keys-cotted joints-spigot and socket, sleeve and cotter, jib and cotter joints-Knuckle joints.

UNIT – VI
SHAFTS: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. Use of internal and external circlips, Gaskets and seals (stationary & rotary).

UNIT – VII

UNIT – VIII
Mechanical Springs:

TEXT BOOKS:
3. Design Data hand Book, S MD Jalaludin, AnuRadha Publishers

REFERENCES:
1. Design of Machine Elements / V.M. Faires
UNIT – I
Introduction: Modes and mechanisms of heat transfer – Basic laws of heat transfer – General discussion about applications of heat transfer.

UNIT – II
Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – Initial and boundary conditions.
One Dimensional Steady State Conduction Heat Transfer: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation

UNIT III
One Dimensional Transient Conduction Heat Transfer: Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Concept of Functional Body

UNIT – IV

UNIT – V
Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate - Use of empirical relations for Vertical plates and pipes.

UNIT VI
Condensation: Film wise and drop wise condensation – Nusselt’s Theory of Condensation on a vertical plate - Film condensation on vertical and horizontal cylinders using empirical correlations.

UNIT VII

UNIT VIII

TEXT BOOKS:
1. Heat Transfer / HOLMAN/TMH
REFERENCE BOOKS:
5. Essential Heat Transfer - Christopher A Long / Pearson Education
7. Heat and Mass Transfer-Kondandaraman
FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

*Note*: Any 10 of the above 12 experiments are to be conducted.
III Year B.Tech. M.E.I-Sem  T                  P                  C

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THERMAL ENGINEERING LAB

1. I.C. Engines Valve / Port Timing Diagrams
2. I.C. Engines Performance Test( 4 -Stroke Diesel Engines )
3. I.C. Engines Performance Test on 2-Stroke Petrol
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine and retardation and motoring test on 4- stroke diesel engine
6. I.C. Engines Air/Fuel Ratio and Volumetric Efficiency
7. Performance Test on Variable Compression Ratio Engines, economical speed test.
8. Performance Test on Reciprocating Air – Compressor Unit
9. Study of Boilers
10. Dis-assembly / Assembly of Engines.
UNIT I


UNIT II

Designing Organisational Structures: Basic concepts related to Organisation - Departmentment and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

UNIT III

Plant location, definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach. Plant Layout – definition, objectives, types of production, types of plant layout – various data analyzing forms-travel chart.

UNIT IV

Work study - Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts-difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved-equipment, different methods of performance rating- allowances, standard time calculation. Work Sampling – definition, steps involved, standard time calculations, differences with time study.

UNIT V


UNIT VI

Introduction to PERT / CPM: Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

UNIT VII

Inspection and quality control, types of inspections - Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM-Quality Circles, ISO 9000 series procedures.

UNIT VIII

TEXT BOOKS:

2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.

REFERENCES:

UNIT – I
Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

UNIT – II
Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT – III
Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT – IV
Drafting and Modeling systems: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT – V

UNIT – VI

UNIT – VII
Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with CAD/CAM.

UNIT – VIII
Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOK:
1. CAD / CAM A Zimmer & P. Groover/PE/ PHI
2. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH

REFERENCES:
1. Automation, Production systems & Computer integrated Manufacturing/Groover/P.E
2. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age
3. Principles of Computer Aided Design and Manufacturing / Farid Amirome / Pearson
4. CAD/CAM: Concepts and Applications/Alavala/ PHI
UNIT – I

UNIT – II
LINEAR MEASUREMENT: Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.
MEASUREMENT OF ANGLES AND TAPERS: Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.
LIMIT GAUGES: Taysors principle – Design of go and No go gauges, plug ring, snap, gap, taper, profile and position gauges.

UNIT – III
OPTICAL MEASURING INSTRUMENTS: Tool maker’s microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer.

UNIT – IV
MEASUREMENT THROUGH COMPARATORS: Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.

UNIT-V
SCREW THREAD MEASUREMENT: Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.

UNIT -VI
MACHINE TOOL ALIGNMENT TESTS: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machine tools.. Preparation of acceptance charts.

UNIT -VII
GEAR MEASUREMENT: Gear measuring instruments, Gear tooth profile measurement. Measurement of diameter, pitch pressure angle and tooth thickness.
Coordinate Measuring Machines: Types of CMM, Role of CMM, and Applications of CMM.

UNIT – VIII
SURFACE ENGINEERING: Surface treatment processes and their character tics and applications. (a) Overlay coatings (b) Diffusion coatings (c) Thermal or mechanical modification of Surfaces

TEXT BOOKS:
1. Engineering Metrology / I C Gupta / Danpath Rai

REFERENCES:
1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
4. Surface Engineering with Lasers/ Dehosson J.T.
UNIT – I
Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems – Actual air refrigeration system problems – Refrigeration needs of Air crafts.

UNIT – II

UNIT III
Condensers – classification – Working Principles
Evaporators – classification – Working Principles
Expansion devices – Types – Working Principles

UNIT IV

UNIT V
Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube.

UNIT VI
Introduction to Air Conditioning: Psychometric Properties & Processes – Characterization of Sensible and latent heat loads – Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, GSHF- Problems, Concept of ESHF and ADP.

UNIT VII
Requirements of human comfort and concept of effective temperature- Comfort chart – Comfort Air conditioning – Requirements of Industrial air conditioning, Air conditioning Load Calculations.

UNIT VIII
Air Conditioning systems - Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers.

TEXT BOOKS:
1. Refrigeration and Air Conditioning / CP Arora / TMH.
2. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai

REFERENCES:
1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration - Dossat / Pearson Education.
3. Refrigeration and Air Conditioning-P.L.Bellaney
4. Basic Refrigeration and Air Conditioning – Ananthanarayanan / TMH
UNIT – I

UNIT – II
ENGINE PARTS : Connecting Rod : thrust in connecting rod – stress due to whipping action on connecting rod ends – Cranks and crank shafts, strength and proportions of over hung and center cranks – crank pins, crank shafts.

UNIT – III
Pistons, Forces acting on piston – construction design and proportions of piston., Cylinder, Cylinder liners,

UNIT – IV

UNIT – V
POWER TRANSMISSIONS SYSTEMS, PULLEYS : Transmission of power by belt and rope drives, transmission efficiencies, Belts – Flat and V types – Ropes - pulleys for belt and rope drives, Materials, Chain drives

UNIT – VI

UNIT – VII
Design of power screws : Design of screw, Square ACME, Buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

UNIT – VIII
Machine Tool Elements : Design of beds, slide ways, spindles- material selection, design of strength and rigidity of parts.

TEXT BOOK :

REFERENCES :
1. Design Data hand Book, S MD Jalaludin, Anuradha Publishers
3. Data Books : (i) P.S.G. College of Technology (ii) Mahadevan
UNIT – I

UNIT II

UNIT – III
Steam Nozzles: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

UNIT – IV
Steam Turbines: Classification – Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-Laval Turbine - its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

UNIT V

UNIT VI
Steam Condensers: Requirements of steam condensing plant – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, air pump- cooling water requirement.

UNIT – VII

UNIT – VIII

TEXT BOOKS:
2. Gas Turbines – V.Ganesan /TMH

REFERENCES:
1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
3. Gas Turbines / Cohen, Rogers and Saravanan Muttoo / Addison Wesley – Longman
Section A:
1. Measurement of lengths, heights, diameters by vernier calipers micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height of spur gear.
6. Tool makers microscope and its application.
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by Two wire/ Three wire method or Tool makers microscope.
10. Surface roughness measurement by Taly Surf.

Section B:
1. Introduction of general purpose machines - Lathe, Drilling machine, Milling machine, Shaper, Planing machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
2. Step turning and taper turning on lathe machine.
3. Thread cutting and knurling on - lathe machine.
4. Drilling and Tapping
5. Shaping and Planing
6. Slotting
7. Milling
8. Cylindrical Surface Grinding
9. Grinding of Tool angles.
1. Introduction
The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use ‘good’ English and perform the following:
- Gather ideas and information, to organise ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

2. Objectives:
This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:
The following course content is prescribed for the Advanced Communication Skills Lab:

- Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- Vocabulary building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.
- Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
- Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.
- Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading.

4. Minimum Requirement:
The English Language Lab shall have two parts:
   i) The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
   ii) The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):
Computer network with Lan with minimum 60 multimedia systems with the following specifications:
iv) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB
v) Headphones of High quality

5. Suggested Software:
The software consisting of the prescribed topics elaborated above should be procured and used.
Suggested Software:

- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

The following software from ‘train2success.com’

- Preparing for being Interviewed,
- Positive Thinking,
- Interviewing Skills,
- Telephone Skills,
- Time Management
- Team Building,
- Decision making

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. Books Recommended:

5. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai
8. Books on TOEFL/GRE/GMAT/CAT by Barron’s/cup
9. IELTS series with CDs by Cambridge University Press.
15. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

**Advanced Communication Skills Lab Practicals:**

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.
UNIT – I


UNIT – II


UNIT – III
REPLACEMENT : Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.

UNIT – IV

UNIT – V

UNIT – VI
INVENTORY : Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT – VII

UNIT – VIII
SIMULATION : Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

TEXT BOOK :
1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller & Libermann (TMH).

REFERENCES :
2. Operations Research: Methods & Problems / Maurice Saseini, Arthur Yaspan & Lawrence Friedman
6. O.R/Wayne L.Winston/Thomson Brooks/cole
7. Introduction to O.R /Taha/PHI
UNIT – I
Data base System Applications, data base System VS file System – View of Data – Data Abstraction –
Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database
Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator
– Transaction Management – data base System Structure – Storage Manager – the Query Processor

UNIT – II
History of Data base Systems, Data base design and ER diagrams – Beyond ER Design Entities, Attributes
and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with
the ER Model – Conceptual Design for Large enterprises.

UNIT – III
Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints
– Querying relational data – Logical data base Design – Introduction to Views – Destroying altering Tables and
Views.

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of
Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive
Power of Algebra and calculus.

UNIT – IV
Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated
Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using
Null values – Logical connectivity’s – AND, OR and NOT – Impact on SQL Constructs – Outer Joins –
Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT – V
Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition
– reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition –
Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued
Dependencies – FORTH Normal Form.

UNIT – VI
Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent –
Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

UNIT – VII
Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer
Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT – VIII
Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes
– Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations –
Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) –
B+ Trees: A Dynamic Index Structure.

TEXT BOOKS :

REFERENCES :
2. Fundamentals of Database Systems, Elmasri Navrte Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education
UNIT – I

UNIT – II

UNIT – III
Analysis of Beams : Element stiffness matrix for two node, two degrees of freedom per node beam element.

UNIT – IV
Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions.

UNIT – V
Finite element modelling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements.

UNIT – VI
Two dimensional four nodded isoparametric elements and numerical integration.

UNIT – VII
Steady state heat transfer analysis : one dimensional analysis of a fin and two dimensional analysis of thin plate. Analysis of a uniform shaft subjected to torsion.

UNIT – VIII

TEXT BOOK :
1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu / Prentice – Hall.

REFERENCES :
2. Finite Element Methods/ Alavala/TMH
4. Finite Element Analysis/ C.S.Krishna Murthy
UNIT – I

UNIT – II
Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

UNIT – III

UNIT – IV
MEASUREMENT OF LEVEL: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubler level indicators.
FLOW MEASUREMENT: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer, Laser Doppler Anemometer (LDA).

UNIT – V
MEASUREMENT OF SPEED: Mechanical Tachometers – Electrical tachometers – Stroboscope, Noncontact type of tachometer

UNIT – VI

UNIT – VII
MEASUREMENT OF HUMIDITY: Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter.
MEASUREMENT OF FORCE, TORQUE AND POWER: Elastic force meters, load cells, Torsion meters, Dynamometers.

UNIT – VIII

TEXT BOOKS:
2. Mechanical Measurements / BeckWith, Marangoji.Linehard, PHI /PE

REFERENCES:
1. Measurement systems: Application and design, Doeblin Earnest. O. Adaptation by Manik and Dhanesh/ TMH
2. Instrumentation and Control systems/ S.Bhaskar/ Anuradha Agencies.
3. Experimental Methods for Engineers / Holman.
5. Instrumentation & mech. Measurements by A.K. Tayal,Galgota Publications
6. Instrumentation, measurement & analysis by B.C.Nakra & K.K.Choudhary, TMH
7. Mechanical Measurements /sahani
UNIT – I

UNIT – II

UNIT – III
Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

UNIT – IV
Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – V

UNIT VI
Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

UNIT VII

UNIT VIII
Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading - Processing - Spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCES:
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
UNIT-I
Elementary details in numerical Techniques: Number system and errors, Representation of integers, Fractions, Floating point Arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, Convergence of Sequences.

UNIT – II

UNIT - III

UNIT - IV

UNIT - V
Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme.

UNIT - VI

UNIT - VII
Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation.

UNIT -VIII
Finite Volume Method: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, Upwind interpolation, Linear interpolation and Quadratic interpolation.

TEXT BOOK :
1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers

REFERENCES :
UNIT – I
INTRODUCTION : Definition – Trends - Control Methods: Standalone , PC Based ( Real Time Operating Systems, Graphical User Interface , Simulation ) - Applications: SPM, Robot, CNC, FMS, CIM.

UNIT – II
SIGNAL CONDITIONING : Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , sped channels
Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps –
Software - Digital Signal Processing – Low pass , high pass , notch filtering

UNIT – III

UNIT – IV
ELECTRONIC INTERFACE SUBSYSTEMS : TTL, CMOS interfacing - Sensor interfacing - Actuator interfacing – solenoids , motors isolation schemes- opto coupling, buffer IC’s - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – V
ELECTROMECHANICAL DRIVES : Relays and Solenoids - Stepper Motors - DC brushed motors - DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation - Variable Frequency Drives, Vector Drives - Drive System load calculation.

UNIT – VI

UNIT – VII
PROGRAMMABLE LOGIC CONTROLLERS : Basic Structure - Programming : Ladder diagram -
Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling -
Analog input / output - PLC Selection - Application.

Unit – VIII
S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear ,
Circular - Core functionalities – Home , Record position , Go to Position - Applications : SPM, Robotics.

TEXT BOOKS :
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES :
ADVANCED DATA STRUCTURES AND ALGORITHMS
(ELECTIVE – I)

Unit I:
C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), exception handling.

Unit II:
Function Overloading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.

Unit III:
Algorithms, performance analysis-time complexity and space complexity, O notation, Omega notation and Theta notation, Review of basic data structures - the list ADT, stack ADT, queue ADT, implementation using template classes in C++, sparse matrix representation.

Unit IV:
Dictionaries, linear list representation, skip list representation, operations- insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

Unit V:
Priority Queues – Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion, Application-Heap Sort, External Sorting- Model for external sorting, Multiway merge, Polyphase merge.

Unit VI:
**Search trees (part I):** Binary search trees, definition, ADT, implementation, operations Searching, insertion and deletion, Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations- insertion, deletion and searching.

**Search trees (part II):** Introduction to Red –Black trees and Splay Trees, B-Trees-B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees.

Unit VII:
Divide and Conquer- General method, applications – Binary search, merge sort, quick sort, Strassen’s matrix multiplication Efficient non recursive tree traversal algorithms, Biconnected components. Disjoint set operations, union and find algorithms.

Unit VIII:
**Greedy method and Dynamic programming:** General method (Greedy), Minimum cost spanning trees, Job sequencing with deadlines, General method (Dynamic Programming), Optimal binary search trees, 0/1 knapsack problem, Ordering Matrix Multiplications

**TEXT BOOKS:**

**REFERENCE:**
5. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI/Pearson Education.
UNCONVENTIONAL MACHINING PROCESSES
(ELECTIVE – II)

UNIT – I

UNIT II
Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT – III
Abrasive jet machining, Water jet machining and abrasive water jet machine : Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.

UNIT - IV

UNIT - V

UNIT – VI
Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes – General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT-VII
Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.
Chemical machining-principle- maskants –etchants- applications.

UNIT – VIII
Magnetic abrasive finishing, Abrasive flow finishing, Electrostream drilling, Shaped tube electrolytic machining.

TEXT BOOK :
1. Advanced machining processes/ VK Jain/ Allied publishers.

REFERENCES :
1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.


REFERENCES :
2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
5. Production Control / Moore.
UNIT – I
PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II
SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-III

UNIT-IV
WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

UNIT-V

UNIT-VI
GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-VII
OCEAN ENERGY: OTEC. Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-VIII
DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and joul Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday’s law’s, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:
1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy Sources /G.D. Rai

REFERENCES:
1. Renewable Energy Sources /Tweedell & Weir
2. Solar Energy /Sukhame
7. Renewable Energy Technologies /Ramesh & Kumar /Narosa
UNIT – I
Introduction to the Sources of Energy – Resources and Development of Power in India.

STEAM POWER PLANT: Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.

UNIT II

UNIT – III

UNIT IV

UNIT – V
HYDRO PROJECTS AND PLANT: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT VI
DIRECT ENERGY CONVERSION: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT – VII

UNIT – VIII

TEXT BOOK :
1. A Text Book of Power Plant Engineering / Raipur / Laxmi Publications

REFERENCES :
2. Power plant Engineering/ Ramalingam/ Scitech Publishers
5. An Introduction to Power Plant Technology / G.D. Rai.
UNIX AND SHELL PROGRAMMING
(ELECTIVE-II)

Unit I:
Introduction to Unix:- Architecture of Unix, Features of Unix, Unix Commands – PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip.

Unit II:
Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text processing utilities and backup utilities, detailed commands to be covered are tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, commun, cme, diff, tr, awk, cpio

Unit III:
Introduction to Shells:
Filters:
Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

Unit IV:
Grep:
Operation, grep Family, Searching for File Content.
Sed:
Scripts, Operation, Addresses, commands, Applications, grep and sed.

Unit V:
awk:

Unit VI:
Interactive Korn Shell:

Korn Shell Programming:
Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Unit VII:
Interactive C Shell:

C Shell Programming:
Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Unit VIII:
File Management:
File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

TEXT BOOKS:

REFERENCES:
1. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.
2. Unix programming environment, Kernighan and Pike, PHI / Pearson Education
HEAT TRANSFER LAB

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin
6. Experiment on Transient Heat Conduction
8. Heat transfer in natural convection
9. Parallel and counter flow heat exchanger.
10. Emissivity apparatus.
11. Stefan Boltzman Apparatus.
15. Study of Two – Phase flow.
UNIT – I

UNIT – II
Limits and Fits: Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

UNIT – III
Form and Positional Tolerances: Introduction and indication of the tolerances of from and position on drawings, deformation of runout and total runout and their indication.

UNIT – IV
Surface roughness and its indication: Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.

UNIT – V
Heat treatment and surface treatment symbols used on drawings.

UNIT – VI
Detailed and Part drawings: Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

UNIT – VII
Part drawing using computer aided drafting by CAD software

TEXT BOOKS:
2. machine Drawing with Auto CAD- Pohit and Ghosh, PE

REFERENCE:

(B) INSTRUMENTATION LAB
1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotometer for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.
## 2007-08

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**

**KAKINADA**

<table>
<thead>
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<th>IV Year B.Tech. M.E. II-Sem</th>
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### PRODUCTION PLANNING AND CONTROL

#### UNIT – I
Introduction : Definition – Objectives of production Planning and Control – Functions of production planning and control – Elements of production control – Types of production – Organization of production planning and control department – Internal organization of department.

#### UNIT – II
Forecasting – Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods.

#### UNIT – III
Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q–Systems –

#### UNIT – IV
Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

#### UNIT – V

#### UNIT – VI
Scheduling Policies – Techniques, Standard scheduling methods,

#### UNIT – VII
Line Balancing, Aggregate planning, Chase planning, Expediting, controlling aspects.

#### UNIT – VIII

### TEXT BOOKS :

1. Elements of Production Planning and Control / Samuel Eilon.
2. Modern Production/ operation managements / Baffa & Rakesh Sarin

### REFERENCES :

2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
5. Production Control / Moore.
Objective:
This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Logic application to Systems Engineering is also presented. This subject is very important and useful for doing Project Work.

Unit – I: Introduction to Neural Networks
Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Unit- II: Essentials of Artificial Neural Networks
Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

Unit-III: Single Layer Feed Forward Neural Networks

Unit- IV: Multilayer Feed forward Neural Networks
Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Unit V: Associate Memories

Unit – VI: Classical & Fuzzy Sets
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT VII: Fuzzy Logic System Components
Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT VIII: Applications

Neural network applications: Process identification, control, fault diagnosis.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOK:

REFERENCE BOOKS:
UNIT - I
Study of various parameters: Viscosity, flow of fluids, viscosity and its variation - absolute and kinematic viscosity, temperature variation, viscosity index determination of viscosity, different viscometers used.

UNIT - II
Hydrostatic lubrication: Hydrostatic step bearing, application to pivoted pad thrust bearing and other applications, hydrostatic lifts, hydrostatic squeeze films and its application to journal bearing.

UNIT - III
Hydrodynamic theory of lubrication: Various theories of lubrication, petroff’s equation, Reynolds equation in two dimensions - Effects of side leakage - Reynolds equation in three dimensions, Friction in sliding bearing, hydrodynamic theory applied to journal bearing, minimum oil film thickness, oil whip and whirl anti-friction bearing.

UNIT – IV
Friction and power losses in journal bearings : Calibration of friction loss friction in concentric bearings, bearing modulus, Sommerfield number, heat balance, practical consideration of journal bearing design considerations.

UNIT - V

UNIT - VI
Study of current concepts of boundary friction and dry friction.

UNIT - VII
Types of bearing oil pads: Hydrostatic bearing wick oiled bearings, oil rings, pressure feed bearing, partial bearings - externally pressurized bearings.

UNIT - VIII
Bearing materials: General requirements of bearing materials, types of bearing materials.

TEXT BOOK:
1. Fundamentals of Tribology, Basu, SenGupta and Ahuja/PHI
2. Tribology in Industry: Sushil Kumar Srivatsava, S. Chand &Co.

REFERENCE:
1. Tribology – B.C. Majumdar
UNIT-I

UNIT-II
Silicon Carbide: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles,
Nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano composites,

UNIT-III
Mechanical properties: Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties,

Unit -IV
Electrical properties: Switching glasses with nanoparticles,Electronic conduction with nano particles

Optical properties: Optical properties, special properties and the coloured glasses

UNIT-V
Process of synthesis of nano powders, Electro deposition, Important nano materials

UNIT-VI:
Investigating and manipulating materials in the nanoscale: Electron microscopics, scanning probe microscopics, optical microscopics for nano science and technology, X-ray diffraction.

UNIT-VII
Nanobiology: Interaction between bimolecules and nanoparticle surface, Different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies, Application of nano in biology, nano probes for Analytical Applications-A new Methodology in medical diagnostics and Biotechnology, Current status of nano Biotechnology, Future perspectives of Nanobiology, Nanosensors.

UNIT-VIII
NanoMedicines: Developing of Nanomedicines Nanosystems in use, Protocols for nanodrug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications, Molecular Nanomechanics, Molecular devices, Nanotribology, studying tribology at nanoscale, Nanotribology applications.

TEXT BOOKS:
2. Nano Essentials- T.Pradeep/TMH
UNIT-I

UNIT-II

UNIT-III

UNIT-IV
MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control

UNIT-V
THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

UNIT-VI

UNIT-VII
PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

UNIT-VIII

TEXT BOOKS:

REFERENCES:
PRINCIPLES OF ENTREPRENEURSHIP
(Elective-IV)

Unit I: Introduction to Entrepreneurship
Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur.
The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development, Ethics and Social
responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur.

Unit II: Creating and Starting the Venture
Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and
development process.

Unit III: The Business Plan
Nature and scope of Business plan, Writing Business Plan, Evaluating Business plans, Using and
implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities.

Unit IV: Financing and Managing the new venture
Sources of capital, Record keeping, recruitment, motivating and leading teams, financial controls . Marketing
and sales controls. E-commerce and Entrepreneurship, Internet advertising.

Unit V: New venture Expansion Strategies and Issues
Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus
issues and stock splits.

Unit VI: Institutional support to Entrepreneurship
Role of Directorate of Industries, District Industries, Centres (DICs), Industrial Development Corporation
(IDC), State Financial corporation (SFCs), Small Scale Industries Development Corporations (SSIDCs), Khadi
and village Industries Commission (KVIC), Technical consultancy Organisation (TCO), Small Industries
Service Institute (SISI), National Small Industries Corporation (NSIC), Small Industries Development Bank of
India(SIDBI)

Unit VII: Production and Marketing Management
Thrust of production management, Selection of production Techniques, plant utilization and maintenance,
Designing the work place, Inventory control, material handling and quality control. Marketing functions, market
segmentation, market research and channels of distribution, Sales promotion and product pricing.

Unit VIII
Labour legislation, Salient Provision under Indian Factories Act, Industrial Disputes Act, Employees State
Insurance Act, Workmen’s Compensation Act and payment of Bonus Act.
This course replaces the course offered in earlier years as ‘Entrepreneurship & Management’

Text Books:

REFERENCES:
1. Vasant Desai: Dynamics of Entrepreneurial Development and management, Himalaya Publishing
5. Bolton & Thompson : Entrepreneurs- Talent, Temperament, Technique, Butterworth Heinemann,
management, PHI, 4/e, 2005.
UNIT – I
Introduction Types and strategies of automation, pneumatic and hydraulic components circuits. Automation in machine tools. Mechanical feeding and tool changing and machine tool control transfer the automaton.

UNIT – II
Automated flow lines: Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration.

UNIT – III
Analysis of Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT – IV
Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – V
Automated material handling: Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.

UNIT – VI
Automated storage systems, Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – VII
Adaptive control systems: Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

UNIT – VIII
Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Prototyping.

TEXT BOOK:
1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./PE/PHI

REFERENCES:
2. CAD / CAM / CIM by Radhakrishnan.
3. Automation by W. Buekinsham.
Unit-I
Introduction, Application area of Computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Unit-II
Output primitives: Points and lines, line drawing algorithms, mid-point circle algorithm,
Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm

Unit-III
2-D geometrical transformations: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates

Unit -IV
2-D viewing: The viewing pipe-line, viewing coordinate4 reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm

Unit -V
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curve, Bezier and B-spline surfaces, Basic illumination models, shading algorithms

Unit -VI
3-D geometric transformations: Translation, rotation, scaling, reflection and shear transformation and composite transformations

Unit -VII
Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting

Unit-VIII
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification

Text books:

REFERENCES:
5. Computer Graphics, Steven Harrington, TMH
OPERATING SYSTEM CONCEPTS
(ELECTIVE – IV)

UNIT I:
Computer System and Operating System Overview: Overview of computer operating systems operating systems functions protection and security distributed systems special purpose systems operating systems structures and systems calls operating systems generation

UNIT II:
Process Management – Process concepts threads, scheduling-criteria algorithms, their evaluation, Thread scheduling, case study of Windows

UNIT III:
Concurrency: Process synchronization, the critical- section problem, Peterson’s Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case study of Windows

UNIT IV:
Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table , segmentation, virtual memory, demand paging, page- Replacement, algorithms, case study of Windows

UNIT V:

UNIT VI:
File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.
File System implementation- File system structure, file system implementation, directory implementation, directory implementation, allocation methods, free-space management, efficiency and performance, case study of Windows

UNIT VII:
Mass-storage structure overview of Mass-storage structure, Disk structure, disk attachment disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

UNIT VIII:
Protection and Security: Protection, Goals of Protection, Principles of Protection, Access control The Security problem, program threats, system and network threats cryptography as a security tool,

TEXT BOOKS:

REFERENCES:
2. Operating System A Design Approach-Crowley, TMH.
(A) CAD / CAM LAB :

1. **Drafting**: Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXF AND IGES FILES.


3. a). Determination of deflection and stresses in 2D and 3D trusses and beams.
   b). Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
   c). Determination of stresses in 3D and shell structures (at least one example in each case)
   e). Steady state heat transfer Analysis of plane and Axisymmetric components.

4. a). Development of process sheets for various components based on tooling Machines.
   b). Development of manufacturing and tool management systems.
   c). Study of various post processors used in NC Machines.
   d). Development of NC code for free form and sculptured surfaces using CAM packages.
   f). Quality Control and inspection.

**Any Six Software Packages from the following:**

Use of Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.