### JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Course structure for B.Tech. (Regular) I year (2009-10) for affiliated Engineering Colleges.

**MECHANICAL ENGINEERING (M.E)**  
(Common for Branches: M.E., C.E, Bio-Tech., Aero.E.)

<table>
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<tr>
<th>S.N o</th>
<th>Course code</th>
<th>Subject</th>
<th>Th</th>
<th>Tu/Drg./Lab.</th>
<th>Credits</th>
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<td>9ABS101</td>
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Th = Theory; Tu = Tutorial; Drg = Drawing & Lab = Laboratory:
* Engineering Drawing will have University External Exam.
** The Students attend the Physics lab and Chemistry lab. in alternate week that is 3/2 per week. The end exam shall be conducted separately and average of the two exams will be recorded by the exam section
# The Students attend Engineering and IT work shop as a single lab. every week and the end exam is conducted as a single lab. sharing the Maximum marks and time for one task from Engineering workshop and one from IT workshop. The sum of the marks awarded will be recorded
### B.Tech II - I Semester

<table>
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<tr>
<th>S. No</th>
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*NOTE: In Electrical Engineering and Electronics Engineering two questions from each part should be chosen to answer five questions in the End semester examination.

The Students attend the Electrical Engineering lab and Electronics Engineering lab in alternate week that is 3/2 per week.
The Students attend the Material Science lab and Mechanics of Solids lab in alternate week that is 3/2 per week.
Machine Drawing will be 4 hrs End Exam
# MECHANICAL ENGINEERING (M.E.)

## B.Tech II - II Semester

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Total: 30 credits
# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

## MECHANICAL ENGINEERING (ME) COURSE STRUCTURE

### III B. Tech. – I Semester (ME)

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| contact periods/week | 24 | 6 | 28 |
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<td>3. Mechatronics</td>
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<td>9A03709</td>
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1. INTRODUCTION :

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students’ handbooks.

The teacher should focus on the skills of reading, writing, listening and speaking while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two way communications in place of the one-sided lecture.

The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

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

Listening Skills:
Objectives
1. To enable students to develop their listening skills 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 they can comprehend the speech of people of different backgrounds and dialects.

*Students should be given practice in listening and identifying the sounds of English language and to mark stress, right intonation in connected speech.*

- 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 ability to speak fluent 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
- Just A Minute (JAM) Sessions.

(Using exercises from all units of the prescribed text)

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

The students shall be trained in reading skills using the prescribed text for detailed study. They shall 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 articles from magazines/newspapers

Writing Skills:
Objectives
1. To develop an awareness in the students the skill to write exact and formal writing
2. To equip them with the components of different forms of writing.
   • 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 are prescribed and divided into Eight Units:

For Detailed study: ENJOYING EVERYDAY ENGLISH,
Sangam Books (India) Pvt Ltd, Hyderabad, 2009
For Non-detailed study: INSPIRING LIVES,
Maruti Publications, Guntur, 2009

Unit -I
a. Heaven’s Gate from ENJOYING EVERYDAY ENGLISH
b. Mokshagundam Visvesaraya from INSPIRING LIVES
2009-10

Unit -II
a. Sir C.V. Raman from ENJOYING EVERYDAY ENGLISH
b. Mother Teresa from INSPIRING LIVES

Unit -III
a. The Connoisseur from ENJOYING EVERYDAY ENGLISH
b. Dr. Amartya Kumar Sen from INSPIRING LIVES

Unit -IV
a. The Cuddalore Experience from ENJOYING EVERYDAY ENGLISH
b. Gertrude Elion from INSPIRING LIVES

Unit -V
a. Bubbling Well Road from ENJOYING EVERYDAY ENGLISH
b. Vishwanathan Anand from INSPIRING LIVES

Unit -VI
a. Odds Against Us from ENJOYING EVERYDAY ENGLISH
b. Charlie Chaplin from INSPIRING LIVES

Unit – VII
Exercises on
Reading and Writing Skills
Reading Comprehension
Letter writing
Report writing

Unit – VIII
Exercises on Remedial Grammar covering Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses Vocabulary development covering Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

Evaluation: The question paper shall contain two parts, Part A containing questions from Units I- VI and Part B containing questions from units VII & VIII. The student is required to answer five full questions choosing at least one from Part B.
REFERENCES:
1. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009


UNIT III - PRINCIPLES OF QUANTUM MECHANICS & ELECTRON THEORY: Waves and Particles - de-Broglie’s hypothesis – Heisenberg’s uncertainty principle - Schroedinger’s one dimensional wave equation (Time Independent) - Particle in a one dimensional potential box – Energy levels - Fermi-Dirac distribution and effect of Temperature (qualitative treatment only) – Scattering - Source of electrical resistance - Kronig-Penney model (qualitative treatment only) - energy bands – metals, semi conductors & insulators.


DIELECTRIC PROPERTIES: Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizations (qualitative treatment only) - Local field - Clausius-Mossotti equation –Frequency dependence of polarisability (qualitative treatment only) – Ferro electricity- BaTiO₃.

UNIT VI- SUPERCONDUCTIVITY: General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization – Josephson effects – BCS theory - Applications of superconductors.


TEXT BOOKS:
1. Engineering Physics by P.K.Palanisamy, Scitech Publications
REFERENCES:
1. Physics Volume 2, by Halliday, Resnick and Krane; John Wiley India
2. Solid State Physics by C.Kittel, Wiley India
3. Engineering Physics by Mittal, I.K.International
B.Tech. I Year (M.E.)  

(9ABS103) ENGINEERING CHEMISTRY


UNIT IV: Chemistry of nano materials: Nano materials definition, properties and applications; Explosives and Propellants: Explosives, Classification, precautions during storage, blasting fuses, important explosives. Rocket propellants, classification of propellants. Lubricants: Principles and function of lubricants - Classification and properties of lubricants – Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralisation Number and Mechanical Strength.


UNIT VI: Phase rule: Definition, Terms involved in Phase Rule and Phase rule equation. Phase diagrams – one component system (water system), two component system (lead- silver system) Eutectics, heat treatment based on iron-carbon phase diagram, hardening, annealing.


TEXT BOOKS:

1. Engineering Chemistry  Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, McGraw Hill Higher Education Hyd., 2009

REFERENCES:

2. Fuel Cells principles and applications by B.Viswanath, M.Aulice Scibioh-Universities press
4. Physical Chemistry - Glasston & Lewis.
UNIT I– Differential equations of first order and first degree – Exact, linear and Bernoulli equations. Applications: to Newton’s law of cooling, law of natural growth and decay, orthogonal trajectories.

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 – (excluding proof). Simple examples of Taylor’s and Maclaurin’s Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

UNIT IV– Radius of Curvature – Curve tracing – Cartesian, polar and parametric curves. Applications of integration to lengths, volume and surface area of solids of revolution in Cartesian and polar coordinates

UNIT V– Multiple integral: – Double and triple integrals – Change of Variables – Change of order of integration.

UNIT VII– Differentiation and integration of Laplace transform – Application of Laplace transforms to ordinary differential equations of first and second order.


TEXT BOOKS:


REFERENCES:


Unit II - Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements, Nested for Loops, Other Related Statements - break, continue, goto.

Unit III - Functions - Library Functions, Top-Down Design and Structure Charts, Functions with and without Arguments, Communications Among Functions, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands. Arrays - Declaring and Referencing Arrays, Array Subscripts, Using For Loops for Sequential Access, Using Array Elements as Function Arguments, Arrays Arguments, Multidimensional Arrays.


Unit V - Structure and Union - Introduction, Features of Structures, Declaration and Initialization of Structures, Structure within Structure,
Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

**Unit VI-** Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, _Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

**Unit VII-** Data Structures - Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operation on a Stack, Implementation of a Stack, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.

Linked List - Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

**Unit VIII-** Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort. Searching- Linear and Binary Search Methods.

**TEXT BOOKS :**

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education

**REFERENCES :**

3. C and Data Structures, a snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand
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:
a) Conic Sections including the Rectangular Hyperbola – General method only.
b) Cycloid, Epicycloids and Hypocycloid
c) Involutes.
d) Helices

UNIT II– PROJECTION OF POINTS AND LINES: Principles of Orthographic Projection – Conventions – First and Third Angle Projections. Projections of Points, Lines inclined to one or both planes, Problems on projections, Finding True lengths & traces only.

UNIT III– PROJECTIONS OF PLANES: Projections of regular Plane surfaces/figures, Projection of lines and planes using auxiliary planes.

UNIT IV– PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to one or both planes – Auxiliary Views.


Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectional parts.
UNIT VI– ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS:

Conversion of Isometric projections/views to Orthographic Views – Conventions.

UNIT VII– INTERPENETRATION OF RIGHT REGULAR SOLIDS: Projections of curves of Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.


TEXT BOOKS:
1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

REFERENCES:
1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Guptha, J.K. Publishers
JAWAHARLAL NEHRU  
TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year (M.E.)

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(9A01101) ENGINEERING MECHANICS

UNIT I– BASIC CONCEPTS - System of forces– Moment of forces and its Application – Couples and Resultant of Force System


UNIT II– ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, Tension Coefficient method and methods of sections for vertical loads, horizontal loads and inclined loads.


UNIT IV– CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Centre of Gravity of Composite figures. (Simple problems only).

UNIT V– AREA MOMENT OF INERTIA - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses.( Simple problems only)


TEXT BOOKS:

3. Engineering Mechanics, Bhavikatti and Rajasekharappa

REFERENCES:

2. Mechanics of Materials by Timoshenko & Gere, CBS
C PROGRAMMING AND DATA STRUCTURES

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

Recommended Systems/Software Requirements:
- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise 1.
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.

Exercise 2.
a) Write a C program to calculate the following Sum:
   \[ \text{Sum} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \frac{x^{10}}{10!} \]
b) Write a C program to find the roots of a quadratic equation.

Exercise 3
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 Towers of Hanoi problem.

Exercise 4
a) The total distance travelled by vehicle in ‘t’ seconds is given by distance \( S = ut + \frac{1}{2}at^2 \) where ‘u’ and ‘a’ are the initial velocity (m/sec.) and acceleration (m/sec^2) respectively. 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 from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

Exercise 5
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

Exercise 6
a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to a 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

Exercise 7
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.

Exercise 8
a) Write a C program to generate Pascal’s triangle.
b) Write a C program to construct a pyramid of numbers.

Exercise 9
Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression:
\[ 1 + x + x^2 + x^3 + \ldots + x^n \]
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 of without computing the sum. Find if any values of x are also illegal? If so, test for them too.

Exercise 10
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 11100 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.

Exercise 11
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.)
Exercise 12
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.)

Exercise 13
a) Write a C programme to display the contents of a file.
b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Exercise 14
Write a C program that uses functions to perform the following operations on singly linked list:
   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

Exercise 15
Write C programs that implement stack (its operations) using
   i) Arrays   ii) Pointers

Exercise 16
Write C programs that implement Queue (its operations) using
   i) Arrays   ii) Pointers

Exercise 17
Write a C program that uses Stack operations to perform the following:
   i) Converting infix expression into postfix expression
   ii) Evaluating the postfix expression

Exercise 18
Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort   ii) Selection sort

Exercise 19
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
Exercise 20
Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

Exercise 21
Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

Exercise 22
Write C programs to implement the Lagrange interpolation and Newton-Gregory forward interpolation.

Exercise 23
Write C programs to implement the linear regression and polynomial regression algorithms.

Exercise 24
Write C programs to implement Trapezoidal and Simpson methods.

REFERENCE BOOKS
1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
ENGINEERING WORKSHOP

Objectives: The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:
   a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
   b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
   c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
   d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
   e. Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
   f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint
2. TRADES FOR DEMONSTRATION:
   a. Plumbing
   b. Machine Shop
   c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

REFERENCE BOOKS:

I.T. WORKSHOP

Objectives:
The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. The students should work on a working PC (PIV or higher) to disassemble and assemble back to working condition and install
Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible. **Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

**Productivity tools** module would enable the students in crafting professional word documents, excel spreadsheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. (It is recommended to use Microsoft office 2007 in place of MS Office 2003)

**PC Hardware**

**Exercise 1 – Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Exercise 2 – Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.

**Exercise 3 – Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Exercise 4 – Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

**Exercise 5 – Task 5: Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective
peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

**Exercise 6 – Task 6: Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

**OFFICE TOOLS**

**LaTeX and Word**

**Exercise 7 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each. Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 1 : Using LaTeX and Word** to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Excel**

**Exercise 8 - Excel Orientation:** The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text
LaTeX and MS/equivalent (FOSS) tool Power Point

Exercise 9 - Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it’s asked).

Exercise 10 - Task 2: Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Internet & World Wide Web
2 Exercises

Exercise 11 - Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

Exercise 12 - Task 2: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.
REFERENCES:
1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion – Leslie Lamport, PHI/Pearson.
3. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4. Upgrading and Repairing, PC’s 18th e, Scott Muller QUE, Pearson Education
5. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
ENGINEERING PHYSICS LAB

Any TEN of the following experiments are to be performed during the Academic year.

Sl.No.  Name of the Experiment

2. Dispersive power of the prism – Spectrometer.
4. Determination of particle size by using a laser source.
5. Determination of thickness of a thin wire using parallel fringes.
7. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s method.
8. Numerical aperture of an optical fiber.
9. Hall effect.
11. Energy gap of a material of p-n junction
12. Determination of rigidity modulus of a wire material – Torsional pendulum
13. Determination of dielectric constant.
15. Melde’s experiment – Transverse & Longitudinal modes.
Equipment required:

Spectrometer, Grating, Prism, Mercury vapour lamp, Sodium vapour lamp, Travelling Microscope, Wedge arrangement, Newton rings setup, Stewart-Gee’s apparatus, He-Ne laser source, Optical fiber, Hall effect kit, B-H loop kit, Energy gap kit (four probe method), Torsional pendulum, Dielectric constant kit, Sonometer, Melde’s apparatus

ENGINEERING CHEMISTRY LAB

2. Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry.
4. Preparation of Standard EDTA and Estimation of Copper
5. Determination of Manganese in Steel and Iron in Cement.
6. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide solution by Conductometric titration
7. Determination of viscosity of the oils through Redwood viscometer
8. Determination of calorific value of fuel using Bomb calorimeter
9. Estimation of dissolved oxygen
10. Determination of Eutectic Temperature of binary system (Urea – Benzoic Acid)

BOOKS:

1. Chemistry-lab manual by Dr K.N.Jayaveera and K.B. Chandra Sekhar, S.M. Enterprizes Ltd.
Equipment Required:
1. Glass ware: Pipettes, Burettes, Volumetric Flasks, Beakers, Standard flasks, Measuring jars, Boiling Test tubes, reagent bottles, (Borosil)
2. Analytical balance (keroy) (15 Nos)
3. Calorimeter
4. Bomb Calorimeter
5. Redwood viscometer No.1 & No.2
6. Conductometer/ Conductivity bridge
7. Wash bottles, test tube stands, burette stands
8. Gas cylinders with Bunsen burners
9. Chemicals: Hydrochloric acid, sodiumhydroxide, EDTA, EBT indicator, fast sulfon black-f, urea, benzoic acid, methanol, Mohr’s salt, copper sulphate, magnesium sulphate, ammonia, ammonium sulphate, calcium sulphate etc.,
The Language Lab focuses on the production and practice of sounds of language and equips students with the use of English in everyday situations and contexts.

Objectives:
1. To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
2. To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm
4. To initiate them into greater use of the computer in resume preparation, report-writing, format-making etc.
5. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, GMAT etc.

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 (giving directions etc.)
4. Speaking on the mobiles and telephone conversation
5. Role Play.
7. ‘Just A Minute’ Sessions (JAM).
8. Describing Objects / Situations / People.
9. Information Transfer
10. Debate

**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

**PRESCRIBED SOFTWARE:** GLOBARENA

**Suggested Software:**
- Cambridge Advanced Learners’ English Dictionary with CD.
- The Rosetta Stone English Library
- Clarity Pronunciation Power – Part I
- 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
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
Books Suggested 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):

3. **Speaking English Effectively**, Krishna Mohan & NP Singh (Macmillan)
8. **DELTA’s key to the Next Generation TOEFL Test**, 6 audio CDS, New Age International Publishers, 2007
UNIT – I

UNIT – II
Symmetric, skew – Symmetric, Orthogonal, Hermitian, Skew Hermitian and unitary matrices and their properties - Quadratic forms – Reduction of quadratic forms to canonical form and their nature.

UNIT – III

UNIT – IV

UNIT – V
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace’s equation under initial and boundary conditions.
UNIT – VI

**Interpolation:** Introduction – Newton’s forward and backward interpolation formulae – Lagrange’s Interpolation formula.

UNIT – VII

UNIT – VIII

TEXT BOOKS:

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
TORSION OF CIRCULAR SHAFTS- Theory of pure torsion- Derivation of torsion equations; \( T/J=q/r=N_0/l \) – Assumptions made in the theory of pure torsion- torsional moment of resistance- polar section modulus.

SPRINGS- Introduction- types of Springs – deflection of closed and open coil helical springs under axial pull and axial couple – Springs in series and parallel- carriage or leaf springs

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 & outside pressures – compound cylinders.

TEXT BOOKS :
2. Solid Mechanics, by Popov

REFERENCES :
4. Strength of Materials by S.Timshenko
PART-A-ELECTRICAL 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

UNIT - III
TRANSFORMERS : Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

UNIT - IV

TEXT BOOKS:
REFERENCES:

PART-B-ELECTRONICS ENGINEERING

UNIT-V
DIODE AND ITS CHARACTERISTICS:
PN Junction diode, Symbol, V-I characteristics, Diode Applications, Rectifiers-Half Wave, Full Wave and Bridge Rectifiers (Simple Problems).

UNIT-VI
TRANSISTORS

UNIT-VII
INDUCTION HEATING: Theory of Induction Heating, Application in Industries.
ULTASONICS: Generation, Flow Detection and Other Applications.

UNIT-VIII
CATHODE RAY OSCILLOSCOPE
TEXT BOOKS:
2. Industrial Electronics by G.K. Mittal- PHI.

REFERENCES:

Note: In Electrical Engineering ad Electronics Engineering minimum of two questions form each part should be chosen for answering five questions in the end Semester Examination.
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

UNIT -IV
Cast Irons and Steels : Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal 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, cermets.

UNIT - VIII

TEXT BOOKS :
1. Introduction to Physical Metallurgy, Sidney H. Avener.
2. Essential of Materials Science and Engineering, Donald R. Askeland, Thomson.

REFERENCES :
1. Material Science and Metallurgy, kodgire.
4. Elements of Material science, V. Rahghavan
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B.Tech. II-I Sem (M.E)  T  P  C
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(9A03302) THERMODYNAMICS

UNIT – I

UNIT II

UNIT – III

UNIT IV
Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron

UNIT - V

UNIT – VI

UNIT - VII

UNIT - VIII
TEXT BOOKS:
1. Engineering Thermodynamics, PK Nag, TMH, III Edition
2. Basic Engineering Thermodynamics, A. Venkatesh, Orient Longman

REFERENCES:
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles, TMH
3. Thermodynamics – J.P.Holman, McGrawHill
4. An introduction to Thermodynamics, YVC Rao, New Age
5. Engineering Thermodynamics – Jones & Dugan
I. 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.

II. 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.

III. 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:
Machine Drawing – Dhawan, S.Chand Publications

REFERENCES:
Machine Drawing – Luzzader
Machine Drawing – Rajput

Note: The End exam will be for 4 hrs in the following format.

All questions are to be answered

Q1 – Questions set on section I & II of the syllabus 2 out of 3 or 2 out of 4 to be answered with a weightage of 4 marks each – 08 marks

Q2– Questions set on Section II of the syllabus 2 out of 3 to be answered with a weightage of 10 marks each – 20 marks

Q3 – Drawing of assembled views of Section III items of Syllabus with a weightage of 42 marks

Note: All answers should be on the drawing sheet only. Answers on the drawing sheet only will valued.
PART - A: Electrical Engineering Lab:
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.
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

PART - B: Electronics Engineering Lab:
2. V - I characteristics of PN junction Diode.
3. Full wave rectifier with and without capacitive filter.
4. Input and output characteristics of Common Emitter (CE) configuration.
5. Frequency response of a single stage CE amplifier.
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(9A03304) MATERIAL SCIENCE LAB AND
MECHANICS OF SOLIDS LAB

(A) MATERIAL SCIENCE LAB:
Preparation and study of the Micro Structure of pure metals like
Iron, Cu and Al.
Preparation and study of the Microstructure of Mild steels, low
carbon steels, high – C steels.
Study of the Micro Structures of Cast Irons.
Study of the Micro Structures of Non-Ferrous alloys.
Study of the Micro structures of Heat treated steels.
Hardeneability of steels by Jominy End Quench Test.
To find out the hardness of various treated and untreated steels.

(B) MECHANICS OF SOLIDS LAB:
Direct tension test been
Bending test on
  a) Simple supported beam
  b) Cantilever beam
Torsion test
Hardness test
  Brinells hardness test
  Rockwell hardness test
Test on springs
Compression test on cube
Impact test
Punch shear test

Note: Internal and End examinations evaluation will be done separately
and the average will recorded.
UNIT – I

UNIT – II

UNIT – III
Binomial and poison distributions Normal distribution – Related properties.

UNIT – IV
Sampling distribution: Populations and samples – Sampling distribution 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, $\Psi^2$ test, Estimation of proportions.

UNIT – VIII
Queuing Theory: Pure Birth and Death process, M/M/1 model and simple problems.

TEXT BOOKS:

REFERENCES:
3. Introduction to Probability, Charles M. Grinstead, J. Laurie Snell, University Press.
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:

UNIT – III
ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological sucession – 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
Biodiversity and its Conservation: Introduction 0

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 – river, hill slopes, etc..

TEXT BOOKS:
2. Environmental Studies by R.Rajagopalan, Oxford University Press.

REFERENCES:
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.
5. Environmental Studies by Anindita Basak – Pearson Education.
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**


**HOOKE’S JOINT**: Single and double Hooke’s joint – Universal coupling – application – problems.

**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**

Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. 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
4. Mechanism and Machine Theory, JS Rao and RV Dukkipati, New Age
5. The theory of Machines, Shieglely, 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
**Rotary (Positive displacement type)** : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.


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 – Pulkrabek, Pearson, PHI
3. Thermal Engineering, Rudramoorthy - TMH
4. Thermodynamics & Heat Engines, B. Yadav, Central Book Depot., Allahabad
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—Piezometer, 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 – manomeric 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.
UNIT – I
CASTING: Steps involved in making a casting – Types of patterns -
Patterns and Pattern making — 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.

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
Inert Gas welding, TIG & MIG welding, Friction welding, Induction
welding, Explosive welding, Laser welding, Soldering & Brazing. Heat
affected zones in welding; welding defects – causes and remedies –
destructive nondestructive testing of welds.
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, plastic blow and injection moulding.

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
Thermal: - Electro discharge machining. Laser beam machining, Electro beam machining.
Chemical: - Chemical and Electro chemical machining.
Hybrid: - Laser assisted Machining.
Rapid manufacturing: - Introduction – concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process
2009-10

TEXT BOOKS:
1. Manufacturing Technology, P.N. Rao, TMH

REFERENCES:
1. Production Technology, R.K. Jain
2. Process and materials of manufacturing – Lindberg, PE
4. Welding Process, Parmar
(9A01407) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Impact of jets on Vanes.
Performance Test on Pelton Wheel.
Performance Test on Francis Turbine.
Performance Test on Kaplan Turbine.
Performance Test on Single Stage Centrifugal Pump.
Performance Test on Multi Stage Centrifugal Pump.
Performance Test on Reciprocating Pump.
Calibration of Venturimeter.
Calibration of Orifice meter.
Determination of friction factor for a given pipe line.
Determination of loss of head due to sudden contraction in a pipeline.
Turbine flow meter.

Note: Any 10 of the above 12 experiments are to be conducted.
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
UNIT I: INTRODUCTION TO MANAGERIAL ECONOMICS
Definition, nature and scope of managerial economics - relation with other disciplines - Demand Analysis: Demand Determinants, Law of Demand and its exceptions

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 AND PRICING POLICIES
Market structures: Types of competition, features of perfect competition, monopoly- monopolistic competition. Price-Output determination under perfect competition and monopoly - Methods of Pricing-cost plus pricing, marginal cost, limit pricing, skimming pricing, bundling pricing, sealed bid pricing and peak load pricing.

UNIT V: BUSINESS ORGANISATIONS AND NEW ECONOMIC ENVIRONMENT
Characteristic features of business, features and evaluation of sole proprietorship, partnership, Joint Stock Company, public enterprises and their types, changing business environment in post-liberalization scenario.

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 proposal, 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 financial statements through Liquidity Ratios (Current 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 Ratios and EPS), Du Pont Chart.

**TEXT BOOKS:**

**REFERENCES**
5. H.L. Ahuja: Managerial Economics, S.Chand, 3/e, 2009
UNIT – I
**Basic Concepts:** Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration – reheating- combined- cycles.

UNIT II
**Boilers:** Classification based on Working principles & Pressures of operation -L.P & H.P.Boilers – Mountings and Accessories – Boiler horse power, equivalent evaporation, efficiency and heat balance – **Draught:** classification – Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught, induced and forced draught.

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 for design of nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line –Shock at the exit.

UNIT – IV
**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. Governing of impulse turbine.

UNIT V

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

UNIT – VII

UNIT – VIII
TEXT BOOKS:
2. Basic and Applied Thermodynamics / P.K. Nag/TMH

REFERENCES:
1. Gas Turbines – V.Ganesan /TMH
2. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot

Question Paper Pattern: 5 questions to be answered out of 8 questions
Each question should not have more than 3 bits
2009-10

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B.Tech. III-I Sem (M.E)  
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(9A03502) DYNAMICS OF MACHINERY

UNIT – I
PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT – II
FRICITION: 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

UNIT-V
GOVERNORS: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with
auxiliary springs. Sensitiveness, isochronism and hunting – effort and power of a governor.

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 method, 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. Dynamics of Machinery/Balleney/Dhanpat Rai
3. Theory of Machines / Thomas Bevan / CBS Publishers
UNIT – I

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 Planning machines – their Principles of working – Principal parts – specification, classification, Operations performed. Kinematic scheme of the shaping slotting and planning machines, machining time calculations.

UNIT – IV
Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig
Boring machine. Deep hole drilling machine. Kinematics scheme of the drilling and boring machines

UNIT – V

UNIT –VI

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

UNIT - VIII

TEXT BOOKS :
2. Workshop Technology – B.S.Raghu Vamshi – Vol II

REFERENCES:
2. Manufacturing Technology-Kalpakzian- Pearson
UNIT – I

INTRODUCTION: General considerations of design, design process. Selection of Engineering Materials - properties – Manufacturing considerations in the design. BIS codes of materials. Preferred numbers.

UNIT – II


UNIT – III


UNIT – IV

RIVETED JOINTS: Types of riveted joints, design of riveted joints. Boiler shell riveting, eccentric loading.

UNIT – V

BOLTED JOINTS – Forms of Screw threads. Stresses in Screw fasteners. Design of bolts with pre-stresses – Design of joints under eccentric loading – Bolts of uniform strength.
UNIT – VI
COTTERS AND KNUCKLE JOINTS: Design of Cotter joints: spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

UNIT – VII
SHAFTS: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code.

UNIT – VIII
KEYS AND COUPLINGS: Design of Rigid couplings: Muff, Split muff and Flange couplings-Flexible couplings.

TEXT BOOKS:
1. Machine design / Schaum Series.

REFERENCES:
1. Machine design- J.E.Shigley

NOTE: Design data books are not permitted in the examinations. The design must not only satisfy strength criteria but also rigidity criteria.

Question Paper Pattern: 5 questions to be answered out of 8 questions
Each question should not have more than 3 bits.
UNIT – I
Introduction: Modes and mechanisms of heat transfer – Basic laws of heat transfer – General applications of heat transfer.

UNIT – II
Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – boundary and Initial conditions.

UNIT III

UNIT IV
Convective Heat Transfer: Dimensional analysis – Buckingham $\pi$ Theorem and its application for developing semi – empirical non-dimensional correlations for convective heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

UNIT – V
Forced convection: External Flows: Concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer for flow over-Flat plates, Cylinders and spheres..


Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for convective heat transfer on plates and cylinders in horizontal and vertical orientation.

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
Heat Exchangers:
Classification of heat exchangers – overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods.

UNIT VIII
Radiation Heat Transfer

TEXT BOOKS:

REFERENCE BOOKS:
2. Heat Transfer / Holman .J.P/TMH
5. Heat and Mass Transfer-Kondandaraman

NOTE: Thermal Engineering data books are permitted in the examinations.
Question Paper Pattern: 5 questions to be answered out of 8 questions
   Each question should not have more than 3 bits.
(9A03506) HEAT TRANSFER LAB

1. Thermal conductivity of insulating powder material through Concentric Sphere apparatus.
2. Thermal conductivity of insulating material through lagged pipe apparatus.
3. Overall heat transfer co-efficient through Composite Slab Apparatus.
4. Thermal Conductivity of metal (conductor).
5. Heat transfer in pin-fin.
6. Experiment on Transient Heat Conduction.
9. Experiment on Parallel and counter flow heat exchanger.
10. Emissivity of a gray body through Emissivity apparatus.
11. Experiment on Stefan Boltzman Apparatus.
15. Study of Two – Phase flow.

NOTE: Thermal Engineering data books are permitted in the examinations.
1. Valve / Port Timing Diagrams of an I.C. Engines
2. Performance Test on a 4 -Stroke Diesel Engines
3. Performance Test on 2-Stroke Petrol engine
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Engine
5. Retardation and motoring test on 4- stroke engine
8. Performance Test on Variable Compression Ratio Engines, economical speed test.
9. Performance Test on Reciprocating Air – Compressor Unit
9. Study of Boilers
10. Dismantling / Assembly of Engines to identify the parts and their position in an engine.
(9A03601) INDUSTRIAL MANAGEMENT

UNIT I

UNIT II
Designing Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralisation, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less 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 micro-motion and memo-motion 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 - Applications.

UNIT V

UNIT VI
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 - critical path calculation - crashing of simple of networks.

UNIT VII

UNIT VIII
HUMAN RESOURCE MANAGEMENT- Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.- difference with job evaluation,
different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs selling, marketing mix, product life cycle.

**TEXT BOOKS:**

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

**REFERENCES:**

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B.Tech. III-II Sem (M.E)  

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(9A03602) CAD / CAM

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 & Drafting: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, Geometric commands, layers, display control commands, editing, dimensioning.

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

UNIT – IV

UNIT – V
Group Tech: Part family, coding and classification, production flow analysis, advantages and limitations.
Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT – VI
Types of manufacturing systems: FMS, Material handling systems, computer control systems, JIT, Human labor in manufacturing systems.

UNIT – VII
Computer integrated production planning: Capacity planning, shop floor control, MRP-I, MRP-II, CIMS benefits.

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

TEXT BOOKS:
1. CAD / CAM, A Zimmers & P.Groover/PE/PHI
2. CAD / CAM – Principles and applications / P.N. Rao/TMH

REFERENCES:
1. Automation, Production systems & Computer integrated Manufacturing, Groover, P.E
2. CAD / CAM / CIM, Radhakrishnan and Subramanian, New Age
4. CAD/CAM Theory and Practice, R. Sivasubramaniam, TMH
5. Computer aided design and manufacturing, Lalit Narayan / PHI.
6. Computer aided manufacturing, T.C. Chang / Pearson

**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
LINEAR MEASUREMENT: Length standard, line, end & wavelength standards, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.
MEASUREMENT OF ANGLES AND TAPERS: Different methods – Bevel protractor – angle gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.

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

UNIT – IV
SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness- Numerical assessment of surface finish – CLA, R.M.S Values – $R_a$, $R_z$ values, Methods of measurement of surface finish-profilograph, Talysurf, BIS symbols for indication of surface finish.

MEASUREMENT THROUGH COMPARATORS: Comparators – Mechanical, Optical, Electrical, Electronic, Pneumatic comparators and their uses.

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

UNIT -VI

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 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, Mahajan, Dhanpat Rai

REFERENCES:
1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology, Connie Dotson, 4e, Thomson
4. Surface Engineering with Lasers, Dehosson J.T.
(9A03604) REFRIGERATION AND AIR CONDITIONING

UNIT – I
Introduction to Refrigeration: Necessity and applications – Unit of refrigeration and C.O.P. –
Different refrigeration methods - Air Refrigeration: Ideal and Actual cycles, Open and Dense air systems — problems – Refrigeration needs of Air crafts.

UNIT – II
Vapour compression refrigeration – Basic cycle - working principle and essential components of the plant – COP –
Representation of cycle on T-S and p-h charts – Expander vs. Throttling, effect of sub cooling and super heating – cycle analysis – Actual cycle- Influence of various parameters on system performance – Construction and Use of P-h charts – numerical Problems.

UNIT III

UNIT IV
Vapor Absorption Refrigeration System – description and working of NH₃ – water system and Li Br –water ( Two shell & Four shell) System -Calculation of max COP. Principle of operation of three Fluid absorption system.
UNIT V

UNIT – VI

UNIT VII
Air Conditioning equipment - humidifiers – dehumidifiers – air filters, fans and blowers.

UNIT – VIII
Requirements of human comfort and concept of Effective Temperature- Comfort chart –Comfort Air Conditioning- Summer, Winter & year round air conditioning- simple problems.

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.
4. Basic Refrigeration and Air-Conditioning – Ananthanarayan / TMH

Tables/Codes: Thermal Engineering Data Book containing Refrigerant and Psychrometric property Tables and charts

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
ENGINE PARTS: Pistons, Forces acting on piston – Construction Design and proportions of piston. Cylinder, Cylinder liners,

UNIT – III
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 cranks

UNIT – IV

UNIT – V
POWER TRANSMISSIONS SYSTEMS: Design of Flat belt drives, V-belt drives & rope drives. Selection of wire ropes, design procedure for chain drives.

UNIT – VI

UNIT – VII
MECHANICAL SPRINGS: Stress and deflections of helical Springs-Springs for fatigue loading – Natural frequency of helical springs-Energy storage capacity- Helical Torsion springs- Leaf springs-Coaxial springs

UNIT – VIII
DESIGN OF POWER SCREWS: Design of screw, Square ACME, Buttress screws- Efficiency of the screw. Design of nut, compound screw, differential screw, ball screw- possible failures.

TEXT BOOK:
1. Machine Design /V.B.Bhandari/TMH

REFERENCES:
2. Data Books : (I) P.S.G. College of Technology (ii) Balaveer Swamy and Mahadevan
4. Machine Design by Kanniah/ scitech publishers
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(9A03606) AUTOMOBILE ENGINEERING

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

UNIT – VI

UNIT – VII
Steering System: Steering geometry – camber, castor, king pin rake, combined angle toe-in, 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, Pneumatic and vacuum brake systems.
TEXT BOOKS:

REFERENCE BOOKS:
1. Automobile Engineering, R.K.RAJPUT,Laxmi Pub
3. Automotive engines, Newton, Steeds & Garret.
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.
4. Alignment test on the lathe.
5. Alignment test on milling machine.
6. Study of 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.
10. Surface roughness measurement by Talysurf instrument.

Section B:
2. Job on Step turning and taper turning on lathe machine
3. Job on Thread cutting and knurling on -lathe machine.
4. Job on Drilling and Tapping
5. Job on Shaping and Planning
6. Job on Slotting
7. Job on Milling
8. Job on Cylindrical Surface Grinding
1. Introduction

The Advanced English Language Skills Lab introduced at the 3rd year B.Tech level is considered essential for the student for focusing on his/her career. At this stage it is imperative for the student to start preparing for the ever growing competition in the job market. In this scenario, in order to be on par with the best, he/she needs to improve his/her Communication and soft skills.

This course focuses on the practical aspects of English incorporating all the four (LRSW) skills relevant to the requirements of the prospective employers in view of globalization. The proposed course will enable the students to perform the following:

- Intensive reading to improve comprehension and communication
- Attentive listening for better understanding
- Write project/research/technical reports
- Write Resume’ to attract attention
- Discuss ideas / opinions for better solutions
- Face interviews confidently
- Gather information, organize ideas, and present them effectively before an audience
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the
required ability to face computer-based competitive exams such GRE, TOEFL, CAT, GMAT etc.

2. Objectives:
Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student’s proficiency in English at all levels. The lab intends to train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career.

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

**Reading Comprehension** -- Reading for facts, guessing meanings from context, speed reading, scanning, skimming for building vocabulary (synonyms and antonyms, one word substitutes, prefixes and suffixes, idioms and phrases.)

**Listening Comprehension** -- Listening for understanding, so as to respond relevantly and appropriately to people of different backgrounds and dialects in various personal and professional situations.

**Technical Report Writing**—Types of formats and styles, subject matter, organization, clarity, coherence and style, data-collection, tools, analysis
Resume’ Writing—Structure, format and style, planning, defining the career objective, projecting one’s strengths, and skills, creative self marketing, cover letter

Group Discussion-- Communicating views and opinions, discussing, intervening, providing solutions on any given topic across a cross-section of individuals, (keeping an eye on modulation of voice, clarity, body language, relevance, fluency and coherence) in personal and professional lives.

Interview Skills—Concept and process, pre-interview planning, mannerisms, body language, organizing, answering strategies, interview through tele and video-conferencing

Technical Presentations (Oral)—Collection of data, planning, preparation, type, style and format, use of props, attracting audience, voice modulation, clarity, body language, asking queries.

4. Minimum Requirements
The English Language Lab shall have two parts:

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.

The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a TV, A digital stereo-audio and video system, Camcorder etc

System Requirement (Hardware Component):
Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:
P-IV Processor, Speed-2.8 GHz, RAM_512 MB minimum, Hard Disk-80 GB, Headphones

Prescribed Software: GLOBARENA
Books Suggested 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):

6. The ACE of Soft Skills by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010
9. From Campus To Corporate by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010
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(9A03701) OPERATIONS RESEARCH

UNIT – I


UNIT – II


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

UNIT – IV
UNIT – V
WAITING LINES: Introduction – Single Channel – Poisson arrivals – exponential service times – with finite queue length and non finite queue length models– Multichannel – Poisson arrivals – exponential service times with finite queue length and queue length and non finite queue length models.

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. Introduction to operations Research, Taha, PHI

REFERENCES:
2009-10

7. Operations Research, R. Veerachari and V. Ravi Kumar, I.K International
UNIT – I
Introduction to Automation: Need, Types, Basic elements of an automated system, levels of automation, hardware components for automation and process control, mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT – II
Automated flow lines: Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, qualitative analysis.

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

UNIT – IV
Introduction to Industrial Robots: Classification. Robot configurations, Functional line diagram, Degrees of Freedom. Components, common types of arms, joints, grippers.

UNIT – V
Manipulator Kinematics: Homogeneous transformations as applicable to rotation and translation - D-H notation, Forward and inverse kinematics.

Manipulator Dynamics: Differential transformation, Jacobians. Lagrange – Euler and Newton – Euler formations.

UNIT VI
Trajectory Planning: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion.

Robot programming - Types – features of 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. Automation, Production systems and CIM, M.P. Groover/Pearson Edu.
2. Industrial Robotics - M.P. Groover, TMH.

**REFERENCES:**
5. Robotics and Control, Mittal R K & Nagrath I J, TMH.
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(9A03703) FINITE ELEMENT METHODS

UNIT-I

UNIT-II

UNIT - III

UNIT-IV
Frames, Plane stress and strain equations: Two-dimensional
arbitrarily oriented beam element rigid plane frame examples, grid equations. Basic concepts of plane stress and plane strain, derivation of the constant strain triangular element stiffness matrix and equations, treatment of body and surface forces, explicit expression for the constant strain triangle stiffness matrix, finite element solution of a plane stress problem.

UNIT - V
Development of a linear strain and axisymmetric elements: Introduction, derivation of the linear strain triangular element stiffness matrix and equations, example LST stiffness determination, comparison of elements, derivation of the stiffness matrix, solution of an axisymmetric pressure vessel
Isoparametric formulation: Isoparametric formulation of the bar element stiffness matrix, rectangular plane stress element, Isoparametric formulation of the plane element stiffness matrix, evaluation of the stiffness matrix and stress matrix by Gaussian quadrature.

UNIT - VI
Heat and Mass Transfer analysis: Derivation of the basic differential equation, heat transfer with convection, typical units thermal conductivities, K: and heat transfer coefficients, h, one-dimensional finite element formulation using a variational method, two-dimensional finite element formulation, line or point sources, one-dimensional heat transfer with mass transport, finite element formulation of heat transfer with mass transport by Galerkin's method, flow chart and examples of a heat transfer program

UNIT - VII
Fluid flow and thermal stress analysis: Derivation of the basic differential equations, one-dimensional finite element formulation, two-dimensional finite element formulation, flow chart and examples of a fluid flow program. Formulation of the
thermal stress problem and examples.

UNIT-VIII
Structural Dynamic and Time Dependent Heat Transfer:
Dynamics of a spring mass system, direct derivation of the bar element equations, numerical integration in time, natural frequencies of a one-dimensional bar, time dependent one dimensional bar analysis, beam element mass matrices and natural frequencies, truss, plane frame, plane stress/strain, axisymmetric, solid element mass matrices, time-dependent heat transfer.

TEXT BOOK:
1. A first course in Finite Element Method, Daryl L Logan, Cengage Learning
3. Introduction to Finite Elements in Engineering, Chandraputla, Ashok and Belegundu, Prentice Hall.

REFERENCES:
1. An introduction to Finite Element Method, JN Reddy, TMH
2. Finite Element Method, its basics and fundamentals, O.C. Zienkiewicz, Elsevier
4. Fundamentals of Finite element analysis, David V Hutton, TMH
5. Finite Element Analysis, C.S. Krishna Murthy
**Question Paper Pattern:** 5 questions to be answered out of 8 questions

Each question should not have more than 3 bits.
UNIT-I
Definition - Basic principles of measurement - Measurement systems, generalized configuration and functional descriptions of measuring instruments - examples. Dynamic performance characteristics sources of error, Classification and elimination of error.

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.

MEASUREMENT OF TEMPERATURE: Classification - Ranges - Various Principles of measurement - Expansion, Electrical Resistance - Thermistor - Thermocouple - Pyrometers - Temperature Indicators.

UNIT - III
MEASUREMENT OF PRESSURE: Units - classification - different principles used- Manometers, Piston, Bourdon pressure gauges, Bellows - Diaphragm gauges. Low pressure measurement - Thermal. conductivity gauges - ionization pressure gauges, Mcleod pressure gauge.

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 .

Measurement of Acceleration and Vibration: Different simple instruments - Principles of Seismic instruments - Vibrometer and accelerometer.

UNIT - VI

STRESS & STRAIN MEASUREMENTS: Various types - electrical strain gauge - gauge factor - method of usage of resistance strain gauge for bending, compressive and tensile strains - usage for measuring torque, Strain gauge Rosettes.

UNIT - VII

MEASUREMENT OF HUMIDITY - Moisture content in the gases, sling psychrometer, Absorption psychrometer, Dew point meter.

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, Torsion meters, Dynamometers.

UNIT - VIII

ELEMENTS OF CONTROL SYSTEMS: Introduction, Importance - Classification - Open and closed systems Servomechanisms-Examples with block diagrams-Temperature,
speed & position control systems

TEXT BOOKS:

1. Measurement systems: Application and design, Doeblin Earnest. O. Adaptation by Manik and Dhanesh, TMH
2. Mechanical Measurements, Beckwith, Marangoni, Linehard, PHI, PE

REFERENCES:

1. Instrumentation, measurement & analysis, B.C. Nakra & KK Choudhary, TMH
3. Instrumentation and Control systems, S. Bhaskar, Anuradha Agencies.
5. Instrumentation & mech. Measurements, AK. Tayal, Galgotia Publications
6. Mechanical Measurements, Sawhani
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B.Tech. IV-I Sem (M.E)  
(9A03705) ENTREPRENEURSHIP  
(Elective-I)


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


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


UNIT VI: Choosing location and layout, Issues related to Selection of layout.
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: Global aspects of Enterprenership.

Text Books:
1. Entrepreneurship, Robert Hisrich, & Michael Peters, TMH, 5th Edition

REFERENCES:
8. Industrial Law, ND Kapoor, Sultan Chand & Sons, 2005
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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(9A03706) COMPUTATIONAL FLUID DYNAMICS (ELECTIVE – I)

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
Finite Difference Applications in Heat conduction and Convention - Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer.

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
Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton's second law of
motion, expanded forms of Navier-stokes equations, conservation of energy
principle, special forms of the Navier-stokes equations.

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:
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(9A03707) MECHATRONICS
(ELECTIVE – I)

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


UNIT – III  PRECISION MECHANICAL SYSTEMS:

UNIT – IV  ELECTRONIC INTERFACE SUBSYSTEMS : TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isoation 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.


TEXT BOOKS :
2. Mechatronics,M.D.Singh,J.G.Joshi PHI.
REFERENCES:
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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(9A03708) MODERN MANUFACTURING METHODS
(ELECTIVE – II)


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  ELECTRO – CHEMICAL PROCESSES:

UNIT – V  THERMAL METAL REMOVAL PROCESSES: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded
surface and machine tool selection. Wire EDM, principle, applications.

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

UNIT-VII  **Plasma Machining:** Principle, metal removal mechanism, process parameters, accuracy and surface finish, applications.  
**Chemical Machining:** Fundamentals of chemical machining- Principle- maskants –etchants- advantages and applications.

**Rapid Prototyping:** Classification – Stereo lithography, Selective Laser Sintering, applications.

**TEXT BOOKS:**  
1. Advanced machining processes, VK Jain, Allied publishers.

**REFERENCES:**  
1. Modern Machining Process , Pandey P.C. and Shah H.S., TMH.  
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(9A03709) TOOL DESIGN
(ELECTIVE-II)

UNIT-I
Tooling materials and heat treatment: Properties of materials, ferrous, nonferrous, non metallic, tooling materials, heat treating, Limits, tolerances; and FITS, Gauges and gauge design coated tools, ceramic tools.

UNIT -II
Design of single point cutting tools: Single point, cutting tools- various systems of specifications, geometry and their inter, relation, theories of formation of chip and their effect, design of broach.

UNIT - III
Design of multipoint cutting tools: Drill geometry, Design of Drills, Rake & Relief angles of twist drill, speed, feed and depth of cut, machining time, forces, Milling cutters, cutting speeds and feed-machining times-design-form cutters, combination tools, reamers etc.

UNIT - IV
Design of jigs and fixtures: Basic principles of location and clamping, locating, methods and devices, jigs, definitions, types, general consideration in the design of jigs, drills bushing, methods of construction, fixtures-vice fixtures milling, boring, and lathe grinding fixtures.

UNIT-V
Design of sheet metal blanking and piercing: Fundamentals of die
cutting operating, power press types, General press information, Material handling equipment, cutting action in punch and die operation. Die clearance, and types of Die construction. Die design fundamentals-blanking and piercing die construction, pilots, striper and pressure pads presswork material, strip layout, short run tooling for piercing.

UNIT-VI
Design of sheet metal bending, forming and drawings die: Bending dies, drawing dies, forming dies, drawing operations, variables that effect metal flow during drawing. Determination of blank size, drawing force, single and double action draw dies.

UNIT -VII
Tool life and tool wear: theories of tool wear-adhesion, abrasive and diffusion wear mechanisms forms of wear, tool life criteria and Mach inability index, tool wear criterion, measurement of tool wear.

UNIT-VIII
Using plastics as tooling materials: introduction, plastics commonly used as tooling material application of epoxy plastic tools construction methods of plastic tooling metal forming operations with Urethane dies. Calculating forces for urethane pressure pads, economics of tooling.

TEXT BOOKS:

REFERENCES:
1. Production Engineering Design (Tool Design) , Surendra Kenav and Umesh 'Chandra, Satyaprakashan, New Delhi 1994..
Amitabha Battacharya and In1yong Ham.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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(9A03710) POWER PLANT ENGINEERING
(ELECTIVE - II)

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
STEAM POWER PLANT: COMBUSTION PROCESS:
Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT – III

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

UNIT VI
POWER FROM NON-CONVENTIONAL SOURCES:
DIRECT ENERGY CONVERSION: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT – VII

UNIT – VIII
POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of
Pollution control.

**TEXT BOOK :**
1. A Text Book of Power Plant Engineering, Rajput, Laxmi Publications

**REFERENCES :**
2. Power Plant Engineering, Ramalingam, Scietech Publishers
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(9A03711) INSTRUMENTATION & CONTROL SYSTEMS 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.
12. Study of anemometer
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(9A03712) 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, DXE AND IGES FILES.

2. **Part Modeling:** Generation of various 3D Models through Protrusion, revolve, shell sweep.

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,
UNIT – I
Functions of production planning & controls operations & productivity, productivity measurement, goods and services, Design of goods and services: selection, generating new products, product development, issues in product design.

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

UNIT – III
Factors affecting facilities location, mathematical models for facilities, location, Types of facilities- layout: product layout, process layout, group technology layout, Assembly line balancing, computerised layout: ALDEP, CRAFT, CORELAP.

UNIT – IV
Strategies for aggregates planning, aggregate planning using O.R. Models, Chase planning, Expediting, controlling aspects.

UNIT – V

UNIT – VI
Scheduling Policies – Techniques, flow shop and job shop Scheduling techniques.

UNIT – VII
MRP, –lot sizing techniques in MRP, introduction to ERP, LOB (Line of Balance).

UNIT – VIII
Lean Management, philosophy and creation of lean enterprise, JIT concepts-Kanban System-Elements of total quality management, Six Sigma Quality Control.
TEXT BOOKS:
3. Operation and O.M by Adam & Ebert - PHI Pub.,

REFERENCES:
2. Inventory Control Theory and Practice, Martin K. Starr and David W. Miller.
4. Production Control, Moore.
6. Operation Management by Jay Heizar & Read new Pearson
7. Elements of Production Planning and Control, Samuel Eilon.
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 titled 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 Joule 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, Twidell & Weir
2. Solar Energy, Sukhatme
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(Elective – III)

UNIT – I

UNIT – II
Quality standards – Need of standardization - Institutions – bodies of standardization,

UNIT – III

UNIT - IV

UNIT – V
Quality circles – organization – focus team approach – statistical process control –
process chart – Ishikawa diagram – preparing and using control charts.

UNIT VI

UNIT – VII

UNIT – VIII
Six sigma approach – application of six sigma approach to various industrial situations.

TEXT BOOKS:
1. Total Quality Management, Joseph & Susan Berg

REFERENCE BOOKS:
1. Quality management, Howard Giltow-TMH
2. Quality management, Evans.
3. Quality management, Bedi
UNIT-I
INTRODUCTION: Importance and scope, definition and terminology, simple harmonic motion, combination of simple harmonic motions, Fourier analysis.

UNIT-II
SINGLE DEGREE FREEDOM SYSTEMS-I:
Undamped free vibration: Classical method, Energy method, phase plane method, equivalent systems, torsional systems.

UNIT-III
SINGLE DEGREE FREEDOM SYSTEMS-II:
Damped free vibration: Viscous damping, under damping, critical damping, coulomb damping, equivalent damping coefficient

UNIT-IV
SINGLE DEGREE FREEDOM SYSTEMS WITH FORCED VIBRATIONS:
Steady state forced vibration, sources of excitation, impressed harmonic force, impressed force due to unbalance, motion excitation, transmissibility and isolation, performance of different type of isolators, power absorbed by viscous damping, General theory of seismic instruments, accelerometer and vibrometer, methods of vibration control, excitation reduction at source, system modification.

UNIT-V
TWO DEGREE FREEDOM SYSTEMS: Natural frequencies and modes of vibration by classical method of spring-mass system, forced vibration, dynamic vibration absorber

UNIT-VI
MULTI DEGREE FREEDOM SYSTEMS: Influence co-efficient method, damped mass and distributed mass systems, stodola method, Holzer’s method, newtons iteration method, orthogonality of mode shapes.

UNIT-VII
VIBRATION IN CONTINUOUS SYSTEMS: Longitudinal vibration of bars, torsional vibrations of circular rods or shafts, lateral vibrations of beams and shafts.

UNIT-VIII
Whirling of shafts critical speed of shafts, Rayleigh’s upper bound approximation, Dunkerley’s lower bound approximation, critical speed of shafts with damping.

TEXT BOOK:
1. Mechanical Vibrations, G.K.Grover

REFERENCE BOOKS:
2. Vibration problems in Engineering,Timeoshenko and Young
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(9A03805) GAS TURBINES AND JET PROPULSION (Elective – III)

UNIT-I
Gas Turbine Operating Cycles: Simple open cycle gas turbine or air standard Brayton cycle, Actual Brayton cycle, the cycle air flow rate, the cycle work ratio, optimum pressure ratio or maximum cycle thermal efficiency, means of improving the efficiency and the specific output of simple cycle.

UNIT-II
Gas Turbines; gas turbine applications, gas turbine advantages & disadvantages, energy flow & back work, deviation from ideal cycle, gas turbine with regeneration, thermal efficiency of gas turbine with & without regenerator, gas turbine engines, intercooling & reheating, turbojet engine, turbofan engine, turboprop engine.

UNIT-III
Jet propulsion: Historical sketch- reaction principle- essential features of propulsion devices- Thermal jet engines, classification of – energy flow, thrust, thrust power and propulsion efficiency- need for thermal jet engines and applications.

UNIT-IV
UNIT-V

UNIT-VI
Rocket Engines: Need for, applications- basic principle of operation and parameters of performance – classification, solid and liquid propellant rocket engines, advantages, domains of application – propellants – comparison of propulsion systems.

UNIT-VII
Rocket Technology: Flight mechanics, application thrust profiles, acceleration- staging of rockets, need for – feed systems, injectors and expansion nozzles – rocket transfer and ablative cooling.

UNIT-VIII
Testing & instrumentation - need for Cryogenics – advanced propulsion systems, elementary treatment of Electrical nuclear and plasma Arc Propulsion.

TEXT BOOKS:
1. Gas Turbines , V. Ganesan TMGH
2. Gas Dynamics & Jet Propulsion, Dr. S.L. Somasundaram.

REFERENCES BOOK:
1. Gas turbines , cohen , Rogers & Sarvana Muttoo , Addision Wiley & longman
2. Thermodynamics of propulsion, Hill & Paterson.
4. Element of Gas Turbines propulsion , Jack D Matingly, MGH
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(9A03806) GEOMETRIC MODELLING  
(ELECTIVE-IV)

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 pipe0line, viewing coordinat4 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:**
1. Mathematical Elements for computer graphics, David 1 Rodgers, TMH

**REFERENCES:**
1. CAD/CAM Theory, Ibrahim Zeid, TMH
3. Computer Graphics, Steven Harrington, TMH
2009-10

Question Paper Pattern: 5 Questions to be answered out of 8 questions.

Each question should not have more than 3 bits.
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(9A03807) COMPOSITE MATERIALS
(ELECTIVE – IV)

Unit-I

Unit-II

Unit-III
Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

Unit-IV

Unit-V

Unit-VI

UNIT-VII

UNIT-VIII
Failure Analysis and Design of Laminates: Introduction, Special Cases of Laminates, Failure Criterion for a Laminate, Design of a Laminated Composite, Other Mechanical Design Issues

Text Books:

References:
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(9A03808) PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS (ELECTIVE-IV)

UNIT I  NATURE AND SCOPE OF ENGINEERING ETHICS

UNIT II  ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as experimentation- Engineers as responsible experimenters, the challenger case, Codes of Ethics, A balanced outlook on law.

UNIT III  ENGINEER’S RESPONSIBILITY FOR SAFETY
Concept of safety and risk, assessment of safety and risk- risk benefit analysis and reducing the risk- three- mile island, Chernobyl and safe exists.

UNIT IV  GLOBAL ISSUES
Multinational corporations- Environmental ethics- Computer ethics and Weapons developments

UNIT V  INTRODUCTION TO INTELLECTUAL PROPERTY
Meaning and Types of Intellectual Property, Intellectual Property Law Basics, Agencies responsible for intellectual property

UNIT VI  FOUNDATIONS OF TRADEMARKS
Meaning of Trademarks, Purpose and Functions of Trademarks, types of Marks, Acquisition of Trademark rights, Common Law rights, Categories of Marks, Trade names and Business Name, Protectable Matter, Exclusions from Trademark Protection

UNIT VII  FOUNDATIONS OF COPYRIGHTS LAW
Meaning of Copyrights, Common Law rights and Rights under the 1976 copyright Act, Recent developments of the Copyright Act, The United States Copyright Office

UNIT VIII  FOUNDATIONS OF PATENT LAW

TEXT BOOKS:

REFERENCES: