Department of Mechanical Engineering

SEMESTER I

Course Title: English and Communication Skills–I
Course Code: CE/EE/ME/ECE-101
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this subject is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the subject, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.

UNIT 1

Facets of Literature-I (Short Stories & Poems)

Short Stories:

1. Homecoming – R.N. Tagore
2. The Selfish Giant - Oscar Wilde
3. The Diamond Necklace- Guy- De Maupassant

Poems:

1. Ozymandias – P.B. Shelley
2. Daffodils – William Wordsworth
3. Stopping by Woods on a Snowy Evening – Robert Frost

UNIT 1I

Facets of Literature-II (Prose)

1. I Have A Dream – Martin Luther King
2. On Habits – A. G. Gardiner
3. On Seeing People Off – Max Beerbohm

UNIT III

Grammar and Usage

Parts of speech:

Nouns, Pronouns, Adjectives, Articles, Verbs, Adverbs, Prepositions, Interjection. Identifying parts of speech, Structures: Verb patterns and Question tags, Subject – Verb agreement (concord)

Pair of words (Words commonly confused and misused):

Tenses, Correction of incorrect sentences, One word Substitution

UNIT IV

Translation, Paragraph and Compression

Translation of Glossary of Administrative Terms from English into Urdu/Hindi, Translation from Urdu/Hindi into English.

Paragraph of 100-150 words from outlines

Comprehension: Unseen passages of literacy, . scientific, data/graph based for comprehension exercises.

UNIT V

Communication

Definition, Introduction and Process of Communication

Objectives of Communication.

Notices

Course Outcome

CO 1.Communicate effectively verbal as well as in writing in English
CO 2 Comprehend given passage and summarize them.
CO 3. Draft official letters.
CO 4. Apply correct voice and prepositions in formal communication.
CO 5. Make sentence using connector for desire meaning.
CO 6 Develop presentation skills
CO 7. Face oral examination and interviews

REFRENCES

1. English and Communication Skills, Book-I By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh Published By Abhishek Publication, 57-59, Sector-17, Chandigarh.
0 Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons.
1 The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India.
2 New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh, .
3 New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh, .
4 A Practical English Grammar by Thomson and Marlinet.
5 Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill.
6 English Conversation Practice by Grount Taylor; Tata McGraw Hill.
7 Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi.
8 Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi.
9 Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

Department of Mechanical Engineering

SEMESTER I

Course Title: Applied Mathematics-I
Course Code: CE/EE/ME/ECE-102
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied Mathematics forms the backbone of engineering students. Basic elements of algebra, trigonometry, coordinate geometry have been included in the curriculum as foundation course. This course will develop analytical abilities to make exact calculations and will provide continuing educational base to the students.

UNIT 1

Algebra

Arithmetic progression, its nth term, sum of n terms with their applications to engineering problems. Geometrical progression, its nth term and sum of n terms and to infinity with application to engineering problems; Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors)

UNIT 1I

Permutations, Combinations & Binomial Theorem

Concept of permutations and Combinations: Value of ${}^{n}p_{r}$ ${}^{n}c_{r}$.

Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof)

UNIT III

Trigonometry

Concept of angles, measurement of angles in degrees, grades and radians and their conversions.

Review of ratios of some standard angles (0, 30, 45, 60, 90 degrees), T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

UNIT IV

Co-Ordinate Geometry-I

Cartesian and Polar coordinates (two dimensional), conversion from Cartesian to polar coordinates and vice-versa, distance between two points (Cartesian co-ordinates), section formulae.

Area of triangle when its vertices are given, co-ordinates of centroid, in center of a triangle when the vertices are given, simple problems on locus.

UNIT V

Co-Ordinate Geometry-II

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines, perpendicular distance formula (without proof)
General equation of a circle and its characteristics.
To find the equation of a circle, given:

* Centre and radius
* Three points lying on it
* Coordinates of end points of a diameter

Course: Outcome

CO 1.To understand basics and applications of Algebra
Permutations, Combinations & Binomial Theorem
, determinants, matrices
CO 2. To understand trigonometry, coordinate geometry

CO 3. Comprehensive knowledge of basic mathematics

REFRENCES

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
3. Applied Mathematics by Dr. RD Sharma
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar.
5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
6. Engineering Mathematics by Dass Gupta
7. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
8. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
9. Engineering Mathematics, Vol I, II & III by V Sundaram et.al, Vikas Publishing House (P) Ltd., New Delhi
10. Engineering Mathematics by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
11. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
12. Engineering Mathematics, Vol I & II by AK Gupta, MacMillan India Ltd., New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER I

Course Title: Applied Physics-I Max. Marks: 100

Course Code: CE/EE/ME/ECE-103
L T P
4 0 0

External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles

UNIT 1

Units and Dimensions

Physical quantities, Fundamental and derived units, Systems of units (CGS, MKS and SI units), Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, gravitational constant, density). Coefficient of viscosity, stress, strain and elasticity)

Principle of homogeneity

Uses of Units and Dimensions:

(a) Conversion of one system of unit into another

(b) Determination of formula of a physical quantity such as time period of simple pendulum and determination of formula for centripetal force by the method of units and dimensions

(c) Knowing the correctness of a physical equation

Limitations of dimensional analysis

UNIT II

Force and Motion

Scalar and vector quantities–definitions with examples. Simple addition and multiplication of scalar and vector quantities

Force - resolution and composition of forces, Parallelogram Law of forces with the derivation for the resultant force and direction of the resultant force.

Newton's Laws of motion – concept of momentum and their application, determination of force equation from Newton's second law of motion, derivation of Newton's third law of motion from 2nd Law, impulse and impulsive forces, simple numerical problems.

Projectile motion - horizontal and oblique and their equation.

Derivation and definitions of Time of flight, Maximum height, Horizontal range and the condition for the maximum range.

Linear and angular velocity and acceleration with their relations.

Circular motion – centripetal force and centrifugal force in detail.

Banking of roads and rails, bending of a cyclist.

UNIT III

Work, Power and Energy

Work: definitions and its SI units. Work done in moving an object on horizontal and inclined plane (incorporating frictional forces).

Power: definitions and its SI units, calculation of power in simple cases.

Energy: Definitions and its SI units, Kinetic energy and Potential energy with examples and their derivation. Principle of conservation of energy (for freely falling bodies), transformation of energy from one form to another.

UNIT IV

Simple Harmonic Motion and Rotational Motion

Definition of simple harmonic motion relation for the displacement, velocity, acceleration, and time period of a body executing simple harmonic motion, Free, forced and resonant vibrations with examples

Definitions of torque and angular momentum, radius of gyration

Derivation of rotational kinetic energy and hence definition of moment of inertia

Conservation of angular momentum and applications

UNIT V

Temperature and Transfer of Heat

Difference between heat and temperature on the basis of K.E. of molecules, Principles of measurement of temperature and different scales of temperature**,** Bimetallic and Platinum resistance thermometer: their merits and demerits, Pyrometers–Disappearing filament optical pyrometer.

Modes of transfer of heat (conduction, convection and radiation with examples), Coefficient of thermal conductivity. Determination of coefficient of thermal conductivity of good conductor by Searle's method and bad conductor by Lee's disc method, Properties of heat radiation. Black body radiation-Stefan's law, Kirchhoff's law, Wien's law, in case of black body radiations. Prevost's theory of heat exchange

Course: Outcome

CO 1: .Identify general properties of matters.

CO 2:Use and application of different measuring instruments.

CO 3: Apply principles and concept of physics for solving various engineering problems.

CO4: To understand the basic concepts of Units and Dimensions

CO5: To acquaint the students with the practical skills of force and motion.

REFRENCES

1. Applied Physics Vol. I, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi

6. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
7. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
8. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

Department of Mechanical Engineering

SEMESTER I

Course Title: Applied Chemistry-I
Course Code: CE/EE/ME-104
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Every branch of engineering is expanding greatly. The contributions of chemicals and chemical products are playing important role in the field of engineering, biotechnology, agriculture and pharmacology etc. The numbers of such chemical products are exponentially increasing each successive year. This results in enhancing the responsibility of engineers while choosing engineering materials for converting them into finished products. Now a days, choosing engineering material is not only based on conventional qualitative and quantitative testing of their chemical composition and behavior under service conditions, but also based on environmental and eco-friendly factors. To achieve such objectives it is essential to know applied aspects of chemistry. Applied chemistry for diploma students in various engineering and technology courses is designed to develop scientific temper and appreciation of physical and chemical properties of engineering materials, which are used in their professional career. Best efforts should be made to teach and train the engineers by imparting essential knowledge required from this subject through demonstrations, and minor projects.

Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

UNIT 1

Basics Concepts

Definition of matter, element, compound and mixtures, atom, molecule, ion, symbol, formula, valency and chemical equation. Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound. Essentials of a chemical equation, balancing of a chemical equation.

Matter, element, compound and mixtures, atoms, molecules, ions, symbols and formulae, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone.

Scope and significance of Environmental Science.

Decomposition of organic compounds and biodegradability.

UNIT 1I

Atomic Structure and Chemical Bonding

Fundamental particles i.e. electron, proton and neutron (their characteristics). Modern periodic law, introduction of periodic table, periods and groups. Electronic concept of valency. Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency with the help of suitable examples of each.

UNIT III

Water

Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam generation. Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange process. Simple numerical problems related to soda lime process. Definition of degree of hardness of water and the systems to express the degree of hardness of water. Simple numerical problems related to finding the degree of hardness on different scales. Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply

UNIT IV

Solutions

Concept of homogenous solution, brief introduction of the terms (i) Ionization (ii) Acidity (iii) Basicity (iv) Equivalent weight and gram equivalent weight with suitable examples. Strength of a solution (i) Normality (ii) Molarity (iii) Molality as applied in relation to a solution. Definition of pH, and different industrial applications of pH

UNIT V

Electrolysis

Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples. Faraday's Laws of Electrolysis. Different industrial applications of 'Electrolysis'. Elementary study of (i) lead acid battery and (ii) Ni-Cd battery with special reference to their reaction mechanisms.

Course: Outcome

CO 1. Students will be able to know the basic concepts ofAtomic Structure and Chemical Bonding

CO 2 Students will be able to know the types of water used in the subject

CO 3 Students will be able to make different kind of solutions with their respective properties.

CO4.To understand the concept of electrolysis, electrolytesand Different industrial applications Faraday's Laws of Electrolysis conductors and non-conductors

REFRENCES

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar

5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER–I

Course Title: Engineering Drawing-I
Course Code: CE/EE/ME/ECE-105

L	T	P
4	0	0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis while imparting instructions should be to develop conceptual skills in the students.

Note: 1. First angle projection is to be followed
2. Instruction relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

Unit-I

Drawing Office Practice, Lines, Lettering and Dimensioning

Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards, Drafting table/board.

Different types of lines in engineering drawing as per BIS specifications, Instrumental single stroke (vertical and inclined gothic) lettering of 35 mm height in the ratios of 7:4, Instrumental double stroke lettering of 35 mm height in the ratio of 7:4, vertical. Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4. Necessity of dimensioning - methods and principles. Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches – chain and parallel dimensioning

Unit-II

Simple Geometrical Constructions & Scale

Construction of regular polygons (triangle, square, pentagon, hexagon) and circles, Ellipses (concentric circle method and oblong method), Parabola (rectangle and tangent method). Curves (cycloid and helix).

Scales – their need and importance, Definition of representative fraction (RF); Finding RF of a given scale, Types of scales, Construction of plain and diagonal scales.

Unit-III

Principle of Projections

Principle of orthographic projection, Planes of projection, four quadrants, first angle projection and third angle projection, Projection of points situated in different quadrants. Projection of lines, Lines inclined to one plane and parallel to the other and vice versa

Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and parallel to the other or vice versa. Projection of solids, such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both. Drawing 3 orthographic views of given objects (at least five objects). Identification of surfaces on drawn orthographic views from isometric object drawn. Exercises on missing lines, surfaces and views.

Unit-IV

Sectional Views & Isometric Views

Need for sectional views – conventional sections of various materials. Drawing of different conventions for materials in sections, conventional breaks for shafts, pipes, rectangular, square, angle, channel and rolled sections.

Fundamentals of isometric projections (theoretical instructions) and isometric scales. Isometric views from 2 or 3 given orthographic views

Unit-V

Development of Surfaces (2 sheets):

Development of surfaces – cubes, prisms, (square, pentagonal and hexagonal), cylinders, pyramids (square, pentagonal, hexagonal) and cones

Course: Outcome

CO 1.Identify and use differing drawing tools/instruments.
CO 2 Use the concept of projection for Mechanical Engineering Drawings.
CO 3. Prepare engineering drawing manually with given geometrical dimensions using
prevailing drawing standards using proper scale.
CO 4 Visualize and draw the shape of simple object form orthographic view to vise versa

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House

2. A Text Book of Engineering Drawing by Surjit Singh published by Dhanpat Rai and Co., Delhi

3. Engineering Drawing by PS Gill published by SK Kataria and sons, Delhi

4. Engineering Drawing by RB Gupta published by Satya Prakashan, New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each un

SEMESTER I

Course Title: English & Communication Skills-I Lab	Max. Marks: 50
Course Code: CE/EE/ME/ECE-111	External: 25
L T P	Internal Assessment: 25
0 0 2	Duration of Exam: 3 Hrs

LIST OF PRACTICALS

1. Locating a Book in Library
2. How to look up words in a Dictionary: meaning and pronunciation of words as given in the standard dictionary using symbols of phonetics.
3. How to Seek Information from an Encyclopedia
4. Listening pre-recorded English language learning programme
5. Paper Reading before an audience (reading unseen passages)
6. Study of spelling Rules
7. Study of essentials of a Good Speech to respond and comprehend visual, oral themes, situations or stimulus and practice before select gathering
8. Exercises on use of different abbreviations
9. Greetings for different occasions
10. Introducing oneself, others and leave taking
11. Exercises on writing sentences on a topic
12.

Course Outcome

CO1 To have practical exposure to the basic language techniques in professional
CO 2 Comprehend given passage and summarize them.
CO 3. Draft official letters.
CO 4. Apply correct voice and prepositions in formal communication.
CO 5. Make sentence using connector for desire meaning.
CO 6 Develop presentation skills.
CO 7. Face oral examination and interviews

SEMESTER I

Course Title: Applied Physics-I Lab
Course Code: CE/EE/ME/ECE-112
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. To find he radius and diameter of given wire by screw gauge
2. To find the volume of cylinder (hollow and solid) by vernier caliper
3. To find the thickness of glass strip by spherometer
4. To verify parallelogram law of forces
5. To find the time period of a simple pendulum and determine the length of second's pendulum.
6. To find the frequency of a tuning fork by a sonometer
7. To find the velocity of sound by using resonance apparatus at room temperature.
8. To find the Moment of Inertia of a flywheel about its axis of rotation
9. To find the surface tension of a liquid by capillary rise method
10. To determine the atmospheric pressure at a place using Fortin's Barometer

Course outcome

After completing this course the student will be able to
CO1: Have a thorough knowledge and use of Screw guage ,Vernier caliper
CO2: find out the thickness glass strip of spherometer.
CO3: understand the use of Barometer.

SEMESTER I

Course Title: Applied Chemistry-I Lab
Course Code: CE/ERE/ME-113
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
2. Preparation of standard solution of oxalic acid or potassium dichromate
3. Determine the strength of solution of HCl with the help of a solution of NaOH and an intermediate solution of standard oxalic acid
4. Find the amount of chlorides in mg per liter in a sample of H_2O with the help of a solution of $AgNO_3$
5. Determine the degree of temporary hardness of water by Soap Titration method
6. Determine the percentage purity of commercial sample like blue vitriol 12.5 g. of which have been dissolved per litre. Given M/20 $Na_2S_2O_3$.
7. Estimation of amount of iron in hematite ore volumetrically
8. Estimation of total alkalinity of water volumetrically
9. Determine conductance, pH of water sample using conductance bridge and pH meter
10. Determination of solubility of a solid at room temperature

Course Outcome

1; Know about the volumetric analysis
2; prepare standard solutions
3; know about the different impurities of water and to determine them .

SEMESTER I

Course Title: Engineering Drawing-I
Course Code: CE/EE/ME/ECE-114
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Drawing Office Practice, Lines, Lettering and Dimensioning (4 sheets)
2. Simple Geometrical Constructions & Scale (4 sheets)
3. Principle of Projections (6 sheets)
4. Sectional Views & Isometric Views (3 sheet)
5. Development of Surfaces (2 sheets):

Course Outcome

CO1: Able to draw Orthographic projections of Lines, Planes, and Solid.
CO2: Able to construct Isometric Scale, Isometric Projections and Views.
CO3: Able to draw Sections of various Solids including Cylinders, cones, prisms and pyramids.
CO4: Able to draw projections of lines, planes, solids, isometric projections and sections of solids including Cylinders, cones, prisms and pyramids using AutoCAD

SEMESTER I

Course Title: General Workshop Practice-I Max. Marks: 150
Course Code: CE/EE/ME/ECE-115 External: 75
L T P Internal Assessment: 75
0 0 6

Objective

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives

LIST OF PRACTICALS

1. Carpentry & Painting Shop-I:

Introduction to various types of wood by demonstration and their identification. Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.

Job I Marking, Sawing and planning practice
Job II Extensive planning practice
Job III Chiseling practice

Introduction to joints, their relative advantages and uses.

Job IV Preparation of half lap joint
Job V Preparation of Mortise and Tenon Joint

Importance and need of polishing wooden items, Introduction to polishing materials.

Job VI Preparation of surface before polishing.
Job VII Application of primer coat.
Job VIII Polishing on wooden items.

2. Fitting and Plumbing Shop-I

Introduction to fitting shop, Common materials used in fitting shop, Identification of materials. Description and demonstration of various types of work benches. Holding devices and files, Precautions while filing.

Job I Filing practice (Production of flat surfaces) Checking by straight edge.
Job II Marking of jobs, use of marking and measuring tools.
Job III Filing a dimensioned rectangular or Square piece of an accuracy of +0.25mm.

Introduction to chipping, Demonstration on chipping and its applications. Demonstration and function of chipping tools.

Job IV Chipping practice

Description & demonstration of simple operation of hacksawing, demonstration and description of various types of blades, their uses and method of fitting the blade.

Job V Making a cutout from a square piece of iron block using hacksaw.

3. Welding Shop-I

Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded.

Electric arc welding, (AC and DC) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc.

Job I Practice of striking arc while using electric arc welding set.

Job II Welding practice job on arc welding for making uniform and straight weld beads.

Common welding defects and inspection. Various types of joints and end preparation.

Job III Preparation of butt joint arc welding.

Job IV Preparation of lap joint by arc welding.

Job V Preparation of single V/double V butt joint by using electric arc welding.

Job VI Preparation of Tee joint by arc welding.

4. Forging shop

Introduction to forging, forging tools, tongs, blowers/pressure blowers, hammers, chisels, punch, anvil, swag-block etc. Forging operations.

Job I Forge a L hook or Ring from MS rod 6 mm ϕ

Job II Forge a chisel and give an idea of hardening and tempering

Job III Lap joint with forge welding

Job IV High Strength Steel (HSS) tools – forging of Lathe shaper tools like side-tools and V-shape tools

5. Electric & Electronic Shop-I

Study and demonstration of common electrical materials such as wires, cables, switches, fuses, ceiling roses, battens, cleats and allied items, tools and accessories such as multi-meter, CRO, types of resisters (colour code) and potentiometers.

Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.

Job II Laying out of complete wiring of a house (i) batten wiring (ii) plastic casing and capping.

Job III Testing and rectification of simulated faults in household appliances such as iron, kettles, water-heaters, fans and mixers.

Job IV Battery connections in series and parallel and battery testing with the help of hydrometers and cell testers.

Job V Cut, strip, join and insulate wires & cables.

Job VI Unsoldering and soldering of resister, capacitor, diodes, transistors on a PCB.

Job VII joining, mounting and dismantling of plugs, sockets, connectors, Bana plugs and terminal strips.

Job VI De-solder and clean all the components and wires from a given equipment, a PCB or a tag strip including sleeving and use of identified tags.

Reference Books

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana and P Kaunaioh; MacMillan India Ltd., New Delhi
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi

- **Note:** *The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.*

Course Outcome

CO1: Able to study and practice on machine tools and their operations.
CO2: Able to practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO3: Able to identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping.
CO4: Able to apply basic electrical engineering knowledge for house wiring practice

SEMESTER-I

Course Title: Student Centred Activities
Course Code: CE/EE/ME/ECE -116
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

SCA will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defence/ Disaster Management activities etc.

SEMESTER II

Course Title: English and Communication Skills–II
Course Code: CE/EE/ME/ECE - 201
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this course is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.

UNIT 1
Facets of Literature-I (Short Stories & Poems)
Short Stories:
1. The Portrait of a Lady - Khushwant Singh
2. The Doll's House – Katherine Mansfield
3. The Refugees – Pearl S. Buck
Poems:
1. All The World's A Stage – W. Shakespeare
2. Say Not, The Struggle Nought Availeth – A.H. Clough
3. Pipa's Song – Robert Browning

UNIT 1I
Facets of Literature-II (Prose)
1. Walking Tours – R.L. Stevenson
2. A Dialogue on Civilization – C.E.M. Joad
3. The Sign of Red Cross – Horace Shipp

UNIT III

Grammar and Usage
Narration
Voice
Idioms and Phrases

UNIT IV
Correspondence & Drafting
Correspondence:
Business Letters & Personal letters
Drafting:
Report Writing, Inspection Notes, Memos, Circulars and Notes, Telegrams, Press Release, Agenda and Minutes of Meetings, Applying for a Job

UNIT V
Communication
Media and Modes of Communication, Channels of Communication, Barriers to Communication, Listening Skills, Body language, Humour in Communication

Course: Outcome
CO To have practical exposure to the basic language techniques in professional
CO 2 Comprehend given passage and summarize them.
CO 3. Draft official letters.
CO 4. Apply correct voice and prepositions in formal communication.
CO 5. Make sentence using connector for desire meaning.
CO 6 Develop presentation skills
CO 7. Face oral examination and interviews

REFRENCES

1. English and Communication Skills, Book-II By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh & Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
6. A Practical English Grammar by Thomson and Marlinet
7. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
8. English Conversation Practice by Grount Taylor; Tata McGraw Hill
9. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
10. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
11. Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

Department of Mechanical Engineering

SEMESTER II

Course Title: Applied Mathematics-II
Course Code: CE/EE/ME/ECE - 202
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus and integral calculus and statistics have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

UNIT 1
Differential Calculus-I
Definition of function; Concept of limits.

Four standard limits $\lim_{x\to a}\frac{x^n-a^n}{x-a}$, $\lim_{x\to 0}\frac{Sinx}{x}$

$\lim_{x\to 0}\frac{a^x-1}{x}$, $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$

Differentiation by definition of x^n, sin x, cos x, tan x, e^x, $\log_a x$ only.
Differentiation of sum, product and quotient of functions. Differentiation of function of a function.

UNIT 1I
Differential Calculus-II
Differentiation of trigonometric inverse functions. Logarithmic differentiation.
Exponential differentiation Successive differentiation (excluding nth order).
Applications:
(a) Maxima and minima
(b) Equation of tangent and normal to a curve (for explicit functions only).

UNIT III
Integral Calculus-I
Integration as inverse operation of differentiation.
Simple integration by substitution, by parts & by partial fractions (for linear factors only)

UNIT IV
Integral Calculus-II
Evaluation of definite integrals (simple problems).

i) $\int_0^{\frac{\pi}{2}} \sin^n x dx$ ii) $\int_0^{\frac{\pi}{2}} \cos^n x dx$ iii) $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$

.

using formulae without proof (m and n being positive integers only)

Applications:

(a) Area bounded by simple curves and axes.

(b) Volume of a solid formed by revolution of an area about axes (simple problems).

UNIT V

Statistics

Measures of Central Tendency: Mean, Median, Mode.

Measures of Dispersion: Mean deviation, Standard deviation.

Course: Outcome

CO 1.Use mathematical tool to understand engineering principles and concepts.

CO 2. Concept of Differential Calculus-I
function; Concept of limits and
Differential Calculus-II

CO 3. Evaluate definite and indefinite integrals

CO 4.Apply integration for finding area and volume

CO 5. Apply basic knowledge of statistics for sampling, data collection, standard deviation

RECOMMENDED BOOKS

1. **Grewal BS,** Elementary Engineering Mathematics by Khanna Publishers, New Delhi.
2. **Kohli S,** Engineering Mathematics by Vol. I & II by IPH, Jalandhar
3. **Dr. Sharma RD** Applied Mathematics
4. **Sabharwal SS & Jain Sunita** Applied Mathematics, Vol. I & II by, Eagle Parkashan, Jalandhar
5. **Gupta Dass** Engineering Mathematics.
6. **Chawla C Dass,** Engineering Mathematics by Asian Publishers, New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: Applied Physics-II
Course Code: CE/EE/ME/ECE - 203
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology

UNIT 1

Waves and vibrations

Generation of waves by vibrating particles, Wave motion with examples, Types of wave motion, transverse and longitudinal wave motion with examples. Velocity, frequency and wave length of a wave (relationship $v = \eta\lambda$). Sound and Light waves.

Acoustics of buildings–reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time

Ultrasonics–production (magnetostriction and piezoelectric detection) & their engineering applications

UNIT 1I

Principle of optics

Introduction: reflection of light, image formation in mirrors (convex and concave), refraction and refractive index, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection.

Defects in image formation by lenses and their correction.

Simple and compound microscope, astronomical and Galileo telescope, magnifying power and its calculation (in each case).

Overhead projector and slide projector

UNIT III

Electrostatics

Coulombs law, unit charge and its SI units. Gauss's Law. Electric field intensity and electric potential, equipotential surfaces and their properties. Calculation of electric field of point charge, charged sphere (conducting and non-conducting), straight charged conductor, plane charged sheet.

Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors. Dielectric and its effect on capacitors, dielectric constant and dielectric break down.

UNIT IV

Electricity

Ohm's law, Resistance of a conductor, specific resistance, series and parallel combination of resistors, effect of temperature on resistance. Kirchoff's law and its applications, Wheatstone bridge principle. Heating effect of current and concept of electric power.

UNIT V

Modern Physics

Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, helium – neon and ruby lasers, applications of lasers.

Fibre optics: Introduction, optical fiber materials, types, light propagation & applications.

Superconductivity: Phenomenon of super conductivity.

Energy sources–Conventional and non-conventional (wind, water, solar, bio, nuclear energy) (only elementary idea).

Course: Outcome

CO 1.Identify general properties of Waves and Vibrations
Principle of Optics

CO 2 Use and application of different measuring instruments.

CO 3.Apply principles and concept of Modern Physics for solving various engineering problems.

CO 4 Use the concept of Electrostatics ,Electricity

RECOMMENDED BOOKS

1. Applied Physics Vol. II, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics-Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics-Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics-Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: Applied Chemistry-II	Max. Marks: 100
Course Code: CE/EE/ME - 204	External: 80
L T P	Internal Assessment: 20
4 0 0	Duration of Exam: 3 Hrs

Objective

The role of chemistry in every branch of engineering and technology is expanding greatly. Now a days, various chemical products are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behaviour when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper and appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstrations/ minor projects and with the active involvement of students.

Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

UNIT I

Manufacture of Materials

A brief introduction of the terms: Metallurgy (types), mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting, calcination and refining as applied in relation to various metallurgical operations.

Metallurgy of (i) Aluminium (ii) Iron with their physical and chemical properties.

Definition of an alloy, purposes of alloying, composition, properties and uses of alloys-brass, bronze, monel metal, magnalium, duralumin, alnico and invar.

Manufacture of Portland cement.

Manufacture of ordinary glass and lead glass and their applications.

Definitions and types of polymers and plastics.

UNIT II

Fuels

Definition of a Fuel, characteristics of a good fuel and classification of fuels with suitable examples.

Definition of Calorific value of a fuel and determination of calorific value of a solid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorific values.

Brief description of 'Proximate' and 'Ultimate' analysis of a fuel. Importance of conducting the proximate and ultimate analysis of a fuel. Merits of gaseous fuels over those of other varieties of fuels. Manufacture, composition, properties and uses of:
(i) Water gas (ii) Oil gas (iii) Biogas

UNIT III

Corrosion

Meaning of the term 'corrosion' and its definition.
Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory
Prevention of corrosion by
1. (a) Alloying
   (b) Providing metallic coatings
2. Cathodic protections:
   (a) Sacrificial
   (b) Impressed voltage method
3. Heat treatment (Quenching, annealing, tempering and normalizing)

UNIT IV

Lubricants

Definition of (i) lubricant (ii) lubrication. Classification of lubricants.
Principles of lubrication:- (i) fluid film lubrication (ii) boundary lubrication (iii) extreme pressure lubrication.
Characteristics of a lubricant such as viscosity, viscosity index, volatility, oiliness, acidity, emulsification, flash point and fire point and pour point.

UNIT V

Classification and Nomenclature of Organic Compounds

Classification of Organic Compounds, functional group, Homologous Series, Nomenclature, Physical and Chemical properties, and industrial use of Organic Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

Course: Outcome

CO 1. Students will be able to know core concepts in Manufacture of Materials and Fuels .
CO 2.Will be able toknow the fundamental science and engineering principles relevant to materials likeCorrosion Lubricants, Classification and Nomenclature of Organic Compounds.
CO 3. Be able to know about Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: Engineering Drawing-II
Course Code: CE/ME - 205
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

UNIT-I

Assembly Drawing & Threads

Principle and utility of detail and assembly drawings. Wooden joints i.e. corner mortice and Tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenon joint.

Nomenclature of threads, types of threads (metric), single and multiple start threads. Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads. Simplified conventions of left hand and right hand threads, both external and internal threads

UNIT-II

Locking Devices, Nuts & Bolts

Lock nut, castle nut, split pin nut, sawn nut, slotted nut.

Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck bolts with hexagonal and square nuts and washers. Foundations bolts – Rag bolt and Lewis bolt

UNIT-III

Screws, Studs, Keys and Cotters

Drawing various types of machine screws. Drawing various types of studs and set screws.

Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position. Cotter joints: (i) gib and cotter joint (ii) knuckle joint

UNIT-IV

Rivets and Welded Joints

Types of structural and general purposes rivet heads. Caulking and fullering of riveted joints. Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting.

Various conventions and symbols of welded joints (IS 696). Practical applications of welded joints say joints on steel frames, windows, doors and furniture

UNIT-V

Couplings, Symbols & Conventions (4 sheets)

Muff or Box coupling, half lap muff coupling. Flange coupling (Protected and non-protected). Flexible coupling.

Civil engineering sanitary fitting symbols. Electrical fitting symbols for domestic interior installations. Building plan drawing with electrical and civil engineering symbols.

Course: Outcome

CO1.Students will be able to know assembly Drawing & Nomenclature of threads

CO 2 Use the concept of projection for Mechanical Engineering Drawings.

CO 3. Be able to prepare Drawing of Screws, Studs, Keys and Cotters Locking Devices, Nuts & Bolts

.CO 4 Visualize and draw the Rivets and Welded Joints Couplings, Symbols & Conventions etc.

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House.
2. A Text Book of Engineering Drawing by Surjit Singh Published by Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill; published by SK kataria and Sons, New Delhi
4. Machine Drawing by RB Gupta published by Satya Prakashan, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: English & Communication Skills-II Lab
Course Code: CE/EE/ME/ECE - 211
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25
Duration of Exam: 3 Hrs

LIST OF PRACTICALS

1. Practice on browsing information from Internet.
2. Group Discussions
3. Mock Interviews
4. Telephone Etiquette – demonstration and practice
5. Situational Conversation with feedback through video recording
6. Presentation on a given theme (using PowerPoint)
7. Exercises leading to personality development like mannerism, etiquettes, body language etc.
8. Reading unseen passages
9. Writing (developing) a paragraph
10. Exercises on writing notices and telephonic messages

Course outcome

CO1: will have good vocablaory.
CO2: will be able to sit and speak well in group discussions
CO3: will have fine demonstrative skills.
CO4: will have good writing skills

SEMESTER II

Course Title: Applied Physics-II Lab
Course Code: CE/EE/ME/ECE - 212
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. To verify Ohm's law
2. To verify law of resistances in series and in parallel
3. To find the internal resistance of a cell by potentiometer
4. To convert a galvanometer into an ammeter of given range
5. To convert a galvanometer into voltmeter of given range
6. To find the velocity of sound in air by resonance apparatus
7. To find the frequency of a tuning fork by a sonometer
8. To set a model of an astronomical telescope and find its magnifying power
9. To set up a model of a compound microscope

Course Outcome

CO1: Understand the basics concepts of Ohm's law.
CO2: Understand the connections of resisters in parallel and series.
CO3: Have a thorough knowledge of device like ammeter,galvanometer,voltmeters etc.
CO4: Perform the conversion of galvanometer in ammeter and voltmeter.
CO5: Understand the working of telescope and microscope.

SEMESTER II

Course Title: Applied Chemistry-II Lab
Course Code: CE/EE/ME - 213
L T P
0 0 1

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Gravimetric analysis and study of apparatus used there in
2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substances
3. Determine the viscosity of a given oil with the help of "Redwood viscometer"
4. Determine the flash point of the given oil with the help of Abel's Flash Point Apparatus
5. Estimate the amount of moisture in the given sample of coal
6. Estimate the amount of ash in the given sample of coal
7. Electroplate the given strip of Cu with Ni
8. Confirmation test of alcohol, aldehydes, carboxylic acid, amine
9. To determination the amount of copper in the given sample of copper sulphate with the help of M/20 sodium thiosulphate solution.
10. Detection of metal ion in the rust (solution of rust in concentrated HCL may be given

Course Outcome

1.To know about the volatile and a non-volatile substances.
2; To know about the viscosity of different fluids.

SEMESTER II

Course Title: Basics Information Technology Lab
Course Code: CE/EE/ME - 214
L T P
0 0 4

Max. Marks: 100
External: 50
Internal Assessment: 50

LIST OF PRACTICALS

1. *Given a PC, name its various components and list their functions*
2. *Identification of various parts of a computer and peripherals*
3. Practice in installing a computer system by giving connection
4. DOS Commands (internal / external) e.g. TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP
5. Exercises on entering text and data (Typing Practice using any tutor)
6. Features of Windows as an operating system
   - Start
   - Shutdown and restore
   - Creating and operating on the icons
   - Opening closing and sizing the windows
   - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
   - Creating and operating on a folder
   - Changing setting like, date, time color (back ground and fore ground)
   - Using short cuts
   - Using on line help

7. MS-Word
   - File Management:
     Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
   - Page Set up:
     Setting margins, tab setting, ruler, indenting
   - Editing a document:
     Entering text, Cut, copy, paste using tool- bars
   - Formatting a document:
     Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
   - Aligning of text in a document, justification of document, Inserting bullets and numbering
   - Formatting paragraph, inserting page breaks and column breaks, line spacing
   - Use of headers, footers: Inserting footnote, end note, use of comments

- Inserting date, time, special symbols, importing graphic images, drawing tools
- Tables and Borders:
  Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
- Print preview, zoom, page set up, printing options
- Using Find, Replace options
- Using Tools like:
  Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and labels
- Using shapes and drawing toolbar,
- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another
- Conversion between different text editors, software and MS word

8. MS-Excel

- Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets
- Menu commands:
  Create, format charts, organize, manage data, solving problem by analyzing data, and exchange with other applications. Programming with MS-Excel, getting information while working
- Work books:

  Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet
- Creating a chart:
  Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
- Using a list to organize data, sorting and filtering data in list

9. MS PowerPoint

a) Introduction to PowerPoint

- How to start PowerPoint
- Working environment: concept of toolbars, slide layout, templates etc.
- Opening a new/existing presentation

- Different views for viewing slides in a presentation: normal, slide-sorter etc.

b) Addition, deletion and saving of slides

e) How to view the slide show?

- Viewing the presentation using slide navigator
- Slide transition
- Animation effects etc.

10. Internet and its Applications

a) Log-in to internet

b) Navigation for information seeking on internet

c) Browsing and down loading of information from internet

d) Sending and receiving e-mail

- Creating a message
- Creating an address book
- Attaching a file with e-mail message
- Receiving a message
- Deleting a message

RECOMMENDED BOOKS

1. Fundamentals of Computer by V . Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi.
2. Computers Today by SK Basandara, Galgotia Publication Pvt ltd. Daryaganj, New Delhi.
3. MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi
4. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura,New Delhi
5. Mastering Windows 95, BPB Publication, New Delhi
6. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
7. Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
8. Learning MS Office XP by Ramesh Bangia, Khanna Book Publishing Co. (P)

SEMESTER II

Course Title: Engineering Drawing-II
Course Code: CE/ERE/ME - 215
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Assembly Drawing & Threads (4 sheets)
2. Locking Devices, Nuts & Bolts (4 sheet)
3. Screws, Studs, Keys and Cotters (3 sheet)
4. Rivets and Welded Joints (3 sheets)
5. Couplings, Symbols & Conventions (4 sheets)

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House.
2. A Text Book of Engineering Drawing by Surjit Singh Published by Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill; published by SK kataria and Sons, New Delhi
4. Machine Drawing by RB Gupta published by Satya Prakashan, New Delhi.

SEMESTER II

Course Title: General Workshop Practice-II
Course Code: CE/EE/ME/ECE - 216
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

Objective

As we know that, the psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

LIST OF PRACTICALS

1. Carpentry and Painting Shop-II

Introduction to joints, their relative advantages and uses.

Job I Preparation of Dovetail joint and glued joint.
Job II Preparation of Mitre Joint
Job III Preparation of a lengthening Joint
Job 1V Preparation of at least one utility job with and without lamination.

Demonstration of job showing use of Rip Saw, Bow saw and Tramme, method of sharpening various saws.

Demonstration of job on Band Saw and circular saw, chain and diesel universal wood working machine, saw resharpening machine, Saw Brazing unit.

Demonstration of various methods of painting wooden items.

Job V Preparation of surface before painting.
Job VI Application of primer coat
Job VII Painting wooden items by brush/roller/spray

2. Fitting and Plumbing Shop-II

Description and demonstration of various types of drills, taps and dies

Selection of dies for tapping. Types of taps, tapping, dieing and drilling operations.

Job I Making internal and external threads on a job by tapping and dieing operations (manually)

Precautions while drilling soft metals, specially aluminum and lead.

Job II Drilling practice on soft metals (Aluminum, Brass and lead)

Care and maintenance of measuring tools like calipers, steel rule, try square, vernier, micrometer, height gauge, combination set, reading gauge. Handling of measuring instruments, checking of zero error, finding of least count.

Job III Preparation of a job by filing on non- ferrous metal.
Job IV Production of a utility job involving all the above operations.
Job V Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow T - Union, socket, stopcock, taps, etc

Description and demonstration of various types of drills, taps and dies; Selection of dies for tapping; Types of taps, Tapping and dieing operations.

3. Welding Shop-II

Introduction of the gas welding, gas welding equipment, adjustments of different types of flames, demonstration and precautions about handling welding equipment.

Job I Practice in handling gas welding equipment and welding practice.

Common welding joints generally made by gas welding.

Job II Preparation Butt joint by gas welding.

Job III Preparation of small cot conduit pipe frame by electric arc welding/gas welding.

Job IV Preparation of square pyramid from M.S rods by welding (type of welding to be decided by students themselves).

Job V Exercise job on spot/seam welding machine.

Demonstration of various methods adopted for painting steel items.

Job VI Painting steel items by brush/roller/ spray

4. Sheet metal & Machine shop

Introduction to sheet metal process and tools

Job I Making sheet metal joints

Job II Making sheet metal trey or a funnel or a computer chassis

Job III Preparation of sheet metal jobs involving rolling, shearing, creasing, bending and cornering

Job IV Prepare a lap riveting joint of sheet metal pieces

Introduction to various machines used in machine shop.

Job V Exercise on simple turning

Job VI Exercise on taper turning

Job VII Marking and drilling practice on mild steel piece

Job VIII Marking and drilling practice on aluminium piece

Job IX Demonstration of various functions of CNC Machine

5. Electric Shop-II

Importance of three phase wiring and its effectiveness.

Job I Laying out 3 phase wiring for an electric motor or any other 3 phase machine.

Estimating and costing power consumption.

Job II Connecting single phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.

Job III Checking continuity of connection (with tester and bulbs), location of faults with a multimeter and their rectification in simple machines and/or other electric circuits fitted with earthing.

Demonstration of dismantling, servicing and reassembling of a table fan/ceiling fan/air cooler/mixer/electric iron, Electric heater, geaser, electric oven etc.

Job IV Dismantling, serving and reassembling of any of the above electrical

appliances.

Job V Demonstration of testing single phase/three phase electrical motor by using voltmeters ammeter clip on meter technometer etc.

Job VI Reversing the rotation of motor.

RECOMMEND BOOKS

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana and P Kaunaioh; MacMillan India Ltd., New Delhi
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi

Note:

The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

SEMESTER-II

Course Title: Student Centred Activities
Course Code: EE-217
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

SCA will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defence/ Disaster Management activities etc.

Department of Mechanical Engineering

SEMESTER- III

Course Title: Thermodynamics-I
Course Code: ME - 301

L	T	P
4	0	0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

A diploma holder in this course is supposed to maintain steam generators, turbines, compressors and other power plant equipment. Therefore, it is essential to impart him basic concepts of thermodynamics, steam generators, steam turbines, compressors and about IC engines.

UNIT-I

Fundamental Concepts

Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic, properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process, reversible and irreversible processes, Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy, internal energy

Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avogadro's law, Renault's law, Universal gas constant, Characteristic gas constants, derivation.

Specific heat at constant pressure, specific heat at constant volume of gas, simple problems on gas equation

UNIT-II

Thermodynamic Processes and Heat Transfer

Types of thermodynamic processes – isochoric, isobaric, isothermal, isentropic, polytropic and throttling processes, equations representing the processes.

Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above processes

Introduction to Heat Transfer: Modes of heat transfer, Fourier's law, steady state conduction, composite structures, Natural and forced convection, thermal radiation

UNIT-III

Laws of Thermodynamics

Laws of conservation of energy, first law of thermodynamics (Joule's experiment), Application of first law of thermodynamics to non-flow systems – Constant volume, constant pressure, Adiabatic and polytropic processes, steady flow energy equation, Application of steady flow energy to equation, turbines, pump, boilers, compressors, nozzles, evaporators, limitations.

Heat source and heat sinks, statement to second laws of thermodynamics; Kelvin Planck's statement, Classius statement, equivalence of statements, Perpetual motion Machine of first kind, second kind, (PMM1, PMM2), Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility, entropy.

UNIT-IV

Properties of Steam and Steam Boiler

Formation of steam and related terms, thermodynamics properties of steam, steam tables, internal latent heat, internal energy of stream, entropy of water, entropy of steam, T- S diagrams, Mollier diagram (H – S Chart).

Quality of steam (dryness fraction), measurement of dryness fraction, throttling calorimeter, separating and throttling calorimeter, Carnot vapour cylce, Rankine cycle

Course

Steam Boiler: Water and fire tube boilers, construction and working of lancashire, babcock and Wilcox boilers. Various mounting and accessories of boilers.

UNIT-V

Air Standard Cycles/Air Compressors

Meaning of air standard cycle – its use, condition of reversibility of a cycle, Description of Carnot cycle, Otto cycle, Diesel cycle, simple problems on efficiency, calculation for different cycles.

Comparison of Otto, Diesel cycles for same compression ratio or same peak pressure developed.

Functions of air compressor – uses of compressed air, type of air compressors. Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram.

Multistage compressors – advantages over single stage compressors, use of air cooler condition of minimum work in two stage compressor (without proof), simple problems

Rotary compressors – types, descriptive treatment of centrifugal compressor, axial flow compressor, vane type compressor.

related field of work.

transformations, equilibrium and entropy to the various engineering devices.

Course: Outcome

CO1-Students will be able to explain the basic principles and applications of the thermody0mics to the various real life systems.

CO2-Students will be able to describe fundamental laws of thermody0mics.

CO3-Students will be able to apply the concepts such as Entropy, Energy Balance also the calculations of heat, work and other important thermodynamic properties for various ideal gas processes.

CO4-Students will be able to estimate performance of various thermody0mic gas power cycles and gas refrigeration cycle and availability in each case.

CO5-Students will be able to examine the condition of steam and performance of vapour power cycle and vapour compression cycle.

CO6-Students will understand Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.

CO7-Students will be able to use Psychometric charts and estimate various essential properties related to Psychrometry and processes.

RECOMMENDED BOOKS

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi

2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi

3. Basic Thermodynamics by PB Joshi and US Tumne; Pune Vidyarthi Grah Prakashan

4. Engineering Thermodynamics by CP Arora; Tata McGraw Hill, Delhi

5. A Treatise on Heat Engineering by VP Vasandani and DS Kumar; Metropolitan Book Company

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER-III

Course Title: Applied Mechanics
Course Code: CE/ME-302

L	T	P
4	0	0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students

UNIT-I
Introduction & Laws of Forces

Introduction: Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics. Definition of basic and derived quantities. Basic units and derived units. Different systems of units (FPS, CGS, MKS & SI) and their conversion from one to another for density, velocity, acceleration, force, pressure, work, power. Concept of rigid body.

Laws of Force: Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & uniformly distributed force, effects of force, characteristics (elements) of a force. Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position. Composition and resolution of *coplanar* concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces-graphically, analytically, resolution of forces, resolving a force into two rectangular components. Free body diagram. Equilibrant force and its determination. Lami's theorem (concept only).

[*Simple problems on above topics*]

UNIT-II
Moment

Concept of moment. Moment of a force and units of moment. Varignon's theorem (definition only). Principle of moment and its applications (Levers–simple and compound, steel yard, safety valve, reaction at support). Parallel forces (like and unlike parallel force), calculating their resultant.

Concept of couple, its properties and effects. General conditions of equilibrium of bodies under coplanar forces. Position of resultant force by moment.

[*Simple problems on the above topics*]

UNIT-III
Friction

Definition and concept of friction, types of friction, force of friction. Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction.

Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane, friction in simple screw jack.

Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force:

(a) Acting along the inclined plane horizontally.

(b) At some angle with the inclined plane.

UNIT-IV

Centre of Gravity & Moment of Inertia

Centre of Gravity: Concept, definition of centroid of plain figures and centre of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion.

Determination of center of gravity of solid bodies-cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed.

[*Simple problems on the above topics*]

Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations).* Second moment of area for L, T and I sections, section modulus.

UNIT-V

Simple Machines

Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machines. Simple and compound machine (Examples). Definition of ideal machine, reversible and self locking machine. Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency. System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency. Working principle and application of wheel and axle, different pulley blocks, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application. *Simple problems on the above topics*

Course: Outcome

CO 1.To provide a comprehensive knowledge of force, work and energy to calculate work done, power required and efficiency for various simple machines.

CO 2. To understand the importance and application of various laws of Mechanics

CO 3. At the end of of the course students will able to understand the importance and application of various laws of mechanics

REFERENCES

1. Applied Mechanics By TL Singla, Harbhajan Singh Parmod Kumar Singla Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.
3. Text Book in Applied Mechanics by MM Malhotra, R Subramanian, PS Gahlot and BS Rathore; Wiley Eastern Ltd., New Delhi.
5. Engineering Mechanics and Strength of Materials by S Ramamurtham; Dhanpat Rai Publishing Co. (P) Ltd., Delhi.
6. Engineering Mechanics by AB Basu; Tata McGraw Hill Publishing Co. Ltd., Delhi.

7. A Text Book of Applied Mechanics by NL Arora and RK Dhawan; India Publishing House, Delhi.
8. A Text Book of Applied' Mechanics by RK Rajput; Laxmi Publications, New Delhi.
9. Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER-III

Course Title: Elements of Electrical and Electronics Engineering
Course Code: ME - 303

L	T	P
4	0	0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

The objective of this subject is to impart fundamental knowledge and skills regarding basic electrical and electronics engineering, which diploma holders will come across in their professional life. This course will provide the students to understand the basic concepts and principles of d.c. and a.c. fundamentals, electromagnetic induction, batteries, transformers, motors distribution system, domestic installation, electrical safety etc. The students will also learn basic electronics including diodes and transistors and their applications.

Unit-I

Application, Advantage of Electricity and Basic Electrical Quantities Definition of voltage, current, power and energy with their units, name of instruments used for measuring above quantities, connection of these instruments in an electric circuit

Difference between ac and dc, various applications of electricity, advantages of electrical energy over other types of energy

Unit-II

Transmission and Distribution System

Key diagram of 3 phase transmission and distribution system, Brief functions of accessories of transmission line. Difference between high and low voltage distribution system, identification of three-phase wires, neutral wire and earth wire in a low voltage distribution system. Identification of voltages between phases and between one phase and neutral. Difference between three-phase and single-phase supply. Arrangement of supply system from pole to the distribution board, function of service line, energy meter, main switch, distribution board

Unit-III

Electrical Safety and Domestic Wiring

Electrical shock and precautions against shock, treatment of electric shock, concept of fuses and their classification, selection and application, concept of earthing and various types of earthing, applications of MCBs and ELCBs

Distinction between light-fan circuit and single phase power circuit, sub-circuits, various accessories and parts of domestic electrical installation. Identification of wiring systems.

Unit-IV

Electric Motors and Pumps

Definition and various applications of single-phase and three-phase motors. Connection and starting of three-phase induction motors by star-delta starter.

Type of pumps and their applications, Use of direct online starter and star delta starter.

Unit-V

Basic Electronics

Basic idea of semiconductors – P and N type; diodes, zener diodes and their applications, transistor – PNP and NPN, symbols, identification of terminals of transistor, of current flowing in a transistor their characteristics and uses. Characteristics and applications of a thyristor, characteristics and applications of servo motors.

RECOMMENDED BOOKS

1. Basic Electrical Engineering by PS Dhogal; Tata McGraw Hill Publishers, New Delhi
2. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New Delhi
3. Basic Electricity by BR Sharma; Satya Prakashan, New Delhi
4. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi
6. Basic Electronics by VK Mehta; S Chand and Co., New Delhi
7. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER- III

Course Title: Workshop Technology-I	Max. Marks: 100
Course Code: ME - 304	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various manufacturing processes is required to be imparted. Hence the subject of workshop technology.

UNIT-I

Welding

Principle of welding, Welding positions and techniques, symbols.- Gas Welding - Types of gas welding flames and their applications, Gas welding equipments- Gas welding torch, Oxy – acetylene cutting torch, Blowpipe, Pressure regulators, Filler rods and fluxes.

Arc Welding - Arc welding machines and equipment, A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation, Electrodes: Classification, B.I.S. specification and selection, Flux for arc welding.

Other Welding Processes - Principle of resistance welding, working and applications of spot welding, seam welding, projection welding and percussion welding, Welding defects and inspection of welded joints.

Modern Welding Methods - Principle of operation, advantages, disadvantages and applications of: Tungsten inert gas (TIG) welding, Metal inert gas (MIG) welding, Thermit welding, Electro slag welding.

UNIT-II

Pattern Making and Moulding

Types of pattern, Pattern material, Pattern allowances. Pattern codes as per B.I.S., Introduction to cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores.

Moulding Sand - Properties of moulding sand, their impact and control of properties viz. moisture, permeability, refractoriness, adhesiveness, cohesiveness, strength, flow ability, collapsibility, Various types of moulding sand.

Mould Making - Introduction to moulding tools, Types of moulds, Step involved in making a mould, Moulding boxes, hand tools used for mould making, Moulding processes: Bench moulding, floor moulding, pit moulding and machine moulding,

UNIT-III

Casting

Principles, working and applications of Dies casting: hot chamber and cold chamber, Centrifugal castin. Gating and Risering System - Elements of gating system, Pouring basin, sprue, runner, gates, Types of risers, location of risers, Directional solidification.Casting Defects - Different types of casting defects, Testing of defects: radiography, magnetic particle inspection, and ultrasonic inspection.

UNIT-IV

Lathe

Description and function of various parts of a lathe. Classification and specification of various types of lathe. Work holding devices. Lathe operations: - Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling. Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time, tool life formula. Lathe accessories:- Centers, dogs, chucks, collets, face plate, angle plate, mandrel, steady rest, taper turning attachment, tool post grinder.

UNIT-V

Cutting Tools and Cutting Materials

Various types of single point cutting tools and their uses.Single point cutting tool geometry, tool signature. Multipoint cutting tool. Properties of cutting tool material.

Study of various cutting tool materials viz. High speed steel, tungsten carbide, cobalt steel, cemented carbides, stellite, ceramics and polycrystalline diamond,Various failures of cutting tool, Cutting fluid – their types, importance, properties & advantages and applications.

Course Outcomes: After completion of this course, the successful students will be able to:

CO 1.Learn the process of metal casting.

CO 2.Understand different sheet metal operations

CO 3.Explain the concept of different metal forming operations.

CO 4.Learn about different welding processes.

CO 5.Understand powder metallurgy and plastic technology.

CO 6. The ability to select manufacturing processes appropriate for particular applications;

CO 7.Further develops interpersonal understanding, teamwork and communication skills working on group assignments.

RECOMMENDED BOOKS

1. A Text Book of Welding Technology by O.P. Khanna.
2. Welding Technology by R.L. Agarwal and Tahil Maghanani; Khanna Publishers, Delhi.
3. A Text Book on Foundry Technology by M.Lal and O.P.Khanna.
4. Foundry Engineering by Tahil Maghnani.
5. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons, Delhi.
6. Manufacturing Technology by M.Adithan and AB Gupta; New Age International (P) Ltd, Delhi.
7. Workshop Technology by RC Jindal; Ishan Publication Ambala city.
8. Elements of Workshop Technology by S.K.Choudhary and Hazara; Asia Publishing House.
9. Metal Cutting Theory and Practices by A Bhattacharyya, Central Book Publisher, Kolkata.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER- III

Course Title: Material Science
Course Code: ME-305
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

UNIT-I

Introduction

Introduction and importance of engineering materials in industry, Classification of engineering materials, Properties of engineering materials; UTS, Ductility, Toughness, Hardness, Malleability, Electrical conductivity and Thermal conductivity.

Structure of Metals: Space lattice, Unit cell, BCC, FCC and CPH Structure of important metals, Crystallization (T-T diagram) of a pure metal, Grains, grain size and grain boundaries, Effect of grain size on properties of metals, Elastic and plastic deformation of metals. Imperfection in crystal structure

Iron Carbon Diagram

Cooling curve of iron and its allotropic forms. Constituents of iron and carbon: Ferrite, cementite, pearlite, austenite and ledeburite. Simplified iron – carbon diagram showing various phases and critical temperatures

UNIT-II

Ferrous Metals & Alloys

Principal ferrous materials – CI, steel and wrought iron. Main properties of different types of cast irons such as grey, white, mottled, malleable and ductile cast irons. Properties and composition of wrought iron. Classification, properties and uses of plain carbon steels

Effect of alloying elements such as aluminum, chromium, nickel, cobalt, manganese, molybdenum, tungsten, vanadium, silicon, sulphur and phosphorous on steels, Importance of alloy steels over plain carbon steels, Composition, properties and uses of stainless steels and high speed steels, Coding of structural steels, plain carbon steels, alloy steels and tool steels as per BIS,

UNIT-III

Non-Ferrous Metals & Alloys

Properties and uses of copper, aluminium, tin, zinc and lead. Composition and use of copper alloys, such as cartridge brass, muntz metal, phosphor bronze, gun metal and aluminium bronze. Composition and uses of cast aluminium-alloys & wrought alminium-alloys.

UNIT-IV

Other Important Materials

Plastics: Definition, classification of plastics, fibre glass, reinforced plastics.

Major applications of various plastics & their uses and grades. Composite materials.Heat insulating materials: Properties and uses of asbestos, glass wool, thermocole, cork, mica. Electrical insulating materials. Properties and uses of china clay, leather, bakelite, ebonite, glass wool, rubber, felt. Sound insulating materials: Cork, fibre boards.abrication materials: Wood, plywood, rubber – natural and synthetic, Glass – plate glass, toughened glass, safety glass. Refractory materials: General characteristics and uses of dolomite, ceramics. Protective coating

materials: Paints, primers, varnishes, enamels, putti, electroplating materials, rubasil, teflon coating. Sealant and adhesives – Application and availability of sealant and adhesives for industrial user.

UNIT-V

Heat Treatment of Steels & Testing of Material

Introduction and importance of heat treatment of steel. Main features of the heat treatment processes such as annealing, normalizing, hardening, tempering, surface hardening and case hardening. Different types of heat treatment furnaces.

Description of identification tests such as appearance, sound, spark, weight, magnetic, bend and filing. Introduction and importance of non-destructive tests such as X-ray, gamma ray, magnaflux and ultrasonic. Study of microstructure using optical microscope, SEM

Course: Outcome

CO1-Be able to apply core concepts in Materials Science to solve engineering problems.

CO2-Interpret about material fundamental and material processing.

CO3-Distinguish the defects in crystal and its effect on crystal properties.

CO4-Figure out the different mechanical properties of material by studying different destructive and non- destructive testing.

CO5-Articulate and utilize corrosion prevention strategies and estimate corrosion behavior of
materials and components

CO6-Acknowledge the importance of surface modification and study the different surface modification methods.

CO7-Perceive the basics of Powder metallurgy and application of powder metallurgy

CO8-Select proper metal, alloys, non metal and powder metallurgical component for specific

RECOMMENDED BOOKS

1. Advances in Material Science by Dr RK Dogra and Dr AK Sharma; SK Kataria and Sons, Nai Sarak, New Delhi.

2. Physical Metallurgy by Y Lakhtin; Mir Publication, Moscow.

3. Metallurgy by A Guleav, Mir Publication, Moscow.

4. Material Science by RK Rajput, Laxmi Publications, Daryaganj, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTE- III

Course Title: Thermodynamics-I -Lab
Course Code: ME - 311

L	T	P
0	0	2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Determination of temperature by
   - 1.1 Thermocouple
   - 1.2 Pyrometer
   - 1.3 Infrared thermometer
2. Demonstration of mountings and accessories on a boiler.
3. Study of boilers (through industrial visit)
4. Study of air compressors.
5. Demonstration of heat transfer through conduction, convection and Radiation

INSTRUCTIONAL STRATEGY

1. Expose the students to real life problems.
2. Plan assignment so as to promote problem solving abilities.

SEMESTER-III

Course Title: Applied Mechanics-Lab
Course Code: ME - 312

L	T	P
0	0	2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Verification of the following laws:
   a) Parallelogram law of forces
   b) Triangle law of forces
   c) Polygon law of forces
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane.
5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel.
7. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.
8. To find out center of gravity of regular lamina.
9. To find out center of gravity of irregular lamina.
10. To determine coefficient of friction between three pairs of given surface.

SEMESTER-III

Course Title: Elements of Electrical and Electronics Engineering Max. Marks: 50
Course Code: ME - 313 External: 25
L T P Internal Assessment: 25
0 0 2

LIST OF PRACTICALS

1. Connection of a three-phase motor and starter with fuses and reversing of direction of rotation
2. Connection of a single-phase induction motor with supply and reversing of its direction of rotation
3. To test a battery for its charged and discharged condition.
4. Identify the different faults in a domestic wiring system
5. Connection and reading of an electric energy meter with supply and load using ammeter, voltmeter, wattmeter
6. Study of a distribution board for domestic installation
7. Ohm's law verification
8. Verification of law of resistance in series
9. Verification of law of resistance in parallel
10. Draw V-I characteristics of P-N junction diode
11. Draw input and output characters of a transistor
12. Draw reverse break down characteristics of a zener diode

INSTRUCTIONAL STRATEGY

The teacher should give emphasis on understanding of concept and various terms used in the subject. Practical exercises will reinforce various concepts.

SEMESTER-III

Course Title: Workshop Technology – I Lab
Course Code: ME- 314
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

WELDING

1. Making following types of joints by gas welding
   - Preliminary joining practice
   - Vertical welding
2. Exercises of gas welding on the following
   - Aluminum
   - Brass
   - Copper
   - C.I.
3. Gas cutting of the following types
   - Preliminary gas cutting practice
   - Stock cutting by oxy acetylene
   - C.I. cutting
4. Making following types of joints by arc welding on M.S, C.I and aluminium
   - Joining practice by arc welding
   - Butt and lap joint (in vertical position, travel up and down).
   - Welding of outside corner joint.
   - Inspection of the welding defects occurred in the job.
5. Exercise on spot welding.
6. Exercise on projection welding (industrial visit should be arranged).
7. Exercise on brazing.
8. Exercise on TIG welding.
9. Exercise on MIG welding.

FOUNDRY

10. Preparation of the following types of moulds.
    - Floor molding
11. Moulding and casting of
    - A solid pattern
    - A split pattern
12. Testing and inspection of casting defects visually.
13. Study of constructional features of coupla furnace.

TURNING

14. Simple exercise on turning and step turning.

15. A composite job involving turning, taper turning, thread cutting and knurling and Eccentric turning.

16. Exercise on internal threading on lathe.

FITTING

17. Dovetail fitting in mild steel piece

18. Radius fitting in mild steel piece.

19. Exercise on pipe bending on MS pipe and PVC pipe using pipe bending machine.

PATTERN MAKING

20. Preparation of solid pattern (single piece)

21. Preparation of split pattern

22. Preparation of self cored pattern

Note: 1. The Workshop Superintendent will prepare & finalize the specific drawings of all jobs in the beginning of semester in consultation with staff

6. The Institutions where foundry shop is not existing, they should arrange a visit to foundry industry in the nearby area.

SEMESTER-III

Course Title: Material Science-Lab
Course Code: ME-315
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Classification of about 25 specimens of materials/machine parts into
   (i) Metals and non metals
   (ii) Metals and alloys
   (iii) Ferrous and non ferrous metals
   (iv) Ferrous and non ferrous alloys
2. Given a set of specimen of metals and alloys (copper, brass, aluminium, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them.
3. a) Study of heat treatment furnace.
   b) Study of a thermocouple/pyrometer.
4. Study of a metallurgical microscope and a specimen polishing machine.
5. To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of following materials:
   i) Brass ii)Copper iii)Grey iv)Malleable v)Low carbon steel vi)High carbon steel vii) HSS
6. To anneal a given specimen and find out difference in hardness as a result of annealing.
7. To normalize a given specimen and to find out the difference in hardness as a result of normalizing.
8. To harden and temper a specimen and to find out the difference in hardness due to tempering.

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect samples of various materials available in the market. Visits to industry should be planned to demonstrate use of various types of materials or Heat Treatment Processes in the industry.

Department of Mechanical Engineering

SEMESTER-III

Course Title: Mechanical Engineering Drawing-I Max. Marks: 100
Course Code: ME- 316 External: 50
L T P Internal Assessment: 50
0 0 4

Objective

Diploma holders in Mechanical Engineering are required to interpret drawings and therefore it is essential that they have skills of preparing drawings and sketches of mechanical components. This subject aims at development of drawing skills in the students.

- *Limits and fits* *(03 sheets)*

  Maximum limit of size, minimum limit of size, tolerance, allowance, deviation, upper deviation, lower deviation, fundamental deviation, clearance, maximum clearance, minimum clearance. Fits – clearance fit, interference fit, transition fit. Hole basis system, shaft basis system, tolerance grades, calculating values of clearance, interference, hole tolerance, shaft tolerance with given basic size for common assemblies like $H_7/g6$, $H_7/m6$, $H_8/p6$

- *Introduction to drawing office equipment through a visit to modern drawing office of an industry.*
- Drawing of the following with complete dimensions, tolerances, materials and surface finish marks.

.1	Universal coupling (Assembly) and Oldham coupling	(02Sheets)
.2	Bearings	(05 sheets)
	.2.1 Bushed Bearing (Assembled Drawing)	
	.2.2 Ball Bearing and Roller Bearing (Assembled Drawing)	
	.2.3 Plummer Block (Detailed Drawing)	
	.2.4 Plummer Block (Assembled Drawing)	
	.2.5 Foot step Bearing (Assembled Drawing)	
.3	Bracket	(01 sheets)
	.3.1 Wall bracket (orthographic views)	
.4	Pulleys	(03 sheets)
	.4.1 Stepped Pulley	
	.4.2 V. Belt Pulley	
	.4.3 Fast and loose pulley (Assembled Drawing)	
.5	Pipe Joints	(03 sheets)
	.5.1 Expansion pipe joint (Assembly drawing)	
	.5.2 Flanged pipe and right angled bend joint (Assembly Drawing)	
	.5.3 Spigot and Socket joint	
.6	Lathe Tool Holder (Assembly Drawing)	(01 sheets)
.7	Reading of mechanical components drawings	(01 sheets)
.8	Sketching practice of bearing, bracket and pulley.	(02 sheets)
9.	Drilling Jig (Detail and Assembly)	(2 sheets)
10.	Machine Vice (Detail and Assembly)	(3 sheets)

Note:- (1) First angle projection should be followed, 20% of drawings may be prepared in third angle projection.

(2) SP-46-1988 should be followed
(3) The drawing should include discussion with tolerances, whenever necessary and material list as per BIS / ISO specifications.

INSTRUCTIONAL STRATEGY

1. Teachers should show model or realia of the components/part whose drawing is to be made
2. Emphasis should be given to cleanliness, dimensioning, layout of sheet
3. Teachers should ensure use of IS codes related to drawing
4. Focus should be on the proper selection of drawing instrument and its proper use

SEMESTER-III

Course Title: Ecology and Environmental Awareness Camp Max. Marks: 50
Course Code: EE-316 Internal Assessment: 50
L T P
0 0 4

ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

1. Basics of ecology, eco system and sustainable development

2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table

3. Sources of pollution - natural and man made, their effects on living and non-living organisms

4. Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms

5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms

6. Sources of noise pollution and its effects

7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods, methods of vermicomposting

8. Mining, blasting, deforestation and their effects

9. Legislation to control pollution and protect environment

10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements

11. Current issues in environmental pollution and its control, Global warming
. Green house gases, non-conventional sources of energy, introduction to clean technology.

12. Introduction to Green buildings, site selection, material efficiency, energy efficiency, water efficiency, building form.

SEMESTER-IV

Course Title: Metrology and Quality Control	Max. Marks: 100
Course Code: ME -- 401	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

Metrology is the science of measurement, Diploma holders in this course are responsible for ensuring process and quality control by making measurements and carrying out inspection of various parameters. For this purpose, knowledge and skills about various measuring instruments are required. The aim of this subject is to develop knowledge and skills regarding various measuring instruments amongst the students.

UNIT-I
Introduction
Definition of metrology. Standard of measurement. Types of Errors - Controllable and random errors. Precision, accuracy, sensitivity, hystersis, response time, repeatability, calibration, uncertainty of measurement. Standardization and standardizing organizations
Limits, Fits and Tolerances: Definition and terminology of limits, fits and tolerances.Hole basis and shaft basis systems. Type of fits. Limit gauges

UNIT-II
Linear Measurement
Construction features and use of instruments for non precision linear measurement: steel rule, callipers, surface plate, angle plate, V-block. Construction features and use of instruments for precision measurements: vernier calipers, vernier height and depth gauges, micrometers. Slip gauges, Indian standards of slip gauges, sets of slip gauges, use of slip gauges. Cylinder bore gauges, feeler and wire gauges. Comparators – Characteristics, uses, working principles of different types of comparators: mechanical, electrical, electronics and pneumatic comparator.

UNIT-III
Angular Measurement
Construction and use of instruments for angular measurements: bevel protector, sine bar, angle gauges, clinometer, angle dekker.Optical instruments for angular measurement, auto collimator.
Measurement of Surface Finish: Terminology of surface roughness. Concept of primary texture and secondary texture. Factors affecting surface finish. CLA, RMS and RA value.
Principle and operation of stylus probe instruments. Tomlinson surface meter and Taylor surface talysurf.
Measurements of Screw threads and Gears. Measurement of screw threads- Introduction, measurements of external and core diameters, checking of pitch and angle of threads with gauges. Effective diameter measurement by three wire method. Measurements of gears (spur) – Measurement of tooth thickness, pitch, testing of alignment of teeth. Profile projector, Coordinate Measuring Machine (CMM), Tool maker's microscope.

UNIT-IV

Instrumentation

Various types of instruments used for mechanical quantities such as displacement, velocity, acceleration, speed and torque. Use of transducers and electronic counters, stroboscope, vibrating reeds and tachometers. Strain gauge – use of strain gauge and load cells. Liquid level and viscosity – liquid level measuring methods and devices, viscometer – plate and cone viscometer, two float viscometer, Rheo viscometer. Temperature measurement – Various types of thermometers, thermocouples, pyrometer (radiation and optical type)

Inspection: Necessity of inspection, their advantages. Types of inspection: remedial, preventive and operative inspection, incoming inspection, in-process and final inspection

UNIT-V

Quality Control

Definition of quality, importance of quality, quality control, Basic statistical concepts, empirical distribution and histograms. Frequency, mean, mode, standard deviation, normal distribution, binomial and poisson (No mathematical derivations). Introduction to control charts, - X, R, P and C charts and their applications. Sampling plans, selection of sample size, method of taking samples. Concept of TQM

Standards and Codes: National and International codes. ISO 9000, concept and its evaluation and implications

Course: Outcome

CO 1.To understand the basic measurement units and able to calibrate various measuring devices.

CO 2. To express error and correction factors of various measuring devices.

CO 3. To use measuring tools such as Sine Bar, Sine Center, Bevel Protractor,

CO 4. Tool Maker Microscope, Gear Tooth Micrometer, Optical Flats

REFERENCE BOOKS

1. Engineering Metrology by RK Rajput; SK Kataria and Sons, Ludhiana.
2. Engineering Metrology by RK Jain; Khanna Publishers, New Delhi.
3. A Text Book of Production Engineering by RC Sharma; S Chand and Company, New Delhi.
4. Metrology Laboratory Manual by M Adithan and R Bahl; NITTTR, Chandigarh.
5. Statistical Quality Control by M. Mahajan: Dhanpat Rai and Sons, Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Thermodynamics-II	Max. Marks: 100
Course Code: ME - 402	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

A diploma holder in this course is supposed to know about testing of IC Engines, fuel supply, ignition system, cooling and lubrication of engines and gas turbines. Hence this subject

UNIT-I

IC Engines and Fuel System

Introduction and classification of IC engine. Working principle of two stroke and four stroke cycle, SI engines and CI engines, Otto cycle, diesel cycle and dual cycle. Location and functions of various parts of IC engines and materials used for them. Concept of IC engine terms: bore, stroke, dead centre, crank throw, compression ratio, clearance volume, piston displacement and piston speed.

Fuel system of Diesel Engine: Component of fuel system. Description and working of fuel feed pump. Fuel injection pump. Injectors.

UNIT-II

Fuel Supply and Ignition System in Petrol Engine

Concept of carburetion. Air fuel ratio. Simple carburetor and its application. Working of Solex and Amal carburetor (line sketch) and its advantages over simple carburetor. Description of battery coil and magneto ignition system. Recent developments in fuel supply system - MPFI, electronic ignition system, common rail direct injection (Diesel)

Increasing the efficiency by adopting super charging & turbo charging.

UNIT-III

Cooling, Lubrication and Testing of IC Engines

Function of cooling system in IC engine. Air cooling and water cooling system, use of thermostat, radiator and forced circulation in water cooling (description with line diagram). Function of lubrication. Types and properties of lubricant. Lubrication system of IC engine

Testing of IC Engines : Engine power - indicated and brake horse power. Efficiency - mechanical, thermal. relative and volumetric. Methods of finding indicated and brake power. Morse test for petro1 engine. Heat balance sheet. Concept of pollutants in SI and CI engines, pollution control, norms for two or four wheelers - EURO - I, EURO -II, EURO-III, their Indian version, methods of reducing pollution in IC engines alternative fuels like - CNG, LPG

UNIT-IV

Steam Turbines and Steam Condensers

Function and use of steam turbine. Steam nozzles - types and applications. Steam turbines - impulse, reaction, simple and compound, construction and working principle. Governing of steam turbines. Function of a steam condenser, elements of condensing plant. Classification - jet condenser, surface condenser. Condenser vacuum, vacuum efficiency, condenser efficiency (formula). Cooling pond and cooling towers.

UNIT-V

Steam Power Plant/Gas Turbines

Main parts and working of power plant with simple line diagram, coal handling system, pulverized coal firing system, ash handling and disposal system, cooling towers. Use of feed water heater, economizer, air pre-heater, re-heating and regeneration and dust collector

Gas Turbines and Jet Propulsion: Classification, open cycle gas turbine and closed cycle gas turbines, comparison of gas turbines with reciprocating IC engines, applications and limitations of gas turbines. Principle of operation of ram-jet engine and turbo jet engine - application of jet engines. Rocket engine - its principle of working and applications. Fuels used in jet propulsion

Course: Outcome

CO1-Classify various types of Engines, to compare Air standard, Fuel Air and Actual cycles Also
make out various losses in real cycles

CO2-Understand Theory of Carburetion, Types of carburetors, Modern Carburetor.

CO3-To understand the main theory behind Internal Combustion Engine along with the understanding of all the components and systems used in the automotive systems and carry out the performance and emission in IC Engines. To understand Stages of Combustion in S. I. Engines and Theory of Deto0tion, Pre-ignition and factors affecting deto0tion.

CO4-Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Criteria for good combustion chamber and types.

CO5-Carry out Testing of I. C. Engines and a0lyze its performance also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control.

CO6-Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors.

CO7-Students will be able to apply these basics in the designing of the automotive components and engines.

RECOMMENDED BOOKS

1. Elements of Heat Engines by Pandey and Shah; Charotar Publishing House, New Delhi.
2. Thermal Engineering by PL.Ballaney; Khanna Publishers, New Delhi.
3. Engineering Thermodynamics by Francis F Huang; MacMillan Publishing Company

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Strength of Materials	Max. Marks: 100
Course Code: ME - 403	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

OBJECTIVE

Diploma holders in this course are required to analyze reasons for failure of different components and select the required material for different applications. For this purpose, it is essential to teach them concepts, principles, applications and practices covering stress, strain, bending moment, shearing force, shafts, columns and springs. It is expected that efforts will be made to provide appropriate learning experiences in the use of basic principles in the solution of applied problems to develop the required competencies

UNIT-I

Stresses, Strains and Instantaneous Stress

Concept of load, stresses and strain. Tensile, compressive and shear stresses and strains. Concept of elasticity, elastic limit and limit of proportionality. Hooke's Law, Young's Modulus of elasticity, Yield point, plastic stage, Strain hardening, Stress strain diagram, Ultimate strength and breaking stress, Percentage elongation, shear stress, shear modulus, Proof stress and working stress. Factor of safety, Bars of varying cross-section, Temperature stresses and strains, Composite sections under compression and tension, Lateral strain, Poisson's ratio, Numerical Problems.

Resilience and Instantaneous Stress: Concept of resilience, proof resilience and co-efficient of resilience. Modes of loading: gradual loading, sudden loading and falling load
Calculation of instantaneous stress induced due to gradual loading, sudden load and falling loads. Numerical problems on the above.

UNIT-II

Beams and Types of Loads

Concept of beams, Types of beams, Types of loading, Concept of end supports – Roller, hinged and fixed, Concept of bending moment and shearing force, Bending moment and shearing force diagram for cantilever and simply supported beams with and without overhang subjected to concentrated and UDL. Point of contra flexure. Numerical problems.

UNIT-III

Bending Stress

Concept of bending stresses, Theory of simple bending, assumptions made in bending theory, Use of equation $\sigma/y=M/I=E/R$,Concept of moment of resistance, Bending stress diagram, Calculation of maximum bending stress in beams of rectangular, I and T sections,Permissible bending stress, section modulus for rectangular, circular and symmetrical I sections

UNIT-IV

Columns

Concept of column, modes of failure, Types of columns, Buckling load, crushing load, Slenderness ratio, Factors effecting strength of a column, End restraints, Effective length, Strength of column by Euler Formula without derivation, Rankine Gourdan formula (without

derivation),Direct and eccentric loading, Direct and bending stresses and their combination, Numerical problems.

UNIT-V

Torsion and Springs

Determination of number of plates, Maximum bending stress and deflection, Closed coil helical spring subjected to axial load, Stress deformation, Stiffness and angle of twist and strain energy, Falling loads on springs, Numerical problems

Torsion: Concept of torsion, difference between torque and torsion, Use of torque equation, Comparison between solid and hollow shaft with regard to their strength, weight and shear stress diagram, Power transmitted by shaft, Concept of mean and maximum torque, Numerical problems.

Course: Outcome

CO 1. Mechanical behavior of the body by determining the stresses, strains and deflections produced by the loads up to the elastic limit.

CO 2.Fundamental concepts related to deformation, strain energy, moment of inertia, load carrying capacity, slope an deflection of beams, shear forces, bending moments, torsional moments, column and struts, principal stresses and strains and theories of failure

CO 3.Apply knowledge of mathematics, science for engineering applications

CO 4. Design and conduct experiments, as well as to analyze and interpret data

CO 5. Design a component to meet desired needs within realistic constraints of health and safety

CO 6. Identify, formulate, and solve engineering problems

CO 7.Practice professional and ethical responsibility

CO 8. Use the techniques, skills, and modern engineering tools necessary for engineering practice

RECOMMENDED BOOKS

1. Strength of Materials by R.S. Khurmi; S. Chand and Company, Delhi.

2. Strength of Materials by DR Malhotra, Satya Prakashan, Delhi.

3. Strength of Materials by RK Rajput, SK Kataria and Sons, Delhi

4. Strength of Materials by Birender Singh.

5. Strength of Materials by Dr. Sadhu Singh.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER-IV

Course Title: **Workshop Technology-II**
Course Code: ME - 404
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various machining processes, modern machining methods, processing of plastic, tools, jigs and fixtures and processing of plastics is required to be imparted. Hence the subject of workshop technology.

UNIT-I
Drilling and Boring
Drilling - Classification of drilling machines and their description, various operations performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping, speeds and feed during drilling, impact of these parameters on drilling, machining time, types of drills and their features, nomenclature of a drill, drill holding devices, types of reamers.
Boring - Principle of boring, Classification of boring machines and their brief description, Specification of boring machines, Boring tools, boring bars and boring heads, Description of jig boring machine.

UNIT-II
Milling
Specification and working principle of milling machine,Classification, brief description and applications of milling machines,Details of column and knee type milling machine,Milling machine accessories and attachment – Arbors, adaptors, collets, vices, circular table, indexing head and tail stock, vertical milling attachment, spiral milling attachment, slotting attachment and rack milling attachment.Milling methods - up milling and down milling. Identification of different milling cutters and work mandrels. Work holding devices. Milling operations – face milling, angular milling, form milling, straddle milling and gang milling.Cutting speed and feed, depth of cut.Indexing on dividing heads, plain and universal dividing heads.Indexing methods: direct, Plain or simple, compound, differential and angular indexing.

UNIT-III
Grinding
Purpose of grinding. Specifications of grinding wheel – Abrasive, Grade, structure, Bond. Common wheel shapes and types of wheel – built up wheels, mounted wheels and diamond wheels. Specification of grinding wheels as per BIS.Truing, dressing, balancing and mounting of wheel.Grinding methods – Surface grinding, cylindrical grinding and centreless grinding.Grinding machine – Cylindrical grinder, surface grinder, internal grinder, centreless grinder, tool and cutter grinder.Selection of grinding wheel.

UNIT-IV

Shaping, Planing and Slotting

Working principle of shaper, planer and slotter. Quick return mechanism applied to shaper, slotter and planer machine. Specification of shaper, planer and slotting machine. Speeds, feeds and depth of cut.

.

Broaching: Introduction, Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down. Elements of broach tool, broach teeth details – nomenclature, types, tool material.

UNIT-V

Metal Forming Process

Press Tool Working: Press working – Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping.

Forging: Open die forging, closed die forging, Cold and hot forging

Rolling: Elementary theory of rolling, Types of rolling mills, Rolling defects and remedies

Extrusion and Drawing: Type of extrusion- Hot and Cold, Direct and indirect, Pipe drawing, tube drawing.

Course Outcomes

CO1-Student will be able to choose machining processing to manufacture any component Manufacturing Industries.

CO2- To Estimate machining time for milling and drilling process

CO3- To understand finishing processes

CO4- To calculate forces during orthogo0l metal cutting.

CO5- To explain principle and applications of advanced machining

to develop part program for turning. design jig and fixture for given component

RECOMMENDED BOOKS

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons, Delhi.
2. Manufacturing Technology by M.Adithan and AB Gupta; New Age International (P) Ltd, Delhi.
3. Workshop Technology Vol. I, II, III by Chapman; Standard Publishers Distributors, New Delhi.
4. Practical Handbook for Mechanical Engineers by Dr. AB Gupta; Galgotia Publications, New Delhi.
5. Workshop Technology by R.C Jindal; Ishan Publications, Ambala city.
6. Production Engineering and Science by Pandey and Singh; Standard Publishers Distributors, New Delhi.
7. Workshop Practice by R.K. Singal, S K Kataria and Sons, New Delhi.

8. A text Book of Production Engineering by P.C. Sharma; S. Chand and Company Ltd., New Delhi.
9. Production Technology by HMT; Tata McGraw Publishers, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Generic Skills and Entrepreneurship Development	Max. Marks: 100
Course Code: CE/EE/ME/ECE– 405	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

Generic Skills and Entrepreneurship Development is one of the courses from "Human Science" subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aims at developing conceptual understanding for setting-up one's own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma passouts for enhancing their employability and self confidence.

UNIT- I

Introduction to Generic Skills and Managing Self

Importance of Generic Skill Development (GSD)

Global and Local Scenario of GSD

Life Long Learning (LLL) and associated importance of GSD.

Knowing Self for Self Development

Self-concept, personality traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.

Managing Self – Physical

Personal grooming, Health, Hygiene, Time Management

Managing Self – Intellectual development

- Information Search: Sources of information
- Listening: Effective Listening
- Speaking: Effective Oral Communication
- Reading: Purpose of reading, different styles of reading, techniques of systematic reading;
- Note Taking: Importance and techniques of note taking
- Writing: Correspondence - personal and business

Managing Self – Psychological

- Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management)
- Techniques to manage the above

UNIT-II

Managing in Team

Team - definition, hierarchy, team dynamics

Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background

Communication in group - conversation and listening skills

UNIT-III

Task Management and Problem Solving

Task Initiation, Task Planning, Task execution, Task close out

Exercises/case studies on task planning towards development of skills for task management

Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving

Different approaches for problem solving.

Steps followed in problem solving.

Exercises/case studies on problem solving

UNIT-IV

Entrepreneurship

Introduction

Concept/Meaning and its need

Competencies/qualities of an entrepreneur

Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

UNIT-V

Market Survey and Opportunity Identification (Business Planning)

- How to start a small scale industry
- Procedures for registration of small-scale industry
- List of items reserved for exclusive manufacture in small-scale industry
- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity
- Considerations in product selection
- Data collection for setting up small ventures.

Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on Preparation of Project Report in a group of 3-4 students

INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

Course Outcomes

CO 1.Understand the concept of business plan and ownerships
CO 2. Interpret key regulations and legal aspects of entrepreneurship in India

CO 3. Understand government policies for entrepreneurs

RECOMMENDED BOOKS

1. Generic skill Development Manual, MSBTE, Mumbai.
2. Lifelong learning, Policy Brief (www.oecd.org)
3. Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication
4. Towards Knowledge Society, UNESCO Paris Publication
5. Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi
6. Human Learning, Ormrod
7. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
8. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
9. Handbook of Small Scale Industry by PM Bhandari
10. Generic Skills and Entrepreneurship Development by Ishan Publishers (Ambala)

Generic Skills and Entrepreneurship Development by Poonam Goyal (GBD)-Punjab

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Metrology and Quality Control Lab	Max. Marks: 50
Course Code: ME - 411	External: 25
L T P	Internal Assessment: 25
0 0 2	

LIST OF PRACTICALS

1. Internal and external measurement with vernier caliper and micrometer.
2. Measurement with height gauge and depth gauge.
3. Measurement of flatness, concentricity with dial indicator.
4. Measurement with combination set and bevel protector.
5. Study and use of slip gauges.
6. Measurement of gear characteristics
7. Measurement of angle with sine bar and slip gauges
8. Measurement of thread parameters by using tool maker's microscope
9. Measurement of bore with cylinder dial gauge for ovality and taper.
10. Measurement of flatness using comparator.
11. Use of feeler gauge, wire gauge, radius gauge and fillet gauges for checking of standard parameters.
12. Measurement of surface roughness of a surface
13. Verify that when random samples are taken from universe with a certain percentage of defectives same percentage tends to appear in random samples by using (Shewart's plastic kit box).
14. Plot frequency distribution for 50 turned components
15. With the help of given data, plot X, R, P and C charts

SEMESTER-IV

Course Title: Thermodynamics-II-Lab
Course Code: ME - 412
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Dismantle a two stroke engine, note the function and material of each part, reassemble the engine

2. Dismantle a single cylinder diesel engine. Note the function of each part, reassemble the engine

3. Dismantle Solex, Amal carburetor, locate' and note down the functions of various parts, re-assemble

4. Study of battery ignition system of a multi-cylinder petrol engine stressing ignition timings, setting, fixing order and contact breaker; gap adjustment .

5. Study of lubricating system of IC engine

6. Determination of BHP by dynamometer

7. Morse test on multi-cylinder petrol engine

8. To prepare heat balance sheet for diesel/petrol engine

9. Local visit to roadways or private automobile workshops

10. Study of steam turbines through models and visit

11. Study of steam condensers through model and visits

12. Performance test of engine by full throttle and part throttle

SEMESTER-IV

Course Title: Strength of Materials -Lab
Course Code: ME - 413
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Tensile test on bars of mild steel and aluminum
2. Shear test on specimen of two different metals
3. Impact test on metals (a) Izode test (b) Charpy test
4. Torsion test on specimens of different metals for determining the angle of twist for a given torque
5. To determine the stiffness of a helical spring and to plot a graph between load and extension
6. Hardness test on different ferrous/non-ferrous materials and finding the Rockwell hardness

SEMESTER-IV

Course Title: Workshop Technology-II
Course Code: ME - 414
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Produce a rectangular block by face milling and prepare a slot on one face with a slotting cutter / side and face cutter.
2. Gear manufacturing by some indexing device on a milling machine & gear hobber. Inspection of gear
3. Job on grinding using
   - Surface grinding
   - Cylindrical grinding
   - Centreless grinding
4. Milling cutter grinding on tool and cutter grinder.
5. Prepare a V-block to $\pm$ 0.2 mm accuracy on shaper machine.
6. Exercise on key way cutting and spline cutting.
7. Preparation of job through eccentric turning.
8. Practice of taper turning.
9. Exercise on EDM for preparation of electrodes(male and female).
10. Marking and drilling practice using column and knee type drilling machine and radial drilling machine
11. A job on drilling, threading, reaming, counter boring and counter sinking

Exercise on boring with the help of boring bar

SEMESTER-IV

Course Title: Mechanical Engineering Drawing-II
Course Code: ME - 415
L T P
0 0 6

Max. Marks: 150
External: 75
Internal Assessment: 75
Duration of Exam: 3 Hrs

Objective

Diploma holders in Mechanical Engineering are required to interpret drawings and therefore it is essential that they have skills of preparing drawings and sketches of mechanical components. This subject aims at development of skills and understanding of mechanical engineering drawingsg

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1. I.C. Engine Parts — 3 sheets
   - 1.1 Piston
   - 1.2 Connecting rod (Assembly drawing)
   - 1.3 Crankshaft and flywheel assembly
2. Boiler Parts — 2 sheets
   - 2.1 Steam Stop Valve (Assembled drawing)
   - 2.2 Blow off cock. (Assembled drawing)
3. Mechanical Screw Jack (Assembled Drawing) — 1 sheet
4. Cams — 4 sheets
   - 4.1 Types of cams and followers (Theoretical)
   - 4.2 Profile of cams for imparting following motions with knife edge and roller followers.:
     - Uniform motion
     - Simple Harmonic Motion
     - Uniformity accelerated and retarded motion:
5. Gears — 4 sheets
   - 5.1 Nomenclature of gears and conventional representation
   - 5.2 Drawing the actual profile of involute teeth of spur gear by different methods.
6. Introduction to CAD Software commands (2D)

6.1 Concept of Computer Aided Drafting (CAD), Tool bars in CAD, software

- 6.2 Drawing commands – point, line, arc, circle, ellipse, polygon
- 6.3 Editing commands – scale, erase, copy, stretch, lengthen and explode, move, array, trim, mirror, chamfer, fillet, rotate
  Dimensioning and placing text in drawing area
- 6.4 Sectioning and hatching
- 6.5 Inquiry for different parameters of drawing entity
- 6.6 Concept of layers and working on multiple layers

SEMESTER-IV

Course Title: Entrepreneurial Awareness Camp
Course Code: ME-416
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during or at the end of 4th semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and wage employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business

SEMESTER-V

Course Title: Production Management	Max. Marks: 100
Course Code: ME – 501	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

OBJECTIVE

Diploma holder in this course is responsible for controlling production and quality of the product on the shop floor as well as for production planning and control. He is also required to supervise erection, installation and maintenance of equipment including material handling and undertake work-study for better utilization of resources. For this purpose, knowledge and skills about these topics need to be imparted to them. This subject aims at development of competencies to prepare material, equipment schedule and production control schedules and maintain required quality levels. In addition, it will also help in developing skills in erection, installation and testing of equipment.

UNIT-I

Production, Planning and Control

Types of production. – Job, batch and mass production.Concept of planning, scheduling, routing, dispatching and follow up, forecasting. Break even analysis and Gantt chart. Project scheduling, application of CPM and PERT, simple numerical problems.

UNIT-II

Plant Location Layout and Handling

Definition. Factors affecting the site selection of plant. Factors affecting plant layout. Types of layout – Process, product, combination and fixed position, layout patterns.Techniques of making layout – Flow diagram, templates, distance volume matrix, travel chart. Line balancing, workstation.

Material Handling: Principles of economic material handling. Hoisting equipment – Fork lift truck, cranes – mobile motor cranes, overhead cranes, traveling bridges crane, derrick crane.Conveying Equipment – Package conveyor, gravity roller conveyors, screw conveyors, flight or scraper conveyors, bucket conveyors, bucket elevators, belt conveyors, and pneumatic conveyors.

UNIT-III

Work Study

Definition, advantages and procedure of Work study. Difference between production and Productivity, measures to improve productivity. Method study – Definition, Objectives and Procedure. Symbols, Flow process chart, Flow diagram, Machine chart, Two hand process chart. Principles of motion economy, Therblig symbols, Simo chart. Work Measurement – Time study, definition, principle and method of time study. Stop watch study – Number of readings, calculation of basic time, rating techniques, normal time, allowance, standard time, simple numerical problems. Ergonomics, some examples of ergonomically designed items.

UNIT-IV

Inventory Management

Material purchasing, store keeping, functions and duties of store department. Definition of inventory, Types of inventory. ABC analysis. Procurement cost, carrying charges, lead-time, reorder point, economic ordering quantity, simple numerical problems. Codification and standardization. Objectives and functions of MRP. Management information of MRP. Concept of JIT.

UNIT-V

Estimation and Costing

Introduction, Purpose/functions of estimating. Different between estimation and costing. Costing concept – ladder and elements of cost. Depreciation, methods of calculating depreciation. Overheads and their types. Estimation of material cost. Estimation of cost for machining processes and fabrication. Numerical problems. Profit and loss estimation

Course: Outcome

CO 1.In production management we learn the concept of production and many type of production planning system.

CO 2.In production we study the plant location layout as well as the site selection of plant.

CO 3. It Introduce the concept of planning management scheduling routing and many other concepts production.

CO 4. We Learn the principal of different type of material handling processes by using hoisting equipments.

CO 5. Also study about production and productivity and to improve the productivity by work study method.

CO 6. Understand the principles of inventory managements.

7. Observe the time schedule and proper way of method study objective and procedure

RECOMMENDED BOOKS

1. Industrial Engineering and Management by T.R. Banga and SC Sharma; Khanna Publishers, Delhi.

2. Industrial Engineering and Management by O.P. Khanna; Dhanpat Rai and Sons, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Theory of Machines	Max. Marks: 100
Course Code: ME – 502	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

OBJECTIVE

A diploma holder in this course is required to assist in the design and development of prototype and other components. For this, it is essential that he is made conversant with the principles related to design of components and machine and application of these principles for designing. The aim of the subject is to develop knowledge and skills about various aspects related to design of machine components.

UNIT-I

Basic Concepts

Definition of statics, kinetics, kinematics and dynamics. Rigid body and resistant body. Links. Kinematics pairs and their types. Degree of freedom. Kinematics chain and their types. Constrained motion and mechanisms. Classification of mechanisms. Equivalent mechanism. Laws of inversion of mechanisms. Single slider crank chain and its inversions. Quick return mechanism and IC engine mechanism. Double slider crank chain mechanism and its inversions like scotch yoke mechanism. Indicator mechanism, pantograph. Steering gear mechanism

Fly Wheel: Functions and principle of fly wheel. Kinetic Energy of rotating masses, turning moment diagram. Types of fly wheels. Fluctuation of speed and energy. Simple problems.

UNIT-II

Governor and Cams

Functions of governor; comparison between a fly wheel and governor. Types of governor – Principle, construction and working of Watt governor Porter, governor, Hartnell governor. Simple problems on watt and porter Governor. Terminology used in Governors: Height, equilibrium speed, Hunting, isochronism, stability, sensitiveness (No numerical problem)

Cams: Definition of cam. Classification of cams. Followers and their classification. Brief description of different types of cams and followers with simple line diagram. Simple cam profile for uniform velocity, SHM and uniform acceleration and deceleration with Flat, knife edge and roller type follower

UNIT-III

Power Transmission Devices (Belt, Rope and Chain Drive)

Introduction: Belt and rope drives, open and crossed belt drives, actions of belt on pulleys, velocity ratio. Material for belts and ropes. Slip in belts & ropes. Types of V Belt and Flat belt. Types of pulleys – step pulley, flat pulley. Crowning in pulley. Laws of belting and length of belt (open & cross belt). Ratio of tensions. Power transmitted and max power transmitted by belt. Centrifugal effect on belt. Initial tension. Chain drive, classification of chains. Selection of rope based on the load to be lifted. Numericals on belt drive and chain drives.

UNIT-IV

Gear Drive

Functions of gear. Classification of gears. Gear nomenclature. Forms of teeth, cycloid profile and involute profile teeth. Simple, compound, reverted and epicyclic gear train. Simple problems on gear trains.

UNIT-V

Friction, Clutches, Balancing and Vibrations

Frictional torque in screws for both square and V-threads. Screw jack. Calculation of power required for raising a load. Friction in collars & pivots.Friction in plate clutch & conical clutch. Different types of bearings & their applications. Selection of bearing and calculation of life time, numerical.

Balancing: Need of balancing. Concept of static and dynamic balancing. Balancing of rotating mass by another mass in the same plane. Concept of reference plane. Simple problems pertaining to several masses rotating in different planes

Vibration: Introduction. Types of vibration – longitudinal, transverse and torsional vibration. Causes, remedial measures & harmful effects of vibrations

Course: Outcome

CO1-Theory of Machines I includes study of velocity, acceleration and force a0lysis of different mechanisms, power transmitting elements.

CO2- The students will be conversant with commonly used mechanism for industrial application.

CO3-The students will get competency in drawing velocity and acceleration diagram for simple and complex mechanism.

CO4-Students will get a0lytical competency in solving kinematic problems using complex algebra method

CO5-The students will get competency in graphical and a0lytical method for solving problems
in static and dy0mic force a0lysis.

CO6-The students will get competency in conducting laboratory experiments for finding moment of inertia of rigid bodies, verification of displacement relation for Hooke□s joints, to measure power transmitted and absorbed by dy0mometer and brakes respectively.
power transmitting elements play vital role.

RECOMMENDED BOOKS

1. JS Rao and Dukkipati; Mechanism and Machine Theory; Wiley Eastern, New Delhi

2. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi

3. MF Spotts: Design of Machine Elements; Prentice Hall of India Ltd., New Delhi

4. R.C Jindal; Theory of Machines & Mechanisms; Ishan Publications, Ambala City

5. S.S Rattan: Theory of Machines; Tata McGrawHill , New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Hydraulics and Hydraulic Machines	Max. Marks: 100
Course Code: ME - 503	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

Diploma holders in this course are required to deal with problems of fluid and use of hydraulics and pneumatics in power generation. For this purpose, knowledge and skills about fluid mechanics and machinery, hydraulics and pneumatics systems are required to be imparted for enabling them to perform above functions.

UNIT-I

Introduction and Pressure Measurment

Fluid, types of fluid; properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity, compressibility and their units.

Pressure and its Measurement: Concept of Pressure (Atmospheric Pressure, gauge pressure, absolute pressure), Pascal's Law, Static Pressure, Units. Pressure measuring devices: peizometer tube, manometers - simple U-tube, differential single column, inverted U-tube, micro manometer. Bourdon pressure gauge. Simple problems.

UNIT-II

Flow of Fluids

Types of fluid flow-steady and unsteady, uniform and non-uniform, laminar and turbulent; rate of flow and their units; continuity equation of flow; Bernoulli's theorem (without proof) and its applications, Discharge measurement with the help of venturimeter, orifice meter and pitot tube, energy of fluid –K.E., P.E., simple problems

UNIT-III

Flow through Orifices and Pipes

C_c, C_v, C_d, flow through drowned, partially drowned orifices, time for emptying a tank through a circular orifice. Simple problems.

Flow through pipes: Definition of pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction; Chezy's equation and Darcy's equation of head loss. Loss of head in pipes due to sudden enlargement, sudden contraction, obstruction on flow path, change of direction and pipe fittings, Simple problems.

UNIT-IV

Hydraulic Devices

Description, operation and application of hydraulic machines – hydraulic ram, hydraulic jack, hydraulic brake, hydraulic accumulator, hydraulic door closer, hydraulic press, selection of specifications of above machines.

UNIT-V

Water Turbines and Pumps

Concept of a turbine, types of turbines –impulse and reaction. Construction and working of pelton wheel, Francis turbine and Kaplan turbine. Concept of hydraulic pump, reciprocating pump, vane pump, screw pump, gear pump. Construction, working and operation of reciprocating pump and centrifugal pump, characteristic curves, trouble shooting and problems in pumps.

Course: Outcome

CO1-Student should be able to apply hydraulic and pneumatic system knowledge in modern equipments and machines to improve the efficiency with low cost.
CO2-Student should be able to know concepts of fluid mechanics and governing laws in hydraulic and pneumatic systems.
CO3-Student should be able to understand operating principle of different components used
in hydraulic and pneumatic systems.
CO4-Student should be able to select various components for hydraulic and pneumatic systems.
CO5-Student should be able to use hydraulic and pneumatic circuits in various Industrial applications.
CO6-Student should be able to understand low cost automation by using pneumatic systems.
CO7- Student should be able to design and formulate any hydraulic and pneumatic circuits. so student with this judgment will be preferable.
CO8-To capture the global market with high power to weight ratio and low cost, as each mechanical industry needs the knowledge and support of hydraulics and pneumatics energy,

RECOMMENDED BOOKS

1. Hyraulics and Hydraulic Machines by RS Khurmi ; S.Chand & Co. Ltd., New Delhi.
2. Hydraulics and Fluid Mechanics by Jagdish Lal; Metropolitan Book Company Ltd., Delhi.
3. Fluid Mechanic, Hydraulics and Hydraulic Machines by K.K. Arora; Standard Publishers Distributors, Delhi.
4. Fluid Mechanics, Hydraulics and Fluid Machines by S. Ramamruthan; Dhanpat Rai and Sons, Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Manufacturing Technology	Max. Marks: 100
Course Code: ME – 504	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various machining processes and modern machining methods is required to be imparted. Hence the subject of workshop technology.

UNIT-I

Modern Machining Processes

Mechanical Process: Ultrasonic machining (USM): Introduction, principle, process, advantages and limitations, applications.

Electro Chemical Processes: Electro chemical machining (ECM) – Fundamental principle, process, applications.

UNIT-II

Electrical Discharge Machining (EDM):

Introduction, principle parts of EDM machine, EDM terminology. Principal, metal removal rate, dielectric fluid and properties of dielectric fluid, applications. Wire cut EDM.

UNIT-III

Plastic Moulding and Metallic Coating Techniques

Injection moulding – working principle, advantages and limitations. Blow moulding – working principle, advantages and limitations. Compression moulding – Working principle, advantages and limitations

Metallic Coating Process: Metal spraying – Wire process, powder process, applications. Electro plating, anodizing and galvanizing. Organic Coatings- oil base paint, rubber base coating

UNIT-IV

Gear Manufacturing and Finishing Processes

Gear hobbing, Gear shaping, Gear shaving, Gear burnishing.

Finishing Processes: Purpose of finishing surfaces, Honing process and its applications, Description of hones, Brief idea of honing machines, Lapping process, its pplications, Description of lapping compounds & tools, Brief idea of lapping machines. Super finishing process and its applications, Use of super finishing attachment on center lathe, Polishing, Buffing.

UNIT-V

Jigs & Fixtures

Importance and use of jigs & fixtures,Principle of location, Locating devices,Clamping devices.

Types of jigs – Drilling jigs, bushes, template jigs, plate jigs, channel jig, leaf jig.Fixture for milling.Advantages of jigs & fixtures.Introduction to rapid prototyping

judgment will be absorbed in any mechanical industry

Course: Outcome

CO1-Student should be able to select appropriate manufacturing processes for advanced components with characterization of work pieces.
CO2-Student should be able to understand Various Advanced manufacturing metal forming Processes
CO3-Student should be able to understand to select proper Advanced Manufacturing process
for welding, casting and forging
CO4-Student should be able to understand various material processing techniques for critical
CO5-Student should be able to understand various micro machining processes
CO6-Student should be able to understand selection of latest additive manufacturing processes
CO7-Student should be able to understand and select various measurement techniques in
CO8-To capture the inter0tio0l market with latest mechanical industry needs with the knowledge and support of advanced manufacturing techniques, so student with this

RECOMMENDED BOOKS

1. Manufacturing Technology by Rao; Tata McGraw Hill Publishers, New Delhi

2. Workshop Technology Vol. I, II, III by Chapman; Standard Publishers Distributors, New Delhi

3. Manufacturing Technology by M. Adithan and A.B. Gupta; New Age International (P) Ltd., New Delhi.

4. Production Engineering and Science by Pandey and Singh; Standard Publishers Distributors, New Delhi

5. Modern Machining Process by Pandey; Tata McGraw Publishers, New Delhi

6. A text Book of Production Engineering by P.C. Sharma; S. Chand and Company Ltd., New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Hydraulics and Hydraulic Machines-Lab
Course Code: ME- 511

L	T	P
0	**0**	**2**

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Measurement of pressure head by employing
   - i) Piezometer tube
   - ii) Single and double column manometer
   - iii) Pressure gauge
2. To find out the value of coefficient of discharge for a venturimeter
3. Measurement of flow by using venturimeter
4. Verification of Bernoulli's theorem
5. To determine the coefficient of friction of pipe using Darcy's equation.
6. Study the working of a pelton wheel and Francis turbine
7. Dismantling and assembly of a single stage centrifugal pump to study its constructional details, operation including fault diagnosis.
8. Study of characteristics curve for centrifugal pump and plot its curves

SEMESTER-V

Course Title: Manufacturing Technology-Lab
Course Code: ME–512
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

PRACTICAL EXERCISES

Advance Turning Shop

1. Exercise of boring with the help of boring bar
2. Exercises on internal turning on lathe machine
3. Exercises on internal threading on lathe machine
4. Exercises on external turning on lathe machine
5. Resharpening of single point cutting tool with given geomet

Machine Shop

1. Produce a rectangular block by facing on a slotting machine
2. Produce a rectangular slot on one face with a slotting cutter
3. Produce a rectangular block using a milling machine with a side and face cutter
4. Prepare a slot on one face using milling machine
5. Job on grinding machine using a surface grinder
6. Prepare a job on cylindrical grinding machine.
7. Exercise on milling machine with the help of a form cutter
8. Exercise on milling machine to produce a spur gear
9. Grinding a drill-bit on tool and cutter grinder
10. Exercise on dressing a grinding wheel

SEMESTER-V

Course Title: Computer Aided Drafting and Drawing
Course Code: ME- 513
L T P
0 0 4

Max. Marks: 100
External: 50
Internal Assessment: 50

LIST OF PRACTICALS

1. Detail and assembly drawing of the following using AUTOCAD (2D) (4 sheets)

   1.1. Plummer Block
   1.2. Wall Bracket
   1.3. Stepped pulley, V-belt pulley
   1.4 Flanged coupling
   1.5 Machine tool Holder (Three views)
   1.6 Screw jack or knuckle joint

2. Isometric Drawing by CAD using Auto CAD (one sheet)

   Drawings of following on computer:
   - Cone
   - Cylinder
   - Isometric view of objects

3. Modelling (02 sheets)

   3D modelling, Transformations, scaling, rotation, translation

4. Introduction to other CAD softwares;

   (Pro Engineer/CATIA / Inventor/Unigraphics/Solid Work: Salient features, simple drawing of components (2 D and 3D)(At least one software)

RECOMMENDED BOOKS

1. Engineering Drawing with AutoCAD 2000 by T. Jeyapooran; Vikas Publishing House, Delhi.
2. AutoCAD for Engineering Drawing Made Easy by P. Nageswara Rao; Tata McGraw Hill, New Delhi.
3. AutoCAD 2000 for you by Umesh Shettigar and Abdul Khader; Janatha Publishers, Udupi.
4. Auto CAD 2000 by Ajit Singh, TMH, New Delhi.
5. Designing with Pro Engineer, Sham Tickoo by Dream Tech Publications, New Delhi.

SEMESTER-V

Course Title: Industrial Training (4 Week after 4th semester) | Max. Marks: 150
Course Code: ME- 514 | External: 75
L T P | Internal Assessment: 75
0 0 6

INDUSTRIAL TRAINING

Industrial Training aims at exposing the students to field practices, size and scale of operation and work culture at practical sites. For this purpose, students at the end of fourth semester are required to be sent for a period of 4 weeks to industry. The evaluation of industrial training will be made during 5th semester.

Each student is supposed to study the material and technology used at site and prepares a detailed report of the observation of process seen by him/her. These students should be supervised and guided by respective subject teachers. Each teacher may guide a group of four to five students.

The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following.

a)	Punctuality and regularity	15%
b)	Initiative in learning new things	15%
c)	Relationship with workers	15%
d)	Industrial training report	55%

SEMESTER-V

Course Title: Minor Project Work
Course Code: ME- 515

L	T	P
0	0	4

Max. Marks: 100
External: 50
Internal Assessment: 50

The object of this training is to:

i) Expose the students to industrial/field procedures and practices so as to have an appreciation of the size and scale of operations.

ii) Develop comprehension regarding concepts, principles and practices taught in the classroom in their application in solving field/industrial tasks/problems.

For effective planning and implementation of this practical training, it is proposed to:

i) Identify adequate number of industrial/field organizations where students will be sent for practical training.

ii) Prepare a workbook, which can be used by students for guiding students to perform definite task during the practical training.

iii) Identification of teachers who would supervise the students and provide guidance during practical training.

The components of evaluation will include the following:

- Punctuality and regularity
- Initiative in learning
- Relationship at works
- Industrial training report

SEMESTER-V

Course Title: Personality Development Camp
Course Code: ME-516
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person interviews; telephonic interviews, panel interviews; group interviews and video conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene

SEMESTER-VI

Course Title: CNC Machine And Automation
Course Code: ME- 601

L	T	P
4	0	0

Max Marks: 100
External: 60
Internal Assessment: 40

Objective

Diploma holders are required to supervise and handle specialized machines and equipment like CNC machines. For this purpose, knowledge and skills about NC machines, part programming in NC machines and tooling for CNC machines are required to be imparted for enabling them to perform above functions. This subject aims at development of knowledge and skills about CNC machines, tools, equipment and use of high tech machines for increased productivity and quality.

Unit-I
Introduction
Introduction to NC, CNC & DNC, their advantages, disadvantages and applications, Machine Control Unit, input devices, selection of components to be machined on CNC machines, Problems with conventional NC, New developments in NC, Axis identification, PLC Control and its components. Its advantages and disadvantages.

Unit-II
Construction and Tooling
Design features, specification Chart of CNC machines, use of slideways, balls, rollers and coatings, motor and leadscrew, swarf removal, safety and guarding devices, various cutting tools for CNC machines, overview of tool holder, different pallet systems and automatic tool changer system, management of a tool room.

Unit-III
Part Programming
Part programming and basic concepts of part programming, NC words, part programming formats, simple programming for rational components, part programming using conned cycles, subroutines and do loops, tool off sets, cutter radius compensation and wear compensation.

Unit-IV
System Devices, Problems in CNC Machines ,Automation and NC system
Actuators, Transducers and Sensors, Tachometer, LVDT, opto-interrupters, potentiometers for linear and angular position, encoder and decoder, axis drives, open loop system, close loop system.
Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines, diagnostic study of common problems and remedies, use of on-time fault finding diagnosis tools in CNC machines.
Role of computer in automation, emerging trends in automation, automatic assembly, manufacture of magnetic tape, manufacture of printed circuit boards, manufacture of integrated Circuits, Overview of FMS, Group technology, CAD/CAM and CIM.

Unit-V
Robot Technology
Introduction to robot technology, basic robot motion, robot applications

CO 4. Be able to interpret a component specification and produce an operational plan for its manufacture.

Course: Outcome
CO 1.Investigate; understand new and ongoing developments in the area of numerical control of machine tool.
CO 2. Understand basic concepts of machines operated through numerical control.
CO 3. Understand the principles of computer numerical control (CNC) and machine Structures.
CO 5. Develop simple part programs with the help of programming languages and manufacture a component

RECOMMENDED BOOKS

1. CNC Machines – Programming and Applications by M Adithan and BS Pabla; New Age International (P) Ltd., Delhi.
2. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata Mc Graw Hill, New Delhi.
3. CNC Machine by Bharaj; Satya Publications, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-VI

Course Title: Machine Design	Max. Marks: 100
Course Code: ME – 602	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

A diploma holder in this course is required to assist in the Design and Development of Prototype and other components. For this, it is essential that he is made conversant with the principles related to design of components and machine and application of these principles for designing. The aim of the subject is to develop knowledge and skills about various aspects related to design of machine components

UNIT-I

Introduction

Design - Definition, types of designs necessity of design. Design procedure.Design terminology: stress, strain, factor of safety, factors affecting factor of safety, stress concentration, methods to reduce stress concentration, fatigue, endurance limit. General design considerations. Codes and standards. Theory of failures.

UNIT-II

Design of Keys and Shafts

Design of keys: Types of keys, materials of keys, functions of keys

Design of shafts: Type of shaft, shaft materials, Type of loading on shaft, standard sizes of shaft available, Effect of keyway on shaft strength, Design of shafts under various loading

Unit- III

Design of Joints

Types of joints: Temporary and permanent, utility of joints. Permanent joints.Welded joints.Types of welded joints, strength of parallel and transverse fillet welds.Strength of combined parallel and transverse welds.Axially loaded welded joints.Riveted joints: rivet materials, rivet heads, leak proofing of riveted joints – caulking and fullering.Different modes of rivet joint failure.Design of riveted joints: lap, butt. Design of boiler joints i.e. circumferential and longitudinal boiler joints. Knuckle joint – Different parts, materials used, types of knuckle joint, design of knuckle joint.Cotter joint – Different parts, types. Design of spigot and socket joint, design of Gib and cotter joint.

UNIT-IV

Design of Couplings

Necessity of a coupling, advantages of a coupling and types of couplings, design of flanged couplings.

UNIT-V
Miscellaneous
Types of gears.
Nomenclature of gears.

Course: Outcome
CO 1.Be able to analyse the stress and strain on mechanical component,and understand identify, and quantity failure modes for mechanical parts.
CO 2.To develop an ability to design a system,and component or process to meet desired need within realistic constraints.
Different gear profiles

CO 3.Demonstrate knowledge on basic machine elements used in machine design to withstand the load and deformation for a given application.

CO 4.Be able to approach a design problem successfully,and taking design for a unique solutions.
CO 5.Be proficient in the use of software for analyses and design.
CO 6. Perform effectively as a member/leader in multidisciplinary

RECOMMENDED BOOKS

1. Machine Design by Pandya and Shah.
2. Machine Design by Sharma and Aggarwal; Katson Publishing House, Ludhiana.
3. Machine Design by R.S. Khurmi & J.K. Gupta; Eurasia Publishing House (P) Ltd.
4. Design of Machine elements by V.B. Bhandari; Tata Mc Graw Hill; Delhi.
5. Engineering Design by George Dieter; Tata Mc Graw Hill; Delhi.
6. Mechanical Engineering Design by Joseph Edwerd Shigley, Mc Graw Hill.
7. Machine Design by Sadhu Singh.
8. Machine Design by G.R. Nagpal.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

Department of Mechanical Engineering

SEMESTER-VI

Course Title: Refrigeration & Air Conditioning	Max. Marks: 100
Course Code: ME – 603	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

The diploma holder of Mechanical Engineering are responsible for supervising and maintenance of RAC system. For this purpose, the knowledge and skill covering basic principles of refrigeration and air conditioning is required to be imparted to the students. Moreover, RAC industry is expanding and employment opportunities in this field are good.

UNIT-I

Fundamental of Refrigeration/Refrigerants

Introduction to refrigeration and air conditioning, units of refrigeration, methods of refrigeration, natural system and artificial system of refrigeration, refrigeration effect. Rating of refrigeration, co efficient of performance. Difference between COP and efficiency. Introduction to air refrigeration cycle. Bell – Colleman cycle, calculation of mass flow rate, work done and COP.

Miscellaneous: Study of Ice plant, cold storage, centrally air-conditioned plant, air conditioning of car. Insulating materials. Safety switches – thermostat, overload protector, low pressure high pressure cut out switch, oil pressure cut out switch.

UNIT-II

Vapour Compression System

Principle, function, parts and necessity of vapour compression system.P – H charts. Dry, wet, and super heated compression. Effect of sub cooling and super heating, effect of moisture in vapour compression system. Comparison between air refrigeration and vapour compression system.

Vapour Absorption System: Introduction, principle and working of electrolux refrigeration system, solar power refrigeration system, advantages and disadvantages of solar power refrigeration system over vapour compression system.

UNIT-III

Refrigerants

Physical, chemical, thermodynamic and commercial properties of NH_3, water, CO_2, R-12, R-22 and R-134 A. Properties of ideal refrigerants used in refrigeration system.

UNIT-IV

Vapour Absorption System

Introduction, principle and working of Electrolux refrigeration system, solar power refrigeration system, advantages and disadvantages of solar power refrigeration system over vapour compression system.

UNIT-V

Refrigeration Equipment

Compressor – Function, various types of compressor. Condenser – Function, Various types of condenser. Evaporators – Function, Various types of evaporators. Expansion Devices – Function, Different types such as capillary tube, thermostatic expansion valve, automatic expansion valve, low side float valve and high side float valve.

Psychrometry: Definition of dry air, moisture, saturated air, unsaturated air, specific humidity, relative humidity, degree of saturation, DBT, WBT, DPT. Psychrometric charts, heating with humidification, cooling with dehumidification, by pass factor. Air conditioning systems. Windows type air conditioner, split type air conditioner.

Course: Outcome

CO1-Students should be able to understand various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables.

CO2-Students should be able to illustrate the fundamental principles and applications of refrigeration and air conditioning system

CO3-Students should be able to obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems

CO4-Students should be able to present the properties, applications and environmental issues of different refrigerants

CO5-Students should be able to estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.

CO6-Students should be able to calculate cooling load for air conditioning systems used for various applications

CO7-Students should be able to use Psychometric charts and estimate various essential properties related to Psychrometry and processes.

CO8-Students should be able to operate and a0lyze the refrigeration and air conditioning systems

RECOMMENDED BOOKS

1. Refrigeration and Air conditioning by A.S Sarao; Satya Prakashan, New Delhi.

2. Refrigeration and Air conditioning by Mahohar Lal.

3. Refrigeration and Air Conditioning by R.S Khurmi & J.K Gupta; S. Chand, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-VI

Course Title: Automobile Engineering	Max. Marks: 100
Course Code: ME - 604	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

These days, automobile has become a necessity instead of luxury. The diploma holders in this course are required to supervise production and repair and maintenance of vehicles. For this purpose, knowledge and skills are required to be imparted to them regarding automobile industry as a whole. This subject aims at developing required knowledge and skills in this area.

UNIT-I

Introduction

Components of an automobile. Classification of automobiles. Layout of chassis. Types of drives-front wheel, rear wheel, four wheel, left hand, right hand.

Diagram of a Typical Wiring System

UNIT-II

Transmission System

Clutch Function, Constructional details and working of single plate and multiplate friction clutches, Centrifugal and semi centrifugal clutch

Gear Box – Function, construction and working of sliding mesh, constant mesh and synchromesh gear box, Torque converter and overdrive, fluid coupling

Function of Universal joint, propeller shaft, Function and construction of differential, Rear axle drives. Function of rear axle and different types of rear axles

Wheels and Tyres-Types of wheels - disc wheels and wire wheel, Types of tyres used in Indian vehicles, Toe in, toe out, camber, caster, kingpin inclination, Tubeless tyres

UNIT-III

Steering & Breaking System

Function and principle. Ackerman and Davis steering gears. Types of steering gears - worm and nut, worm and wheel, worm and roller, rack and pinion type

Braking system: Constructional details and working of mechanical, hydraulic and vacuum brake. Details of master cylinder, wheel cylinder. Concept of brake drum, brake lining and brake adjustment

UNIT-IV

Suspension System and Battery

Function, Types, Working of coil spring, leaf spring Shock absorber, Shock absorber.

Battery: Constructional details of lead acid cell battery. Specific gravity of electrolyte - effect of temperatures on specific gravity. Capacity and efficiency of battery. Battery charging, chemical reactions during charge and discharge. Maintenance of batteries. Checking of batteries for

voltage and specific gravity

UNIT-V

Dynamo, Alternator and Lightning System

Dynamo - Function and details, Regulators - voltage current and compensated type, Cutout - construction, working and their adjustment. Alternator-Construction and working, charging of battery from alternator.

Lighting System and Accessories: Lighting system, Wiring circuit, Headlight, aiming of headlights, Lighting switches, Direction indicators, Windscreen wiper, Horn, Speedometer, Heater, Air conditioning.

Course Title: Automobile Engineering

CO 1. Identify the different parts of the automobile

CO 2. Explain the working of various parts like engine, transmission, clutch, brakes

CO 3. Describe how the steering and the suspension systems operate.

CO 4. Understand the environmental implications of automobile emissions

CO 5. Develop a strong base for understanding future developments in the automobile industry

RECOMMENDED BOOKS

1. Automobile Engineering Vol. I by Kirpal Singh; Standard Publishers, New Delhi
2. Automobile Engineering Vol. I by GBS Narang; Khanna Publishers, Delhi.
3. Automobile Engineering by RB Gupta; Satya Parkashan, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-VI

Course Title: Basics of Management	Max. Marks: 100
Course Code: CE/EE/ME/ECE -605	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3Hrs

Objective

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Topics like Structure of Organization, Leadership, Motivation, Ethics and Values, Customer Relationship Management (CRM), Legal Aspects of Business, Total Quality Management (TQM), Intellectual Property Rights (IPR) etc. have been included in the subject to provide elementary knowledge about these management areas.

UNIT- I

Principles of Management

Introduction, definition and importance of management.

Functions of Management: Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling

Concept and Structure of an organization

Types of industrial organization

a) Line organization
b) Functional organization
c) Line and Functional organization

Hierarchical Management Structure: Top, middle and lower level management

Departmentalization: Introduction and its advantages.

UNIT- II

Leadership and Motivation

Leadership

a) Definition and Need of Leadership
b) Qualities of a good leader
c) Manager vs. leader

Motivation

d) Definition and characteristics of motivation
e) Factors affecting motivation
f) Maslow's Need Hierarchy Theory of Motivation

Job Satisfaction

UNIT -III

Introduction and need of Legal Aspects of Business and Work Culture:

Labour Welfare Schemes

a) Wage payment : Definition and types
b) Incentives: Definition, need and types

Factory Act 1948

Minimum Wages Act 1948

Introduction and importance of Healthy Work Culture in organization

Components of Culture

Importance of attitude, values and behaviour

Behavioural Science – Individual and group behaviour

Professional ethics – Concept and need of Professional Ethics

UNIT –IV

Management Scope in different Areas

Human Resource Development

a) Introduction and objective
b) Manpower Planning, recruitment and selection
c) Performance appraisal methods

Material and Store Management

a) Introduction, functions and objectives of material management
b) Purchasing: definition and procedure
c) Just in time (JIT)

Marketing and Sales

a) Introduction, importance and its functions
b) Difference between marketing and selling
c) Advertisement- print media and electronic media
d) Market-Survey and Sales promotion.

Financial Management – Introduction

a) Concept of NPV, IRR, Cost-benefit analysis
b) Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund

Maintenance Management

a) Concept
b) Preventive Maintenance

UNIT -V

Miscellaneous topics

Customer Relationship Management (CRM)

a) Definition and Need
b) Types of CRM
c) Customer satisfaction

Total Quality Management (TQM)

a) Inspection and Quality Control

b) Concept of Quality Assurance
c) TQM

Intellectual Property Rights (IPR)

a) Introduction, definition and its importance
b) Infringements related to patents, copyright, trade mark

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INSTRUCTIONAL STRATEGY

It is observed that the diploma holders generally take up middle level managerial positions, therefore, their exposure to basic management principles is very essential. Accordingly students may be given conceptual understanding of different functions related to management. Some of the topics may be taught using question answer, assignment or seminar method. The teacher will discuss success stories and case studies with students, which in turn, will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organizations. Appropriate extracted reading material and handouts may be provided.

Course Outcomes

CO 1.Understand the concept of business plan and ownerships

CO2. Interpret key regulations and legal aspects of entrepreneurship in India

CO 3. Understand government policies for entrepreneurs

CO 4. We Learn the principal of different type of material handling processes by using hoisting equipments.

CO 5. Also study about production and productivity and to improve the productivity by work study method.

CO 6. Understand the principles of inventory managements

CO 7. Observe the time schedule and proper way of method study objective and procedure

RECOMMENDED BOOKS

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
6. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
7. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
8. Intellectual Property Rights and the Law by Dr. GB Reddy.
9. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-VI

Course Title: CNC Machines and Automation
Course Code: ME- 611
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Study the constructional details of CNC lathe.
2. Study the constructional details of CNC milling machine.
3. Study the constructional details and working.
   - Automatic tool changer and tool setter
   - Multiple pallets
   - Swarf removal system
   - Safety devices
4. Develop a part programme for following lathe operations and make the job on CNC lathe and CNC turning center.
   - Plain turning and facing operations
   - Taper turning operations (internal and external)
   - Thread cutting operations (internal and external)
   - Operation along contour using circular interpolation
5. Develop a part programme for the following milling operations and make the job on CNC milling and CNC machining centre (vertical and horizontal type).
   - Plain milling
   - Slot milling
   - Contouring
   - Pocket milling
6. Preparation of work instruction for machine operator.
7. Preparation of preventive maintenance schedule for CNC machine.
8. Demonstration of FMS on prototype model and industrial visit for awareness of actual working in production.
9. Use of software for turning operations on CNC turning center.
10. Use of software for milling operations on machine centres.

SEMESTER-VI

Course Title: Refrigeration &Air Conditioning
Course Code: ME- 612
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Identify various tools of refrigeration kit and carry out following operations.
   - Cutting
   - Bending
   - Flaring
   - Swaging and brazing of copper tubes.
2. Study the following compressors used in refrigeration system.
   - Reciprocating compressor
   - Reciprocating hermetically sealed compressor.
3. Study of thermostatic switch, LP/HP cut out switch, overload protector, filters, strainers and filter driers.
4. Locating leaks and charging a refrigeration system.
5. To find COP of a refrigeration system.
6. Detect trouble/faults in a refrigerator and window air conditioner.
7. Visit to a cold storage plant.
8. Visit to a centrally air conditioned building.
9. Dismantling of window type A.C. and testing after assembly.

SEMESTER-VI

Course Title: Major Project Work
Course Code: ME- 613
L T P
0 0 10

Max. Marks: 250
External: 125
Internal Assessment: 125

PROJECT WORK

Project work aims at developing skills in the students whereby they apply the totality of knowledge and skills gained through the course in the solution of particular problem or undertaking a project. The students have various aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given for a group. The students should identify or given project assignment at least two to three months in advance. The project work identified in collaboration with industry may be preferred.
Each teacher is expected to guide the project work of 5-6 students.

- Projects related to increasing productivity
- Projects related to quality assurance
- Projects related to estimation and economics of production
- Projects connected with repair and maintenance of plant and equipment
- Projects related to identification of raw material thereby reducing the wastage
- Any other related problems of interest of host industry

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.

Performance Criteria for Evaluation:

Sense of Responsibility	20%
Inter Personal Skill	10%
Self Expression	10%
Report Writing	30%
Viva Voce	30%

SEMESTER-VI

Course Title: Student Centred Activities
Course Code: EE-614
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

SCA will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defence/ Disaster Management activities etc.