Shri Jagdishprasad Jhabarmal Tibrewala University

(Common to all Branches)

Detailed Syllabus of Diploma First Year

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
श्री जगदीशप्रसाद झाबरमल टीबडेवाला विश्वविद्यालय

INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for Diploma (Common to All Branch)
EFFECTIVE FROM ACADEMIC SESSION 2013-2016

Year: I **Semester: I**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	DP-101	English & Communication Skills-I	3	1	-	3	30/12	70/28	100/40
2	DP-102	Applied Physics-I	3	1	-	3	30/12	70/28	100/40
3	DP-103	Applied Chemistry-I	3	1	-	3	30/12	70/28	100/40
4	DP-104	Applied Mathematics-I	3	1	-	3	30/12	70/28	100/40
5	DP-105	Computer & Information Technology Fundamentals-I	3	1	-	3	30/12	70/28	100/40
6	DP-106	Applied Mechanics-I	3	1	-	3	30/12	70/28	100/40
Practical's									
7	DP-107	Workshop Practice	-	-	3	3	40/16	60/24	100/40
8	DP-108	English & Communication Skills Lab	-	-	3	3	40/16	60/24	100/40
9	DP-109	Electrical & Electronics Lab	-	-	3	3	40/16	60/24	100/40
10	DP-110	Physics Lab	-	-	3	3	40/16	60/24	100/40
		Total	**18**	**6**	**12**				**1000**
		Total Teaching Load	**36**						

DP-101 ENGLISH & COMMUNICATION SKILLS-I

The students seeking admission to the diploma courses do not have the required proficiency in English. It has, therefore, been decided to introduce English and Communication Techniques to help them to attain proficiency in the subject.

1. Narration, Voice, Basic Sentence Patterns. (Nine basic sentence patterns)
2. Transformation of Sentences, Determiners, Preposition.
3. Tenses, Common errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.)
4. Modals in Conversational Usage, Prefix, Suffix,

Idioms & Phrasal verbs :

Modals

Can, Could, Should ,Will, Would, May, Might, Must, Need not, Dare not, Ought to, Used to.

DP-102 APPLIED PHYSICS-I

1. Units and Dimensions:

1.1 Idea of various systems of units
SI units - Basic, Supplementary and Derived Units,
Prefixes & Symbols
1.2 Dimensions and Dimensional Formulae
1.3 Principle of Homogeneity of Dimensions
1.4 Dimensional Analysis
1.5 Applications and Limitations

2. Elasticity:

2.1 Elasticity
2.2 Stress and Strain
2.3 Elastic Limit & Hooke's law
2.4 Young's Modulus, Bulk Modules & Modulus of Rigidity,
Poisson's Ratio

3. Properties of Liquids:

3.1 Surface Tension & Surface Energy
3.2 Cohesive & Adhesive Force
3.3 Angle of Contact
3.4 Capillarity & Expression for Surface Tension
3.5 Streamline & Turbulent Flow
3.6 Reynold Number.
3.7 Viscosity & Coefficient of Viscosity
3.8 Stoke's law & Terminal Velocity

4. Gravitation & Satellites:

4.1 Newton's law of Gravitation
4.2 Acceleration due to Gravity
4.3 Kepler's laws of Planetary Motion (statement only)
4.4 Artificial Satellite (simple idea), Geo-Stationary Satellites
4.5 Escape Velocity
4.6 Velocity & Time Period of an Artificial Satellite.

5. Sound Waves:

5.1 Velocity of Sound Waves
5.1.1 Newton's Formula
5.1.2 Laplace Correction
5.1.3 Factors affecting Velocity of Sound Waves
5.2 Propagation of Progressive Wave, Displacement, Velocity and
Acceleration of a particle during propagation of wave
5.3 Superposition of Waves
5.3.1 Stationary Waves (without mathematical analysis)
5.3.2 Resonance tube

6. Transfer of Heat:

6.1 Modes of Transmission of Heat - Idea of Conduction,
Convection & Radiation
6.2 Thermal Conductivity & Coefficient of Thermal Conductivity
6.3 Black Body
6.4 Kirchoff's Laws & Stefan Boltzmann Law (statement only)
6.5 Newton's Law of Cooling & its Derivation from Stefan's Law

DP-103 APPLIED CHEMISTRY-I

1. Atomic Structure:

1.1 Constituents of the Atom

1.2 Bohr's Model of the Atom

1.3 Quantum Number and Electronic Energy Levels

1.4 Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, *n + l* Rule

1.5 Electronic Configuration of Elements (s,p,d Block Elements)

2. Development of Periodic Table:

2.1 Modern Periodic Law, Long form of Periodic Table.

2.2 Study of Periodicity in Physical and Chemical Properties with special reference to : - Atomic and Ionic Radii, Ionisation Potential. Electron Affinity. Electronegativity. Variation ofEffective Nuclear Charge in a Period. Metallic Character.

3. Electro Chemistry:

3.1 Ionisation, Degree of Ionisation, Factors which Influence Degree of Ionisation .

3.2 Hydrolysis – Degree of Hydrolysis, Hydrolysis Constant.

3.3 pH Value

3.4 Buffer Solution

3.5 Electrolysis, Faraday's Laws of Electrolysis

4. Kinetic Theory of Gases:

4.1 Postulates of kinetic Theory

4.2 Ideal Gas Equation, Pressure and Volume Corrections, Vender Walls Equations

4.3 Liquefaction of Gases, Critical Pressure and Critical Temperature for Liquefaction.

4.4 Liquefaction of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method

5. Carbon Chemistry:

5.1 Definition of Organic Chemistry. Difference between Organic and Inorganic Compounds.

5.2 Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (upto C5).

6. Metals and Alloys:

6.1 General Principles and Terms listed in Metallurgy

6.2 Metallurgy of Iron and Steel

6.3 Different forms of Iron

6.4 Effect of Impurities on Iron and Steel

6.5 Effect of Alloying Elements in Steel

7. Pollution:

7.1 Water Pollution

7.1.1 Causes and Effects

7.1.2 Treatment of Industrial Water Discharges -Screening, Skimming and Sedimentation Tanks, Coagulation, Reductions, Chlorination, Biological Methods.

7.2 Air Pollution

7.2.1 Causes and Effects

7.2.2 Control Methods – Electrostatic Precipitator, Scrubbers, Gravitational Setting Methods, by Plants.

7.3 Awareness on Green House Effect, Depletion of Ozone Layer and Acid rain.

DP-104 APPLIED MATHEMATICS-I

1. 1.1 **Introduction to Different Types of Expansion:**

1.1.1 Factorial Notation

1.1.2 Meaning of C (n, r), P (n, r)

1.1.3 Binomial Theorem for Positive Index, any Index

1.1.4 Exponential Theorem

1.1.5 Logarithm Theorem

1.2 **Complex number:**

1.2.1 Definition of Complex Number

1.2.2 Operations on Complex Number (Add., Sub., Multiplication, Division)

1.2.3 Conjugate Complex Number

1.2.4 Modulus and Amplitude of a Complex Number

1.2.5 Polar form of a Complex Number

2. Trigonometry:

2.1 Allied Angle (sin (180±A), sin (90±A) etc.,

2.2 Sum and Difference Formula (without proof) and their Application

2.3 Product Formula and C-D Formula

2.4 T-Ratios of Multiple and Sub-Multiple Angles (2A, 3A, A/2)

2.5 Solution of Trigonometric Equations: sin X = 0, tan X = 0, cos X = 0, sin X=A, cos X =A & tan x = A

3. Matrices and Determinants:

3.1 Definition and Properties of Determinants

3.2 Definition and Types of Matrix

3.3 Transpose of a Matrix, Symmetric, Skew Symmetric Matrices, Orthogonal matrices, Hermitian and Skew Hermitian

3.4 Minors and Cofactors

3.5 Adjoint and Inverse of a Matrix

3.6 Cramer's Rule

3.7 Solution of Simultaneous Linear Equations by Inverse Matrix Method.

3.8 Characteristic Matrix, Characteristic Equation, Eigen Values & Vectors, Cayley Hamilton Theorem (verification only)

4. Numerical Integration :

4.1 Trapezoidal Rule

4.2 Simpson's 1/3 Rule

4.3 Simpson's 3/8 Rule

4.4 Newton - Raphson Rule

5. Two Dimensional Coordinate Geometry:

5.1 General Introduction

5.2 Distance Formula and Ratio Formula

5.3 Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle

5.4 Area of Triangle

5.5 Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form

5.6 Angle between Two Lines

5.7 Perpendicular Distance of a Line from a Point

6. Conic:

6.1 **Circle :**

6.1.1 Definition and Standard Equations

6.1.2 Equations of Tangent and Normal at a Point (simple problems)

6.2 **Parabola :**

6.2.1 Definition and Standard Equations

6.2.2 Equations of Tangent and Normal at a Point (Simple problems)

6.3 **Ellipse and Hyperbola :**

6.3.1 Definition and Standard Equations

6.3.2 Equations of Tangent and Normal at a Point(simple problems)

DP-105 COMPUTER & INFORMATION TECHNOLOGY FUNDAMENTALS-I

1. Introduction:

1.1 Computer: An Introduction

1.2 Generation of Computers & Types : PC, PC/XT, PC/AT, Main Frame, Super, Lap Top, Pam Top

1.3 Data Representation

1.3.1 Bit, Nibble, Byte, Word

1.3.2 Number System : Decimal, Binary, Hexadecimal & their Conversions

1.3.3 Arithmetic Operations (Addition, Subtraction using Binary Number System

1.3.4 1s , 2s Compliment

1.3.5 Coding Technique : BCD, EBCDIC, ASCII

1.4. Idea of:

1.4.1 Hardware

1.4.2 Software

1.4.3 Firmware

1.4.4 Free ware

1.4.5 Human ware

1.5 Computer Languages and Translators:

1.5.1 Machine

1.5.2 Assembly

1.5.3 High Level Language

1.5.4 Scripting Language

1.5.5 Object Oriented Language

1.5.6 Platform Independent Language

1.5.7 Translators: Assembler, Interpreter, Compiler

2. Introduction to Computer:

2.1 Central Processing Unit (CPU)

2.2 Memory Unit

2.3 Input/ Out Devices : Keyboard, Mouse (Optical), Digitizer, Scanner, Web Camera, Monitor (CRT, TFT) Printers, Plotters, Bar Code Reader

2.4 Secondary Storage Devices : Floppy, Hard Disk, CD, DVD, Flash Drive

2.5 Block Diagram Showing Interconnection of Computer Parts

3. Operating System :

3.1 Definition of Operating System (OS)

3.2 Types of OS

3.2.1 Single user

3.2.2 Multi user

3.2.3 Multi Programming

3.2.4 Time Sharing

3.2.5 Multi Processing,

4. Introduction to Windows XP:

4.1 Introduction to Windows Environment

4.2 Parts of Windows Screen

4.3 Icon, Menu, Start Menu

4.4 Minimizing, Maximizing, Closing Windows

4.5 Windows Explorer, Recycle Bin, Clipboard, My Computer, My Network Places

4.6 Control Panel: Adding New Hardware and Software, Display, Font, Multimedia, Mouse, International System

4.7 Accessories: Paint, Media Player, Scan disk, System Information

5. Information Concepts and Processing:

5.1 Definition of Data, Information

5.2 Need of Information

5.3 Quality of Information

5.4 Concepts of Data Security, Privacy, Protection

5.5 Computer Virus and their types

5.6 Scanning & Removing Virus

DP-106 APPLIED MECHANICS-I

1. Force:

Definition
Units
Different Types of Forces.

2. Coplanar Forces:

Resolution of Forces
Law of Parallelogram of Forces
Resultant of two or more Forces
Basic Conditions of Equilibrium
Lami's Theorem (No Proof)
Jib Crane

2 .7 Law of Polygon of Forces (Only Statement)

3. Moment:

3.1 Definition, Units & Sign Convention
3.2 Principle of Moments
Application of Equilibrium Conditions for non-concurrent Forces

Application of Principles of Forces & Moments:

4.1 Levers & their Types.
4.2 Reactions of Simply Supported Beams (Graphical & Analytical Method)
4.3 Steel Yard.
4.4 Lever Safety Valve
4.5 Foundry Crane

5. Centre of Gravity:

5.1 Concept
5.2 Centroid
5.3 Calculation of C.G. of Regular Bodies
5.4 Calculation of C.G. of Plain Geometrical Figures

6. Friction:

6.1 Types of Friction
6.2 Laws of Friction
6.3 Angle of Friction
6.4 Angle of Repose
6.5 Friction on Horizontal and Inclined Plains
6.6 Application of Laws of Friction Related to Wedge, Ladder and Screw Jack.

7. Simple Machines:

7.1 Basic Concepts
7.2 Loss in Friction
7.3 Inclined Plane
7.4 Simple & Differential Wheel and Axle (Neglecting Rope thickness)
7.5 Screw Jack
7.6 Lifting Crabs
7.7 Systems of Pulleys
7.8 Worm and Worm Wheel

PRACTICAL AND SESSIONALS

DP-107 WORKSHOP PRACTICE

1. A group of student shall be required to do practicals in all the shops during the year. The practical examination will be taken in the shops covered during year.

2. Theory parts of syllabus should be dealt with the respective practicals in practicals classes.

3. Students have to prepare a practical notebook showing the names, specifications and uses of tools and equipment for each shop with figures. This notebook shall be submitted at the time of the Board's practical examinations (PR).

1. Carpentry Shop :

Theory ::

Knowledge of Common Indian Timbers. Name, Functions, Material and Specifications of Common Hand Tools, Holding Tools, Cutting Tools, Measuring and Marking Tools used in Carpentry, Safety Measures.

Introduction of Carpentry Joints and their relative Advantages and uses.

Elementary Idea about the Wooden Polishing Work.

Introduction to Various Carpentry Machine (Band Saw, Circular Saw, Wood Turning Lathe, Wood Planner)

2. Welding and Sheet Metal Shop:

2.1 Welding Shop:

Theory :

Introduction to Welding and its Importance in Engineering Practices, Common Materials that can be Welded.

Gas Welding Theory : Gas Welding Equipment Adjustment of different types of Flames, Practice in Handling Gas Welding Equipment .

Electric arc Welding Theory (AC and DC), Safety Precautions while using

Exercise:

1. Preparation of Cross-Half Lap Joint.
2. Preparation of Dovetail Joint
3. Preparation of Bridle Joint
4. Preparation of Mortise and Tenon Joint
5. Preparation of Mitre Joint
6. Demonstration of Job on Wooden Polishing Work.

Exercise:

1. Preparation of a Butt Joint by Gas Welding.
2. Preparation of Lap Joint by Electric arc Welding.
3. Preparation of T-Joint by Electric arc Welding.
4. Demonstration on Brazing by the Instructor.
5. Demonstration on Soldering.
6. Demonstration on Gas Cutting.

Electric arc Welding. Practice in Setting Current and Voltage for Striking Proper arc.

Common Welding Defects and Inspection, various type of Joints, end Edge Preparation.

Explain Soldering, Brazing and Tipping of Tools, Gas Cutting

2.2 Sheet Metal Shop:

Theory :

Name, Functions and Specification of Common Sheet Metal Tools Like

Slakes, Hammers, Hand Snips, Hand Punches, Groovers, Rivet Sets, Chisels

Name and Function of Marking and Measuring Tools - Scale, Circumference Rule, Straight Edge, Scriber, Semi Circular Protector, Trammel.

Preliminary Idea of Simple Sheet Metal Operations, Different Types of Sheet Metal Edges and Joints, Riveting Methods. Development of Surface in Sheet Metal Work

Involving Various Sheet Metal Joints (Single and Double Hem Joints, Wired Edge, Lap Joint, Grooved Seam Joint, Single and Double Seam Joint) and Exercises (Soldering and Riveting Joints)

1. Preparation of a Soap Tray & Mug
2. Preparation of Funnel.

3. Fitting and Plumbing Shop:

3.1 Fitting shop:

Theory :

Introduction to different materials used in Fitting Shop. Description of Work Bench, Names, Functions and Specification of Holding Devices.

Specification of Files, Precautions While Filing.

Marking of Jobs, use of Marking and Measuring Tools.

What is Chipping, Where Chipping is done. Names Functions and Specifications of Chisels, Hammers etc.

Simple Operation of Hack sawing,

Exercise:

Preparation of following utility Jobs

Exercise:

1. Marking Filing & Hack Sawing Practice.
2. Production of Utility Job involving Marking, Filling and Hack Sawing.
3. Production of Utility Job involving Marking, Filling and Hack Sawing Drilling and Tapping.

different types of Blades, and their uses, Fitting of Blade in Hacksaw Frame.

Name, Functions and Specifications of Drills, Selection of Drills for Tapping, Types of Tapes, Tapping and Dieing Operations.

Precaution While Drilling Soft Metals, Specially Lead.

3.2 Plumbing shop:

Theory :

Classification of Pipes According to Materials and use I.S.I. Specification for Pipes. Introductions to Cement and PVC Pipes and their uses.

Names Functions and Specifications of Plumbing Tools and Accessories such

as Pipe Dies, Wrenches, and
Pipe Vices. Different Pipe Fittings

Exercise:

1. Cutting and Threading on G.I. Pipe
2. Exercise on PVC Pipe Fitting.
3. Repair of Taps and Cocks.

DP-108 ENGLISH & COMMUNICATION SKILLS LAB

1. Listening:

1.1 For improving listening skills the following steps are recommended,
1.1.1 Listen to Prerecorded Tapes
1.1.2 Reproduce Vocally what has been heard
1.1.3 Reproduce in Written form
1.1.4 Summarize the text heard
1.1.5 Suggest Substitution of Words and Sentences
1.1.6 Answer Questions related to the taped text
1.1.7 Summarize in Writing

2. Speaking:

2.1 Introducing English consonant-sounds and vowel-sounds.
2.1.1 Remedial exercises where necessary
2.2 Knowing Word stress Shifting word stress in poly-syllabic words
[For pronunciation practice read aloud a para or page regularly while others monitor]

3. Vocabulary:

3.1 Synonyms. Homonyms. Antonyms and Homophones
3.2 Words often confused, as for example,
[I-me; your-yours; its-it's; comprehensible-comprehensive; complement-compliment]
3.3 Context-based meanings of the words, for example,
3.3.1 man[N] man[vb]; step[|N| ,step[vb]
3.3.2 conflict _____Israel Palestinian conflict Emotional conflict, Ideas conflict
3.3.3 learn ——— 1 learn at this school I learnt from the morning news

4. Delivering Short Discourses:

4.1. About oneself
4.2 Describing a Place, Person, Object
4.3 Describing a Picture, Photo.

5. Group Discussion :

5.1 Developing skill to initiate a discussion [How to open]
5.2 Snatching initiative from others [Watch for weak points, etc.]

6. Expand a topic-sentence into 4-5 sentence narrative.

DP-109 ELECTRICAL & ELECTRONICS LAB

1. Study of Symbol, Specification and Approximate Cost of Common Electrical Accessories, Tools and Wires & Cables Required for Domestic Installation.
2. Study of :
    2.1 Basic Electricity Rules for a Domestic Consumer
    2.2 Safety Precautions & use of Fire Fighting Equipments
3. Use of series of Phase Tester, Series Test Lamp, Tong Tester and **3**
Megger in Testing of Electrical Installation.
4. 4.1 Prepare a Potential Divider and Measure Resistance of a Filament Lamp Using Voltmeter and Ammeter.
    4.2 Measurement of Power and Energy Consumption by an Electric Heater using Watt Meter and Energy Meter.
5. Preparation of Wiring Diagram, Wiring, Testing, Fault Finding & Costing for :
    5.1 Control of one Lamp by one Switch (using Batten andTumbler Switch)
    5.2 Control of Stair Case Wiring (using Casing Capping,CFL and Flush Type Switches)
    5.3 Control of one Bell Buzzer and Indicator by one Switch(using Conduit and Flush type Switch)
6. Prepare one Switch Board as per Institutional Requirement (using Flush type Switches, Sockets, MCB, ELCB, Etc.)
7. Study, Connecting, Testing and Fault Finding of
    7.1 Fluorescent Tube and its Accessories
    7.2 Ceiling Fan with resistance type and Electronic Regulator
8. Study, Functioning, Fault Finding & Repairing of following Domestic Appliances -
8.1 Automatic Electric Iron
8.2 Air Cooler
8.3 Electric Water Pump
9. Design, Draw and Estimate the Material required for Installation for a small Residential Building/ Office/ Hall.

DP-110 PHYSICS LAB

1. To Measure Internal Dia, External Dia and Depth of a Calorimeter using Vernier Callipers.
2. To Measure Density of a Wire using Screwgauge
3. To Measure Radius of Curvature of a Lens, Mirror using Spherometer.
4. To Determine Refractive Index of Glass using Prism.
5. To Determine the Refractive Index of Glass using Travelling Microscope
6. To Determine Focal Length of a Convex Lens by Displacement Method.
7. To Determine the Velocity of Sound at O0c using Resonance Tube.
8. To Determine Young's Modulus of Elasticity using Searle's Apparatus.
9. To Determine Acceleration due to Gravity using Simple Pendulum.
10. To Verify Newton's Law of Cooling.

11. To Verify Law of Resistances.
12. To Determine Specific Resistance of Material using Meter Bridge.
13. To Determine Internal Resistance of a Primary Cell using Potentiometer.
14. To Compare emf of two Primary Cells using a Potentiometer.
15. To Draw Characteristic Curves of PN Diode and Determine its Static and Dynamic Resistance.
16. To Draw Characteristic Curves of a PNP/NPN Transistor in CB/CE Configuration.
17. To Measure Resistance of a Galvanometer by Half-Deflection Method.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
श्री जगदीशप्रसाद झाबरमल टीबडेवाला विश्वविद्यालय

INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for Diploma (Common to All Branch)
EFFECTIVE FROM ACADEMIC SESSION 2013-2016

Year: I **Semester: II**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	DP-201	English & Communication Skills-II	3	1	-	3	30/12	70/28	100/40
2	DP-202	Applied Physics-II	3	1	-	3	30/12	70/28	100/40
3	DP-203	Applied Chemistry-II	3	1	-	3	30/12	70/28	100/40
4	DP-204	Applied Mathematics-II	3	1	-	3	30/12	70/28	100/40
5	DP-205	Computer & Information Technology Fundamentals-II	3	1	-	3	30/12	70/28	100/40
6	DP-206	Applied Mechanics-II	3	1	-	3	30/12	70/28	100/40
Practical's									
7	DP-207	Engineering Drawing	-	-	3	3	40/16	60/24	100/40
8	DP-208	Computer Lab	-	-	3	3	40/16	60/24	100/40
9	DP-209	Mechanics Lab	-	-	3	3	40/16	60/24	100/40
10	DP-210	Chemistry Lab	-	-	3	3	40/16	60/24	100/40
Total			**18**	**6**	**12**				**1000**
Total Teaching Load			**36**						

DP-201ENGLISH & COMMUNICATION SKILLS-II

Phrases

At all; In stead of; In Spite of; As well as; Set up; Up set; Look up; Call off; Call out; Come across; Set right; Look other.

Idioms

Work up (excite); Break down; Stand up for; Turn down; Pass away; Pass on; Back up; Back out; Carry out; Done for (ruined); Bring about; Go through; Ran over; Look up (improve); Pick out (selected).

5. Composition - 1. Unseen Passage, Precise Writing
6. Letter Writing, Paragraph Writing, Report Writing
7. Essay Writing - Essays on general and local topics related to environmental problems.

DP-202 APPLIED PHYSICS-II

1. Electrostatics:

1.1 Coulomb's Law
1.2 Intensity of Electric Field, Intensity due to a Point Charge
1.3 Electric Lines of Forces & Electric Flux
1.4 Electric Potential, Electric Potential due to a Point Charge

2. D.C. Circuits :

2.1 Resistivity, Effect of Temperature on Resistance
2.2 Ohm's Law
2.3 Resistance in Series and Parallel and their Combination
2.4 Kirchoff's Law
2.5 Wheatstone Bridge
2.6 Meter Bridge
2.7 Principle of Potentiometer

3. A.C. Circuits:

3.1 Faraday's Laws of Electro Magnetic Induction, Lenz's Law
3.2 Self and Mutual Inductance
3.3 Alternating Current, Phase & Phase Difference
3.4 Instantaneous, Average and rms value of AC
3.5 Behaviour of Resistance, Capacitance and Inductance in an AC Circuit
3.6 AC Circuits Containing, R-L, R-C and LCR in Series
3.7 Power in AC Circuit and Power Factor
3.8 Choke Coil

4. Semi Conductor Physics:

4.1 Energy Bands in Conductor, Semi Conductor & Insulator
4.2 Chemical Bonds in Semiconductor
4.3 Intrinsic and Extrinsic Semiconductors
4.4 PN-Junction Diode, Working, Biasing and Characteristics Curves

4.5 Zener Diode and Voltage Regulation using it
4.6 Half Wave & Full Wave Rectifiers (only working, no derivations)
4.7 Junction Transistors, Working, Biasing and Characteristic Curves
4.8 Brief Idea of Using Transistors as an Amplifier (without mathematical analysis)

5. Modern Physics:
5.1 Photo Electric Effect
5.2 Einstein's Equation
5.3 Photo Cells
5.4 Lasers
5.4.1 Stimulated Emission and Population Inversion
5.4.2 Types of Laser - Helium Neon and Ruby Laser
5.4.3 Application of Lasers (brief idea only)
5.4.3.1 Material Processing
5.4.3.2 Lasers in Communication
5.4.3.3 Medical Applications.

6. Nuclear Physics:
6.1 Idea of Nuclear Force
6.2 Mass - Defect and Binding Energy
6.3 Nuclear Reactions,
6.4 Natural and Artificial Radioactivity
6.5 Law of Radioactive Disintegration
6.6 Half Life & Mean Life
6.7 Idea of Nuclear Fission and Fusion
6.8 Chain Reaction
6.9 Nuclear Reactor

7. Pollution and its control: 5
7.1 Introduction to Pollution – Water, Air, Soil , Noise, Nuclear and mental pollution
7.2 Types of Pollution
7.3 Brief idea about Noise Pollution and its Control
7.4 Nuclear Hazards
7.5 Nuclear Waste Management

DP-203 APPLIED CHEMISTRY-II

1. Water:
1.1 Sources of Water
1.2 Hardness of Water.
1.3 Degree of Hardness, Estimation of Hardness by EDTA method, Problems on Calculation of Hardness
1.4 Disadvantages of Hardness
1.5 Softening Methods

1.5.1 Lime-Soda Method
1.5.2 Permutite Method
1.5.3 Ion -Exchange Method
1.6 Problems on Softening of Water
1.7 Drinking Water, its Requisites, Purification and Sterilization of Water.

2. Fuels:
2.1 Definition, Classification
2.2 Calorific Value (HCV and LCV) and Numerical Problems on
Calorific Value
2.3 Combustion of Fuels, Numerical Problems on Combustion
2.4 Solid Fuels
2.4.1 Coal and Coke
2.5 Liquid Fuels
    2.5.1 Petroleum and its Distillation
    2.5.2 Cracking, Octane and Cetane Values of Liquid Fuels
    2.5.3 Synthetic Petrol, Power Alcohol
2.6 Bio-Gas
2.7 Nuclear Fuels – Introduction to Fission and Fusion Reactions.

3. Corrosion:
3.1 Definition
3.2 Theories ff Corrosion
    3.2.1 Acid Theory (Rusting)
    3.2.2 Direct Chemical Corrosion or Dry Corrosion
    3.2.3 Wet Corrosion or Electro-Chemical Corrosion (Galvanic and Concentration Cell Corrosion)
3.3 Various Methods for Protection from Corrosion

4. Polymers:
4.1 Definition
4.2 Plastics
4.2.1 Classification, Constituents
4.2.2 Preparation, Properties and Uses of Polythene, Bakelite Ethylene and Nylon.
4.3 Rubber
4.3.1 Natural Rubber, Vulcanization
4.3.2 Synthetic Rubbers - Buna - N, Buna-S, Butyl and Neoprene

5 Cement and Glass:
5.1 Manufacturing of Portland Cement
5.2 Chemistry of Setting and Hardening of Cement
5.3 Glass : Preparation, Varieties and Uses.

6. Lubricants:

6.1 Definition, Classification

6.2 Properties of Lubricants : Viscosity, Oiliness, Flash Point, Fire Point, Acid Value, Saponification, Emulsification, Cloud and Pour Point.

6.3 Artificial Lubricants

7 Miscellaneous Materials:

7.1 Refractories : Definition, Classification and Properties

7.2 Abrasives : Natural and Synthetic Abrasives

7.3 Paint and Varnish : Definition and Function of Constituents

7.4 Soap and Detergents : Definition, Properties and Uses

8. New Engineering Materials: (Brief Idea of Following)

8.1 Superconductors

8.2 Organic Electronic Materials

8.3 Fullerences

8.4 Optical Fibres

DP-204 APPLIED MATHEMATICS-II

1. Function:

1.1 Definition of Function

1.2 Range and Domain of Function

1.3 Types of Function

1.3.1 Absolute Value Function

1.3.2 Exponential value Function

1.3.3 Identity Function

1.3.4 Reciprocal Function

1.3.5 Rational and Irrational Function

1.3.6 Increasing and decreasing Function

1.4 Limits

1.4.1 Concept of Limit

1.4.2 L.H.L., R.H.L.

1.4.3 Limit of Standard Functions

$$\lim_{x\to 0}\frac{\sin x}{x},\quad \lim_{x\to 0}\frac{\cos x}{x},\quad \lim_{x\to 0}\frac{\tan x}{x}$$

$$\lim_{x\to a}\frac{x^n-a^n}{x-a},\quad \lim_{x\to 0}\frac{e^x-1}{x},\quad \lim_{x\to 0}\frac{a^x-1}{x}$$

$$\lim_{x\to 0}\frac{\log(1+x)}{x}$$ (simple problems)

1.5 Concept of Continuity and Differentiability at a Point (simple Problems).

2. Differential Calculus :

2.1 Standard Formulae (Except Hyperbolic Function)

2.1.1 Derivative of Sum, difference, Multiplication and Division of two Functions

2.1.2 Differentiation of Function of a Function

2.1.3 Logarithmic Differentiation

2.1.4 Differentiation of Implicit Functions

2.1.5 Differentiation of Parametric Functions

2.1.6 Differentiation by Trigonometric Transformations

2.1.7 Differentiation of a Function w.r.t. Another Function

2.2 Second Order Derivative

3. Applications of Differential Calculus:

3.1 Geometrical meaning of dy / dx . Tangents and Normals

3.2 Angle of Intersection between two Curves

3.3 Derivative as a Rate Measurer

3.4 Errors and Approximations

3.5 Maxima and Minima of Function with one Variable

4. Integral Calculus:

4.1 General Introduction of Integral Calculus

4.2 Integration of Sum and difference of Functions.

4.3 Integration by Simplification

4.4 Integration by Substitution

4.5 Integration by Parts

4.6 Integration of Rational and Irrational Functions

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{a^2 - x^2}, \int \frac{dx}{x\sqrt{x^2 - a^2}}, \int \frac{dx}{x\sqrt{x^2 \pm a^2}}, \int \frac{dx}{x\sqrt{a^2 - x^2}},$$

$$\int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \sqrt{a^2 - x^2}\,.dx, \int \sqrt{x^2 - a^2}\,.dx$$

Additional standard formulae

$$\int e^{ax} \sin bx dx, \int e^{ax} \cos bx.dx$$

4.7 Integration of Trigonometric Functions

$$\int \sin^m x \cos^n x dx, \int \frac{dx}{a + b\sin x}, \int \frac{dx}{a + b\cos x}, \int \frac{dx}{a + b\sin^2 x},$$

$$\int \frac{dx}{a + b\cos^2 x}, \int \frac{dx}{a\cos^2 x + b\sin^2 x}$$

4.8 Definite Integral and its Properties

DP-205 COMPUTER & INFORMATION TECHNOLOGY FUNDAMENTALS-II

1. Computer and Communication:

1.1 Need of Data Transmission

1.2 Data Transmission Media

1.3 Baud rate and Bandwidth, Digital and Analog Transmission
Serial and Parallel Data Transfer, Protocols, MODEM.
1.4 Networking of Computers : LAN, WAN, MAN, Blue tooth
1.5 LAN Topologies: Bus, Star, Ring, Hybrid
1.6 Introduction to Ports : RS232, IEEE 488, PS2, USB, UTP

2. Internet:

2.1 Introduction to Internet
2.2 Bridges, Routers, Switch, Gate way
2.3 www, Web Site, URL
2.4 e-mail, e-Commerce
2.5 Web browsing, Web page
2.6 Introduction to Hyper text & HTML
2.7 Introduction to http & ftp Protocol

3. Information Processing:

3.1. Word processor
- 3.1.1 Introduction to MS-Word
- 3.1.2 Starting MS-Word
- 3.1.3 Special Features of MS-Word
- 3.1.4 Using Help
- 3.1.5 Opening Document, Typing and Editing
- 3.1.6 Copying, Inserting, Moving, Deleting
- 3.1.7 Copying from One Document to Others .
- 3.1.8 Undo, Redo, Spell Check, Find and Replace
- 3.1.9 Formatting
- 3.1.9.1 Characters and Fonts
- 3.1.9.2 Spacing
- 3.1.9.3 Removing Characters Formatting
- 3.1.10 Inserting Symbols
- 3.1.11 Paragraphs.
- 3.1.12 Page Setting
- 3.1.13 Header and Footer
- 3.1.14 Page Breaks
- 3.1.15 Borders and Shading
- 3.1.16 Print Preview and Printing
- 3.1.17 Tables and Columns
- 3.1.18 Mail Merge
- 3.1.19 Auto Text and Auto correct
- 3.1.20 Introduction to Macro

3.2 Electronic Spread Sheet
- 3.2.1 Introduction to MS-Excel
- 3.2.2 Working with Spread Sheet

3.2.3 Editing the Worksheet
3.2.4 Worksheet Formatting
3.2.5 Formula Entering
3.2.6 Function Wizard
3.2.7 Saving and Printing Work Book
3.2.8 Analysis Tools
3.2.9 Data Tools
3.2.10 Charts
3.2.11 Linking Work Sheets
3.2.12 Report Wizard
3.2.13 Data Base Application
    3.2.13.1 Data Base Components
    3.2.13.2 Working with Database
    3.2.13.3 Creating Excel Database
    3.2.13.4 Adding Records using Data Form
    3.2.13.5 Deleting Records using Menu Command
3.2.13.6 Deleting Records using Data Form
3.2.13.7 Editing Records
3.2.13.8 Finding Records based on Criteria

4. Power Point:

4.1 Introduction to Power Point
4.2 Creating a Presentation/Slide
4.3 Adding Animation in Slide
4.4 Running a Slide Show

DP-206 APPLIED MECHANICS-II

1. Rectilinear Motion:

1.1 Concept
1.2 Motion under Constant Velocity
1.3 Motion under Constant Acceleration
1.4 Velocity-time graph and its uses

2. Motion under Gravity:

2.1 Concept
2.2 Vertical Motion
2.3 Smooth Inclined Plane

3. Projectiles:

3.1 Concept
3.2 Range, Maximum Height and Time of Flight
3.3 Equation of Trajectory
3.4 Calculation of Velocity of Projectile at Certain Height And at Certain instant

4. Newton's Laws of Motion:

4.1 Definitions

4.2 Momentum and it's Unit

4.3 Application of Second Law of Motion

5. Impact and Collision:

5.1 Concept

5.2 Impulse and Impulsive Force

5.3 Law of Conservation of Momentum

5.4 Collision Between Two Rigid Bodies

5.5 Newton's Experimental Law of Collision, Coefficient of Restitution

6. Circular Motion:

6.1 Concept

6.2 Motion under Constant Velocity

6.3 Motion under Constant Acceleration

6.4 Relationship between Linear Velocity and Angular Velocity

6.5 Centrifugal and Centripetal Forces, their Applications

7. Work, Power and Energy:

7.1 Work Done by a Constant Force

7.2 Work Done by Uniform Variable Force

- 7.2.1 Power
  - 7.2.1.1 Indicated Power.
  - 7.2.1.2 Brake Power.
  - 7.2.1.3 Efficiency
  - 7.2.1.4 Power required for an Engine on Horizontal and Inclined (smooth and rough) Planes.
- 7.2.2 Energy
  - 7.2.2.1 Potential Energy
  - 7.2.2.2 Kinetic Energy of Rectilinear Motion
  - 7.2.2.3 Kinetic Rnergy of Circular Motion

PRACTICAL AND SESSIONALS

DP-207 ENGINEERING DRAWING

1. Introduction of Drawing Instruments.

2. Lines, Lettering and Dimensioning:

2.1 Types of Line

2.2 Lettering – Single Stroke, Italics

2.3 Various Systems of Placing the Dimensions

3. Geometrical Construction and Engineering Curves:

3.1 Regular Polygons of Given Side

3.2 Conic sections – Construction of Ellipse, Parabola, Hyperbola
3.3 Construction of Cycloid, Epicycloid and Hypocycloid
3.4 Construction of Involute, Archimedian Spiral and Cylindrical Helix

4. Scales:

4.1 Type of Scales (Reducing and Enlarging)
4.2 Representative Fraction
4.3 Plain and Diagonal Scales

5. Theory of Orthographic Projections :

5.1 Introduction of Projections, Reference Planes and Projectors
5.2 Angle of Projections (First Angle and Third Angle Projections)
5.3 System of Rotations
5.4 Projection of Points in Different Quadrants

6. Projection of Lines :

6.1 Parallel to Both the Planes
6.2 Parallel to One and Perpendicular to Other Planes
6.3 Parallel to One and Inclined to Other Planes
6.4 Inclined to Both the Planes
6.5 True Length of a Line and its Apparent and True Inclinations

7. Projection of Planes:

7.1 Projection of Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular Planes.
7.2 Plane Parallel to One & Perpendicular to Other
7.3 Plane Perpendicular to Both the Planes.
7.4 Plane Perpendicular to One and Inclined to Other Plane.

8. Projection of Solids :

8.1 Projection of Cube, Prism, Pyramid, Cylinder and Cone
8.2 Projection of Solid whose Axis is Perpendicular to One and Parallel to Other plane.
8.3 Projection of Solid Whose Axis is Parallel to One and Inclined to Other Plane.
8.4 Projection of Solid Whose Axis is Parallel to both the Planes (excluding inclined to both the planes)

9. Conversion of Pictorial Views into Orthographic Views:

9.1 Orthographic Projections of Simple Solid Object from Pictorial / Isometric view

1. Preparation of following on Imperial Size Drawing Sheet:-

1.1 Lines, Letters and Scales
1.2 Geometrical Constructions and Engineering Curves.
1.3 Projection of Lines
1.4 Projection of Planes
1.5 Projection of Solids
1.6 Orthographic Projections of Simple objects
1.7 Section and Development of Surfaces of Solids i.e. Cone, Cylinder, Sphere etc.
1.8 Section and Development of Surfaces of Prism and Pyramids
1.9 Isometric Projections

DP-209 COMPUTER LAB

AS PER THE SYLLABUS OF THEORY.

DP-209 MECHANICS LAB

1. Use of Engineering Calculator.
2. Verification of the Law of Parallelogram and Polygon of Forces
    2.1 By using Force Board
    2.2 By using Force Table
3. Verification of the Principle of Moments in case of
    3.1 Compound Lever
    3.2 Bell crank Lever
4. Determination of Reactions in Case of Simply Supported Beams.
5. To Determine Coefficient of Friction between two Surfaces on
    5.1 Horizontal Plane
    5.2 Inclined Plane.
6. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Simple Wheel and Axle
7. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of differential Wheel and Axle
8. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Single Purchase Crab
9. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Double Purchase Crab
10. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Worm and Worm Wheel
11. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Screw Jack
12. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of First System of Pulleys
13. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Second System of Pulleys
14. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Third System of Pulleys.
15. Determination of Value of "g" by Simple Pendulum.

DP-210 CHEMISTRY LAB

1. Identification of Acid and Basic Radicals in a Salt (Total Numbers = 5)
2. Analysis of a Mixture Containing Two Salts (Not Containing Interfacing Radicals). (Total Numbers = 5)
3. Determination of Percentage Purity of an Acid by Titration With Standard Acid.
4. Determination of Percentage Purity of a Base by Titration With Standard Alkali Solution.
5. Determination of the Strength of Ferrous Sulphate using Standard Ferrous Ammonium Sulphate and Potassium Dichromate as Intermediate Solution
6. Determination of the Strength of Farrous Sulfate Solution using Standard Solution of Thiosulphate.
7. Determination of the Strength of Copper Sulphate Solution using a Standard Solution of thio Sulphate.
8. Determination of pH Values of Given Samples.
9. Determination of Hardness of Water by EDTA Method.
10 Estimation of Free Chlorine in Water.
11. Determination of Acid Value of an Oil.
12. Preparation of Soap.

DME 301 STRENGTH OF MATERIALS - I

UNIT-I

Simple Stress and Strain :

Various mechanical properties: Elasticity, Plasticity, Ductility, Brittleness, Toughness, Hardness Concept of stress and strain Type of force - Direct, shear Stress - Tensile, compressive, shear Hook's law: Statement of Hook's law, Young's modulus of elasticity, Tensile test diagram: Gauge length, Limit of proportionality, Elastic limit,Yield point, Yield strength, Ultimate stress, Nominal stress, Proof stress. Working stress and factor of safety: Principle of superposition, Bar of homogeneous section: Bar of uniform cross-section, Bed cross-section, Bar of composite section. Temperature stresses: Homogeneous section, Composite section. Shear stresses: Modulus of rigidity, Shear strain. Poisson's ratio and volumetric strain: Lateral strain, Longitudinal strain, Volumetric strain, Bulk modulus. Relationship between elastic constants

UNIT-II

Compound Stress:

Introduction, Stress components on an inclined plane: Induced by direct stresses, Induced by simple shear, Induced by direct and simple shear stresses. Mohr's circle : For like direct stresses, For unlike direct stresses, For two perpendiculars direct stresses with state of simple shear. Principal stresses and planes: Major principal stress, Minor principal stress, Mohr's circle method for principal stresses.

UNIT-III

Strain Energy :

Introduction, Strain energy from stress - strain diagram, Proof resilience, Types of loading - gradual, sudden, impact, Stress in gradual loading, Stress in sudden loading, Stress in impact loading.

UNIT-IV

Bending Moments and Shear Force :

Basic concept: Types of support, Movable hinge support (roller), Immovable hinge support, Fixed support, Types of beams, Types of loads, Bending moment and shear force diagrams (for point loads, U.D.L. and their combinations), Cantilever beam, Simply supported beam, Simply supported beam with overhang.

UNIT-V

Moment of Inertia :

Concept of moment of Inertia, Radius of gyration, Parallel axis theorem, Perpendicular axis theorem, Moment of Inertia of various section, Rectangle, Triangle, Circle, Moment of inertia of unsymmetrical section like : T-section, channel section, L-section etc.

REFERENCE BOOKS :

1. Strength of Materials & Theory of Structures (vol. I) — B.C.Punmia
2. Strength of Materials — Ramamurtham
3. Strength of Materials — Junarkar

UNIT-I

Introduction :

Introduction concepts: Fluids and solids, Liquid, gas and vapour, Fluid mechanics, Kinematics Dynamics, Fluid properties, Density, Specific volume, Specific gravity, Viscosity, Newton's law of Viscosity, Dynamic and Kinematics Viscosity: Compressibility, Surface tension - soap bubble, drop, Capillarity, Vapour pressure and its importance

UNIT-II

Fluid Pressure and its Measurement :

Definition and its units, Pascal's law: Intensity of pressure at a point in fluid at rest, Pressure head. Pressure: Atmospheric pressure, Gauge pressure, Vacuum pressure, Absolute pressure, Differentials pressure, Law of hydrostatic pressure, Brahma's press, Pressure measurement, Manometers Piezometer - its limitation: U-tube - simple, differential, inverted, Mechanical gauge, Bourdon gauge.

UNIT-III

Hydrostatics :

Total pressure, Centre of pressure, Total pressure and center of pressure in following cases, Plane surface immersed horizontally, Plane surface immersed vertically, Plane surface immersed at an angle, Curved surface (no proof), Working of lock gates, sluice gate.

UNIT-IV

Hydrokinematics :

Description of fluid flow, Eular approach, Lagrangian approach, Definition of path line, stream line, Types of flow, Steady - Non steady, Uniform - Non uniform, Laminar – Turbulent, One, Two, Three dimensional flow, Continuity equation (no proof) : Assumption, Rate of discharge, For one dimensional flow

UNIT-V

Hydrodynamics and Measurement of Flow :

Energy of fluid -pressure, kinetic and potential, Bernoulli’s Theorem (no proof), Assumptions and its limitation, Conversion of pressure into pressure head, velocity into kinetic head, Applications of Bernoulli's theorem, Pitot-tube, Venturimeter, Orificemeter.

REFERENCE BOOKS :

1. Fluid Mechanics & Dr. Jagdish
2. Fluid Mechanics & R.K Bansal
3. Fluid Mechanics & R.S.Khurmi.

DME-303 MANUFACTURING PROCESS – I

UNIT-I

Welding Process :

Classification of welding process, Industrial applications of welding.

Gas Welding :

Principle of oxy-acetylene gas welding, Construction of oxy- acetylene cutting torch and gas welding torch, Blowpipes, single stage and double stage regulators, Gas cutting (oxy-acetylene), lance cutting, flames gauging, grooving

UNIT-II

Electric Welding Process :

Difference between A.C and D.C arc welding, Equipments and accessories of A.C and D.C welding plants, Effect of polarity, length of arc, penetration, crater, arc blow, Electrodes (Metal and Carbon), B.I.S specification for welding, Symbols and electrodes, Flux and their functions, Resistance welding, Spot welding, butt welding, flash welding, Seam welding, percussion welding and projection welding, Atomic hydrogen welding, Shielded metal arc welding, Submerged arc welding, Pressure welding, Welding distortion, welding defects, method of controlling welding defects and inspection of welded joints.

UNIT-III

Modern Welding Methods :

Tungsten inert gas welding (TIG), Principle of operation, advantage, disadvantages, application, Metal inert gas welding (MIG), Principle of operation, advantage, disadvantages, application, Thermit welding, Electroslag welding, Electron beam welding, Ultrasonic welding, Laser beam welding, Robotic welding.

UNIT-IV

Pattern Making :

Introduction to materials - timber, metal, plastics and plaster of Paris etc. Allowances- shrinkage, draft, machining, distortion and shake,Types of Pattern :Solid, Split loose piece, match plate, Sweep, Gated, Skeleton, segmental, follow board, colour code for patterns as per B.I.S.

Mould Making :

Moulding boxes, hand tools used for mould making, Steps involved in making a mould, gating system: definition and brief idea of basin, sprue, runner and gates, Moulding machines - Squeeze machine, jolt squeeze machine and sand slinger. Moulding processes - Green sand, dry sand, loam, Co_2 moulding, skin dried, plaster, metal moulding.

UNIT-V

Castings Defects :

Different types of defects, Testing of defects - Radiography, magnetic particle inspection, Ultrasonic inspection

DME-304 THERMAL ENGINEERING - I

UNIT-I

Basic Concept and Gas Laws :

Thermodynamics, property-Intensive and Extensive, system - open, closed and isolated Energy - Internal energy, potential energy, kinetic energy, heat, work, specific heat, enthalpy,Boyle's law, Charle's law, Joule's law, Characteristics gas equation, gas constant, universal gas constant and molar specific heats, Simple numerical problems

UNIT-II

Laws of Thermodynamics :

Zeroth law of thermodynamics, First law of thermodynamics. Second law of thermodynamics Concept of entropy, Constant volume, constant pressure, isothermal, adiabatic polytrophic processes, throttling and free expansion, work done during these processes.

Availability :

Available and unavailable energy, Effectiveness, Irreversibility in flow and non-flow process.

UNIT-III

Formation of Steam and its Properties :

Generation of steam at constant pressure, various stage of steam- wet steam, dry steam saturated steam, dryness fraction, super heated steam, degree of super heat.Critical point, triple point, thermodynamic properties of steam -specific volume, specific enthalpy, specific internal energy, specific entropy. Steam property diagram: temperature - entropy diagram, enthalpy- entropy diagram, pressure - enthalpy diagram, Heating and expansion of steam during thermodynamic processes, Change of internal energy and entropy of steam during processes, Simple numerical problems Use of steam tables and Mollier charts.

UNIT-IV

Steam Generators :

Definition of boiler according to I.B.R., classification of boilers, description and working of Lancashire, Cochran and Babcock and Wilcox boilers, Comparison of water tube and fire tube boilers. Brief description and working of boiler mountings and accessories used in common boilers.

UNIT-V

Vapour Power Cycle :

Rankine cycle, modified rankine cycle, representation on p-v, t-s and h-s charts and efficiency, Simple numerical problems

REFERENCE BOOKS :

1. Thermal Engineering R.S. KHURMI
2. Thermal Engineering Vol.1 Mathur & Mehta .
3. Thermal Engineering R.K.Purohit.

DME-305 MATERIALS AND MATERIAL SCIENCE

UNIT-I

Classification and Properties of Materials :

Introduction to engineering materials, Classification of materials, Thermal, chemical, electrical, mechanical properties of various materials, Selection criteria for use in industry.

UNIT-II

Structure of Metals and Their Deformation :

Metal structure, Arrangement of atoms in metals, Crystalline structure of metals Crystal imperfections, Deformation of metal, Impact of cold and hot working on metal structure.

UNIT-III

Ferrous Materials :

Classification of iron and steel, Sources of Iron ore and its availability, Manufacture of pig iron, wrought iron, cast iron and steel. Types of cast iron: white, malleable grey, mottled, nodular and alloy and their usage. Classification of steels Different manufacturing method of steel open hearth, bessemer, electric arc. Specification as per BIS and equivalent standards. Effect of various alloying elements on steel. Use of alloy steel (high-speed steel, stainless steel, spring steel, silicon steel).

Non Ferrous Materials :

Important ores and properties of aluminium, copper, zinc, tin, lead. Properties and uses of nonferrous alloys

UNIT-IV

Engineering Plastics and Fibers :

Introduction of plastics, Classification - Thermoplastic and thermosetting, Various trade names of engineering plastics, Fibers and their classification : Inorganic and organic fibers. Uses of fiber

UNIT-V

Insulating Materials :

Various heat insulating material and their usage like asbestos, glass,wool thermocole, cork, puf, china clay. Various electrical insulating materials and their use.

REFERENCE BOOKS :

1. Engineering Material B.K.
2. Elements of Metallurgy H.S. Bawa

DME-306 ELECTRICAL ENGINEERING

UNIT-I

D.C. Machines :

Construction: Operation of D.C. generator, Operation of D.C. motor, Types of D.C. generator and motor, Starters, Speed control methods, Characteristics of D.C. motors.

UNIT-II

Transformer :

Construction of single phase transformer, Types of transformer, Principle of operation, E.M.F equation, Testing of T/F, Polarity test, Open circuit test, Short circuit test, Efficiency and losses, Single phase auto transformer, Types of 3 phase transformers, Cooling methods.

UNIT-III

Induction Motor :

Construction and working principle of single-phase induction motor, Types of single phase induction motors (description only), Production of rotating magnetic field by three phase currents.Construction and working principle of three-phase induction motor, Torque equation Torque slip characteristics, Starting and speed control of 3-phase induction motor, Various types of starters, Methods of increasing starting torque, Application.

UNIT-IV

Industrial Drives :

Elementary idea for industrial drives, Application of industrial drives in following fields - Rolling mill, Textile mills, Paper mill, Crane, Mines, Pumps, Food processor, refrigerators punches.

Electric Heating :

Advantages of electric heating over other types of heating, Principle of operation, construction and uses of electrical heating in - Resistance heating. Induction heating, Arc heating, Brief idea of high frequency heating, dielectric heating and its application..

UNIT-V

Illumination :

Nature of light, Standard terms and definitions, Laws of illumination, Types of lamps Tungston, Halogen, Sodium, Neon, Mercury vapour lamp, Fluorescent tubes.

Instrumentation and Measurement :

Principle, construction and working of the following measuring instruments - Ammeter and voltmeter (moving coil and moving iron type).

Single phase AC energy meter. Multimeter and megger. Transducers. Measurements of mechanical quantities like pressure, strain, temperature

REFERENCE BOOKS :

1. Electrical Engineering (Hindi & K.D.
2. Electrical Technology B.L.Theraj

DME-307 Strength of Materials-I Lab:

1. Study of extensometers
2. Study and operation of UTM
3. Tensile test on mild steel specimen and plotting stress strain curve.
4. Bending test on timber beams.
5. Compression test on common structural materials viz timber, cast iron etc.
6. Determination of toughness of cast iron and mild steel specimen by Charpy and Izod test.
7. Hardness test by Brinell and Rockwell test.

DME-308 Fluid Mechanics-I Lab:

1. Study of different types of manometers and pressure gauges
2. Verification of Bernoulli's theorem
3. Determination of C_d for Venturimeter
4. Determination of C_d for Orificemeter
5. Determination of C_c,C_v and C_d of small orifice
6. Visit of a near by dam.

DME-309 Manufacturing Process-I Lab:

1. Making following types of joints by gas welding : Preliminary joining practice on gas welding, Vertical welding.

2. Exercises of gas welding on the following: Aluminium welding, Brass welding, Copper welding, C.I. welding

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: Preliminary joining practice by arc welding, Butt and lap joint (in vertical position travel up and down), Welding of outside corner joint

5. Exercise on spot welding

6. Exercise on brazing

7. Exercise on TIG/MIG/CO_2 welding

8. Pattern making: Preparation of solid pattern (single piece) Preparation of split pattern, Preparation of self cored pattern

9. Preparation of the following types of moulds: Floor moulding, Turn over moulding.

10. Testing of moulding sand- moisture content.

DME-310 MACHINE DRAWING

Preparation of assembly drawing sheets from detailed drawings :

1. Couplings
2. Plummer block and foot step bearing
3. Machine vice
4. Tail stock
5. Shaper tool head
6. Steam stop valve
7. Feed check valve
8. I.C. Engine connecting rod and piston
9. Drilling jig

DME-401 STRENGTH OF MATERIALS - II

UNIT-I

Deflection :

Concept of deflection of a beam, Use of standard formula for Calculating deflection (for point loads, U.D.L. and their combination) Cantilever beam, Simply supported beam.

UNIT-II

Columns and Struts :

Concept of column and struts, Modes of failure, Types of column; long and short Buckling loads, Slenderness ratio, Euler's formula (without proof), Both ends hinged, One end fixed and other end free, Both ends fixed, One end fixed and other end hinged, Limitations of Euler's Formula Equivalent length, Rankine's formula.

UNIT-III

Torsion of Shaft :

Concept of torsion, Angle of twist, Polar moment of Inertia. Assumptions in the theory of pure torsion. Combined stress due to bending and torsion in solid and hollow shaft.

Springs :

Introduction and classification of springs, Flat carriage springs, Application of flat carriage springs, Determination of number of leaves and their sections, deflection and radius of curvature, Quarter elliptical spring, Closely coiled helical springs : Application of closely coiled helical springs. Determination of deflection, angle of twist, number of coils and stiffness under axial loading in closely coiled helical springs.

UNIT-IV

Thin Cylindrical Shells :

Use of cylinders, Stresses due to internal pressure, Circumferential stress or hoop stress, Longitudinal stress, Design of thin cylinders - calculation of the various dimensions of a thin cylinder.

UNIT-V

Combined Direct and Bending Stress :

Effect of eccentricity, Stress due to eccentric load, Middle third rule.

Frames :

Different types of frames, Calculation of forces in the members of determinate frames. Method of Joints, Method of section, Graphical method.

REFERENCE BOOKS :

1. Strength of Materials & Theory of Structures (Vol. I) — B.C.Punmia
2. Strength of Materials — Ramamurtha
3. Strength of Materials — Junarkar
4. Strength of Materials — R.S. Khurmi

DME-402 FLUID MACHINES

UNIT-I

Impact of Free Jet :

Impulse momentum equation (no proof) Force exerted by a fluid jet on stationery flat plate, Plate normal to the jet, Plate inclined to the jet, Force exerted by fluid jet on moving flat plate, Plate normal to the jet, Plate inclined to the jet, Force exerted by fluid jet on stationary curved vane, Jet strikes at the centre of symmetrical cured vane. Jet strikes tangentially at one. Force exerted by a fluid jet on moving curved vane.

UNIT-II

Hydraulic Turbines :

Classification of water turbines, Pelton turbine, Working principle, Constructional features, Francis turbine and Kaplan turbine, Working principle, Constructional features, Draft tube, Cavitation, Governing of Turbines, Need for governing, Simple governing mechanism, Surge tank, Turbine performance. Introduction to characteristics curve (no numerical problems), Numerical problems on turbines.

UNIT-III

Centrifugal Pump :

Introduction and working principles, Advantages over reciprocating pump, Classification Constructional features, Mechanical manometric and overall efficiency, Head of a pump - static, manometric, Power required to drive the pump, Losses in pump and efficiency, Minimum stating speed, Pumps in series and parallel, Priming, Description and working of multistage centrifugal pump, submersible, deepwell pump and gear pump. Numerical problems.

UNIT-IV

Reciprocating Pump :

Types of pump, Main components and working, Slip Percentage slip, Negative slip, Work down by a reciprocating pump, Acceleration of piston, Its effect on velocity and pressure, Air vessel, Troubles in Reciprocating pump and their remedies. Numerical problems.

UNIT-V

Miscellaneous Hydraulic Machines :

Description, working principle of following machines, Hydraulic accumulator, Hydraulic intensifier, Hydraulic press, Hydraulic coupling and torque converter.

REFERENCE BOOKS :

1. Fluid Mech. & Machines — Dr. Jagdish Lal
2. Fluid Mech. & Machines — Dr. R.K.Bansal
3. Fluid mechanics & Machines — R.S.Khurmi.
4. Fluid Machines — S.S. Ratan

DME-403 INTERNAL COMBUSTION ENGINE

UNIT-I

Gas Power Cycles :

Otto cycle, Diesel cycle, Dual combustion cycle, Atikinson brayton cycle, Air standard efficiency, Effect of compression ratio on efficiency, Numerical Problems.

UNIT-II

Principles of Internal Combustion Engines :

Introduction and Classification of I.C Engines, Working principle of four stroke and two stroke cycle and their comparison, Working and special features of petrol and diesel engines and their comparison and applications, I.C. engine terms - Bore, stroke, dead centres, crank throw, compression ratio, clearance volume, piston displacement and piston speed, B.S.I. specification for I.C. engine parts, Valve timing diagrams, firing order and super charging of I.C. engines

UNIT-III

Petrol Engines :

Concept of Carburation, Air fuel ratio, Simple carburetors and its limitations, Description of Solex and S.U. types carburettors, Multi point fuel injection system, Mechanical and electrical feed pump, Description of coil ignition system and Magneto ignition system,Elementary idea of combustion phenomenon, detonation, pre- ignition and octane number

UNIT-IV

Diesel Engines :

Description and working of Fuel feed pump, Injection of fuel, air and airless injection and fuel injectors. Elementary idea of combustion phenomenon, diesel knock, delay period and Cetane number. Introduction to swirl and open combustion chambers, Introduction to Wankel engine.

UNIT-V

Cooling, Lubrication and Governing :

Necessity of engine cooling, Properties of coolants, Methods of cooling and their merits and demerits, Function of Lubrication, lubrication systems of I.C. Engines, Governing methods of I.C. Engines.

Gas Turbines :

Classification and application of gas turbines, Description of constant pressure (open cycle and closed cycle) and constant volume gas turbines., Methods of increasing thermal efficiency of gas turbines, regeneration, inter cooling, re-heating.

REFERENCE BOOKS :

1. Internal Combustion Engine — Mathur & Sharma
2. Thermal Engineering (In Hindi) — Verma & Gulecha
3. Thermal Engineering Vol 1 — Mathur & Metha.

DME-404 WORKSHOP TECHNOLOGY - I

UNIT-I

Cutting Tools and Materials :

Cutting tools, Standard shape of single point tool, Cutting angles, effect of rake angle, importance of clearance angle, Heat produced by cutting and its effect, Cutting speed, feed and depth of cut, Materials, Materials of cutting tools and their properties, High-speed steel, cobalt steel, tungsten carbide, cemented carbide, stellite, diamond, ceramics.

UNIT-II

Lathe Machine :

Specifications, Classification of lathe machines, Constructional features of a centre lathe and its function, Functions of various parts of lathe, Different operations, which can be performed on the centre, lathe with and without attachments. Calculation of gear trains for thread cuttings, Lathe attachments and lathe accessories.

UNIT-III

Drilling Machines :

Description, working and uses of different drilling machines, Multi spindle drill, gang drill, deep hole drill and small diameter hole drill machines. Specifications and constructional features of radial arm and upright drilling machines. Work holding devices, tool holding devices, Description and types of drills and reamers, Various operations of drilling machines e.g. drilling, reaming, boring, counter-boring, counter sinking, spot facing, tapping. Selection of drill, Cutting speed and feed according to material of job.

UNIT-IV

Shaping, Planning and Slotting Machines :

Description, working and uses of various types of shapers, planers and slotters, Specification, constructional features of a shaper and planner in detail, Mechanism used in shaper - crank and slotted link, whitworth quick return and hydraulic mechanism, Feed mechanism, Mechanism of planner, Various works holding devices and clamping devices used on shaper and planner, Various shaper and planner operations, Shaper and planner tools, Cutting speed, feed and depth of cut on shaper and planner, Difference between shaper, planner and slotter.

UNIT-V

Cutting Fluids and Cooling Process :

Difference between cutting fluid and coolant, Functions of cutting fluid and its action,Requirements of good cutting fluid, Types of cutting fluids, Selection of cutting fluids for different material and operations.

REFERENCE BOOKS :

1. Workshop Technology (Hindi) – II — Tahil Manghnani
2. Workshop Technology (Hindi) – II — B.S.Raghuvanshi
3. Workshop Technology – II — Hazra &
4. Workshop Technology (Hindi) — S.K.Bhatnagar
5. Production Technology — R.K. Jain
6. All About M/C Tools — Gerling

DME-405 **METROLOGY**

UNIT-I

Introduction :

Units and standards of measurement, International, National and company standards, Line and end standards, Errors in measurement, Precision and accuracy

Linear and Angular Measurement :

Vernier calliper, micrometers, height and depth gauges, Bevel protractor, sine bar, slip gauges, angle gauges and clinometers, Auto collimator, angle dekkar, Taper measurements Cylinder bore gauge, Telescopic gauge, feeler and wire gauge

UNIT-II

Measurement of Surface Finish :

Meaning of surface texture, primary and secondary texture Terminology of surface roughness, Factors affecting surface finish, Representation of surface roughness parameters CLA and RMS values. Comparison and direct instrument methods of surface finish measurements.

UNIT-III

Comparators :

Classification, advantages and working mechanism of dial indicators, passmeters, Mechanical, Electrical, Electronic and pneumatic comparators

Light Wave Interference :

Principle of interference, Interferometry applied to flatness testing, N.P.L. flatness interferometer

UNIT-IV

Gear and Screw Measurement :

Screw thread terminology, errors in threads, Effective diameter measurement by two wire and three wire methods, Major and minor diameter measurement, Thread micrometers, Gear tooth terminology, Gear tooth vernier calliper and its application, Measurement of gear pitch.

UNIT-V

Limits, Fits and Tolerance :

Interchangeability - control and need, Definitions and Terminology of limits, fits and tolerances, Basis of limit system, Type of fits, Limit gauges

Machine Tool Metrology :

Alignment tests, Performance tests, Alignment test on lathe and drilling machine.

REFERENCE BOOKS :

1. Engineering Metrology R.K.Jain
2. Engineering Precision Metrology R.C.Gupta
3. Engineering Metrology (Hindi) Mittal
4. Engineering Metrology (Hindi) Bhatnagar.

DME-406 THEORY OF MACHINES

UNIT-I

Simple Mechanism :

Introduction to link, kinematic pair, kinematic chain, structure, mechanism, machine, Slider crank mechanism and its inversion, Double slider crank chain, Example of mechanism with higher pairs

UNIT-II

Velocity and Acceleration in Mechanism :

Velocity diagrams of four bar and single slider crank mechanisms by relative velocity method and instantaneous centre method, Acceleration diagram of four bar chain and reciprocating engine mechanism

UNIT-III

Friction :

Friction of collars and pivots, Friction clutches-plate clutch and centrifugal clutch Friction in journal bearings. Rolling friction, Prony brake, Rope brake and Froude's hydraulic dynamometer.

UNIT-IV

Transmission of Power :

Flat and V-belt drives, Velocity ratio of belt drives, slip in belt, and creep in belt. Length of open and cross belt drives, Power transmitted by a belt, Ratio of driving tension, centrifugal tension, Condition for the maximum power transmission, initial tension in the belt. Chain drives - types of chain drives roller chain and inverted tooth chain. Gear drives - Types of gear wheels, proportions of gear tooth. Gear trains - Simple gear train, compound gear train, reverted gear train and simple epicyclical gear train.

UNIT-V

Vibration :

Causes of vibrations in machine, their effects and method of reducing them, Free or natural vibration, Forced vibration, Damped vibration.

REFERENCE BOOKS :

1. Theory of Machines Jagdishlal
2. Theory of Machines R.S.Khurmi
3. Theory of Machines Abdullah

DME-407 Strength of Materials-II Lab:

1. Determination of deflection for various types of loading
2. Torsion test on brass and mild steel
3. Compression test on columns
4. Determination of stiffness of close coiled spring
5. Deflection test on leaf spring.

DME-408 Fluid mechanics-II Lab:

1. Determination of coefficient of friction for pipes
2. Determination of slip, coefficient of Discharge for a reciprocating pump
3. To draw characteristics curves and efficiency curves of Centrifugal pump, Pelton turbine, Francis turbine
4. Study of model of Kaplan turbine
5. Study of submersible pump, jet pump, deep well pump.

DME-409 WORKSHOP TECHNOLOGY-I LAB:

1. Grinding of various types of single point cutting tool
2. Simple exercise on Lathe Machine involving following operation

    2.1 Simple turning, facing, step turning, Grooving and knurling and taper turning, by compound rest
    2.2 Facing, drilling, boring and step turning, parting off.
    2.3 Taper turning by tails tock off set method
    2.4 V threading, square threading and taper threading by attachment
    2.5 A utility job on lathe machine with an accuracy of □ 0.2 mm

3. Preparing a M.S. block with all faces finished and V grooved on shaper machine
4. Planning practice on a planner on a rectangular C.I plate.
5. Internal slot cutting on the slotter machine

DME-410 **Metrology Lab:**

1. Internal and External measurement with the vernier calliper
2. Internal and External measurement with micrometer
3. Measurement with height and depth gauges.
4. Measurement with dial indicator using surface plate and accessories for -

    4.1 Flatness
    4.2 Concentricity

5. Measurement with combination set and bevels protractor
6. Measurement of thread characteristics
7. Study and use of slip gauges
8. Study of limit gauges.
9. Internal and External taper measurement.
10. Measurement of gear characteristics
11. Measurement of angle with sine bar and slip gauges
12. Study and use of comparators
13. Study and use of tool room microscopes.
14. Measurement of bore with cylinder dial gauge for ovality and taper.
15. Measurement of worn out I.C. Engine piston, clearance between cylinder and piston and between bearing and journal

Note : Industrial visit can be arranged to show these practicals to the students.

DME-501 INDUSTRIAL ENGINEERING

UNIT-I

Production and Productivity:

Production, production functions, productivity, factors affecting productivity, measurement of productivity, causes of decrease in productivity, difference between production and productivity.

UNIT-II

Plant Location, Layout and Material Handling:

Plant location, factors affecting plant location, concept of plant layout, types of layout, their characteristics, factors affecting plant layout, work station design, factors considered while designing a work station, introduction, need and objective of material handling, factors considered while selecting a material handling device, safety concept of material handling equipment.

UNIT-III

Work Study:

Definition and scope of work study; areas of application of work study in industry, Role of work study in improving productivity, Objectives, needs and methods of method study, information collection, recording techniques, process symbols, charts and diagrams, critical examination, development, installation and maintenance of improved methods, work measurement objectives, needs and methods of work measurement, time study, various allowances, calculation of time, work sampling, standard data and its use. Application of engineered time standards and work sampling Ergonomics, concept and advantages.

UNIT-IV

Job Evaluation and Incentives:

Introduction, objectives, needs of job evaluation, job definition, job analysis, data source, job evaluation methods such as ranking method, grade description method, point system and factor comparison method, hybrid system. Incentive-definition and concept, incentive and productivity relation, types of incentives such as financial, non financial. Individual and group incentives, pre requisites for incentives, characteristics of a good incentives plan

UNIT-V

Production Planning and Control:

Introduction, objectives and components (functions) of P.P.C, Advantages of production planning and Production Control, stages of P.P.C, process planning, routing, scheduling, dispatching and follow up, routing purpose, route sheets, scheduling – purpose, machine loading chart, Gantt chart, dispatching – purpose, and procedure, follow up – purpose and procedure. CPM/PERT technique, drawing of simple networks and critical time calculation. Production Control in job order, batch type and continuous type of productions. Difference between these controls.

DME-502 COMPUTER INTEGRATED MANUFACTURING

UNIT-I

Introduction :

Fundamental of manufacturing, CAD-CAM Meaning, Activities of a CAD/CAM system, Manufacturing components of CAD/CAM integration, system approach in manufacturing, Introduction of Automation and Computer Integrated manufacturing, Concept of CIM.

UNIT-II

Automation:

Automation in manufacturing, Basic concepts of automation, Hard automation, Softautomation, comparison of manual operation, hard automation and flexible (Soft)automation, Trends in manufacturing automation, composition of work force in conventional and automated manufacturing system.

UNIT-III

NC Production System:

Introduction to Numerical Control, NC machine Tools, NC control unit, Tooling for NC machine, NC part Programming, Computer automated part programming, CNC/DNC and adaptive control, Components of a DNC system, Categories of adaptive control-adaptive control with optimization (ACO), adaptive control with constraints (ACC), Geometric adaptive control (GAC), benefits of adaptive control.

UNIT-IV

Computer Aided Process Planning (CAPP) :

Concepts of group Technology, approaches to process planning-manual approach, variant process planning, Generative process planning; economic regions for different process planning system, role of process planning in computer integrated manufacturing, integrated process planning system, advantages of CAPP.

UNIT-V

Automated Material Handling:

Introduction to material handling, Objectives of material handling, Types of materials to be moved, Integrated material handling, handling system selection, Introduction toAutomated Guided Vehicles (AGV), Types of AGV-Wire Guided Vehicles, Painted Guided Vehicle, Free ranging AGVs; Different AGVs guidance system, components of an AGV, AGV's basic function, Advantages of using AGVs, Industrial application of AGVs; Automated storage/retrieval systems, Industrial applications.

DME-503 INSPECTION AND QUALITY CONTROL

UNIT-I

Inspection:

Introduction, units of measurement, standards for measurement and Inter changeability. International, national and company standard, line and wavelength standards. Limits fits and tolerances Positional tolerances: maximum materialcondition usage of standards for deciding tolerance. Planning of inspection,Types of inspection: remedial, preventive and operative inspection. Study of factors influencing the quality of manufacture.

UNIT-II

Measurement and Gauging:

Basic principles used in measurement and gauging, mechanical, optical, electrical and electronic. Study of various measuring instruments like: calipers, micrometers, dial indicators, surface plate, straight edge, try square, protectors, sine bar, clinometer, Geometrical parameters & errors:Errors & their effect on quality, concept of errors, measurement of geometricalparameter such as straightness, flatness & parallelism.

UNIT-III

Statistical 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, namely X, R, P and C charts and their applications. Sampling plans, selection of sample size, method of taking samples, frequency of samples. Inspection plan format and test reports**,** Concept of total quality management (TQM).

UNIT-IV

Standards and Codes:

National and International Codes.**,** ISO-9000, concept and its evolution and implications.

UNIT-V

Instrumentation:

Measurement of mechanical quantities such as displacement, vibration, frequency, pressure temperature, humidity by electro mechanical transducers of resistance, capacitance & inductance type.

REFFERENCE BOOKS:

1. Statistical Quality Control by M.Mahajan: Dhanpat Rai and Sons, Delhi
2. Engineering Metrology by RK Jain
3. Engineering Metrology by RK Rajput; SK Kataria and Sons

DME-504 AUTOMOBILE ENGINEERING

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

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

UNIT-II

Steering System:

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

UNIT-III

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 adjustmen.

Suspension System:

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

UNIT-IV

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 and Alternator:

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.

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.

DME-505 WORKSHOP TECHNOLOGY-II

UNIT-I

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.

UNIT-II

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.

UNIT-III

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.

UNIT-IV

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 Working a) Press working – Types of presses, type of dies, selection of press die, die material b) Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping – Forging a) Open die forging, closed die forging b) Cold and hot forging – Rolling a) Elementary theory of rolling b) Types of rolling mills c) Rolling defects and remedies - Extrusion and Drawing a) Type of extrusion- Hot and Cold, Direct and indirect b) Pipe drawing, tube drawing

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.

DME-506 MACHINE DESIGN AND DRAWING

UNIT-I

Introduction Design:

Definition, types of designs necessity of design. Comparison of designed and undersigned work. Design procedure. Practical examples related with design procedure.Characteristics of a good designer. Characteristics of environment required for a designer. 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.

UNIT-II

Design of keys and shafts:

Design of keys: Types of keys, materials of keys, and functions of keys.Design of keys.Design of shafts: Types of shaft, type of loading on shafts, shaft materials, 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, diamond (Lozenzo). Design of boiler joints i.e. circumferential and longitudinal boiler joints.

UNIT-IV

Design of Couplings:

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

UNIT-V

Cams:

Cam profile nomenclature. Types of followers. Motions of followers. To draw cams with different followers with different motions.

Gears:

Types of gears. Nomenclature of gears. Conventional representation of gears. Draw profile of spar gear.

DME-507 COMPUTER INTEGRATED MANUFACTURING LAB :

1. **Creating part**s: Sketching, selection of sketch plane, creating feature on work plane, extrude, dimensioning sketches, constraining sketches. Create Rectangle, Circle, and Polygons. Extrude these to make box, cylinder & prism and dimension the above part, change size by editing dimensions & using constraints.

2. Creating Drawing Views: Planning and setting of drawings, creating drawing views, Hiding extraneous dimensions. Create various drawing views of the 3-D parts.

3. Advanced Modeling Techniques

Extrudes to face/plane, intersect, face draft, 3D rounds, 3D fillets & 3D chamfers, setting & modifying feature dimensions, history based part modification. Use extrude commands to make holes through the above objects. Also face drafts a part on another part. Create 3-D rounds and fillets on box corners and Use history to modify above feature and their dimensions.

4. Assembly of Parts

Basic concepts, starting assembly design, creating part instances, assembling the parts, checking for interference. Make cylinder and piston and assemble them.

DME-508 AUTOMOBILE ENGINEERING LAB:

1. Fault and their remedies in (i) Battery Ignition system (ii) Magneto Ignition system
2. Study and sketch of (i) Head Light Model (ii) Wiper and Indicators
3. Study and sketch of (i) AC Pump (ii) SU Pump (iii) Master Cylinders
4. Study and sketch of (i) rear axle (ii) differential (iii) steering system
5. Fault finding practices on an automobile - four wheelers (petrol and diesel vehicles)
6. Assembly and disassembly of petrol and diesel engine of an automobile.
7. Tuning of an automobile engine.
8. Driving practice on a four wheeler.
9. Charging of an automobile battery and measuring cell voltage and specific gravity of electrolyte.
10. Phasing and calibration of fuel injection pump.

DME-509 WORKSHOP TECHNOLOGY – II LAB

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 ± 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).

DME-510 INDUSTRIAL TRAINING SEMINAR

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. 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%

DME-601 REFRIGERATION & AIR CONDITIONING

UNIT-I

Fundamental of Refrigeration:

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.

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.

UNIT-III

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-IV

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.

UNIT-V

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.

DME-602 POWER PLANT ENGINEERING

UNIT 1

Sources of Energy:

Conventional and non-conventional sources of energy; Importance of electrical energy; Geothermal power plants; Tidal power plants; Windmills; Solar power plants; Direct energy conversion systems; Energy sources in India; Recent developments in power plants.

UNIT 2

Hydro Power Plants: Hydrology: rainfall, runoff, hydrographs, flow duration curves; Site selection for hydro power plants; Classification of hydro power plants; Storage type hydro power plant and its operation; Estimation of power availability; Selection of water turbines; Combination of hydro power plants with steam plants; advantages and disadvantages of hydro power points.

Steam (Thermal) Power Plants: Analysis of steam power cycles for power plant application; High pressure boilers- La-Mont boiler, Benson boiler; Loeffler boiler; Velox boiler; Super pressure steam power plants; Economizers; Air-preheaters; Super heaters and reheaters; Feed water heaters. General layout of thermal power plant; Site selection for thermal power plant; Coal as fuel, classification of coals, analysis of coal; Coal handling; Dead and live storage.

UNIT3

Diesel Power Plants: Introduction; Field of use; Outline of diesel electric power plant; Different systems of diesel power plant; Supercharging of diesel engines; Performance of diesel power plant; Advantages and disadvantages of diesel plants over thermal power p:ants.

UNIT 4

Gas Turbine Plants: Elements of plant; Thermal refinements; Performance of plants; Gas turbine characteristics; Comparison with other plants; Combined steam and gas turbine power plants.

UNIT-V

Nuclear Power Plants:

Basic theory and terminology; Nuclear fission and fusion processes; Fission chain reaction; Moderation; Fertile materials; Nuclear fuels; General components of nuclear reactor; Different types of reactors; Breeder reactors; Nuclear power plants in India; Disposal of nuclear waste.

Reference and Text Books:

1. Power Plant Engineering - By Morse

DME-603 WORKSHOP TECHNOLOGY – III

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. - Electrical Discharge Machining (EDM): Introduction, principle parts of EDM machine, EDM terminology. Principal, metal removing rate, dielectric fluid and properties of electric fluid, applications. Wire cut EDM.

UNIT-II

Plastic Moulding 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-III

Gear Manufacturing and Finishing Processes:

Gear hobbing- Gear shaping- Gear shaving- Gear burnishing.

UNIT-IV

Finishing Processes:

Purpose of finishing surfaces - Surface roughness – definition & units. - Honing process and its applications. - Description of hones. - Brief idea of honing machines. - Lapping process, its applications.- 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.

DME-604 CNC MACHINES AND AUTOMATION

UNIT-I

Introduction:

Basic concepts of NC, CNC & DNC, adoption controls. Advantages & Disadvantage of CNC machines. Application of CNC machines. Difference between conventional & CNC Machines. Profitable applications of CNC Machines.

UNIT-II

Construction of CNC Machines:

Machine control unit.NC control. PLC control, its advantages & disadvantages. Application aid limitations of PLC machines. Axis designate of CNC machines. Special constructional requirement of CNC machines. Slide ways, bolt screw & nut assembly. Lubrication & cooling of CNC machines. Spindle & spindle motors, axis drives motor. Swarf removal & safety provision of CNC machines. Feedback mechanism in CNC machines.

UNIT-III

Tooling of CNC Machines:

Introduction. Various cutting tools for CNC machines. Work holding devices. Automatic tool changer.

Control System:

Open & close loop control system Fundamental problem in control: Accuracy, resolution, repeatability, instability, response & damping, Type of position control: i) Point to point ii) Straight line iii) Continuous

UNIT-IV

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-V

Common Problems in CNC Machines:

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.

Industrial Automation:

What is automation Need of automation. Different types of automation. Advantages/disadvantages of automation.

DME-605 INSTALLATION, TESTING & MAINTENANCE

UNIT-I

Introduction:

Necessity of testing, repair and maintenance**,** Economic aspects, manpower planning and materials management**,** Fits and tolerances – common fits and tolerances used for various machine parts.

Execution and Commissioning of Machines (Installation):

Location, layout and positioning of machines**,** Foundation – types of foundation, foundation plan, erection and leveling, grouping, vibration damping, vibration isolation – methods of isolation.

UNIT-II

Inspection, Servicing, Repair & Overhauling of machines and equipment:

Inspection of various machines and equipment**,** Servicing of various machines and equipment**,** Repair of various machines and equipment**,** Overhauling of various machines and equipment**,** Recalibration of various measuring instruments, testing the speed of machines, accuracy of machines, alignment and performance of machines.

UNIT-III

Maintenance planning & stages of maintenance:

Maintenance planning, Various stages of maintenance.

Overhauling: Frequent failure of common parts, their causes & remedical measures, Maintenance schedule**.** Parts which require frequent maintenance such as belts, couplings, nut, bolts, their repair & maintenance to avoid downtime.

UNIT-IV

Maintenance:

Meaning of maintenance, advantages & disadvantages**,** Types of maintenance**,** Preventive, predictive & breakdown maintenance. Maintenance organization. Centralized maintenance & decentralized maintenance. Computerization of maintenance.

UNIT-V

Storage of parts:

Storage of parts used frequently for replacement and parts which are not easily available in local market. History cards of different machines. Machines repair/replacement decision.

RECOMMENDED BOOKS:

1. Industrial Maintenance by HP Garg; S. Chand and Company.
2. Plant Maintenance Engineering by RK Jain; Khanna Publishers.
3. Installation, Servicing and Maintenance by SN Bhattacharya; S. Chand

DME-606 INDUSTRIAL MANAGEMENT

UNIT-I

Principles of Management:

Management, different functions of management: Planning, organizing,coordination and control. Structure of an industrial organization. Functions of different departments. Relationship between individual departments.

UNIT-II

Human and Industrial Relations:

Human relations and performance in organization. Understand self and others for effective behaviour. Behaviour modification techniques. Industrial relations and disputes. Relations with subordinates, peers and superiors. Characteristics of group behaviour and trade unionism. Mob psychology Grievance, handling of grievances. Agitations, strikes, lockouts, picketting and gherao Labour welfare. Workers' participation in management.

UNIT-III

Professional Ethics:

Concept of ethics. Concept of professionalism. Need for professional ethics. Code of professional ethics. Typical problems of professional engineers. Professional bodies and their role.

UNIT-IV

Motivation:

Factors determining motivation, Characteristics of motivation. Methods for improving motivation. Incentives, pay, promotion, rewards. Job satisfaction and job enrichment.

Leadership: Need for leadership.Functions of a leader. Factors for accomplishing effective leadership. Manager as a leader.

UNIT-V

Human Resource Development:

Introduction. Staff development and career development. Training strategies and methods.

Materials Management:

Material in industry, inventory control model, ABC Analysis, Safety stock, Reorder,level, Economic ordering quantity, Stores equipment, Stores records,

purchasing procedures, purchase records, Bin card, Cardex, Material handling,Manual lifting, Hoist, Cranes, conveyors, trucks, fork trucks.

DME-607 REFRIGERATION & AIR CONDITIONING Lab

1. Identify various tools of refrigeration kit and carry out following operations.
   (1.1)Cutting
   (1.2)Bending
   (1.3)Flaring
   (1.4)Swaging and brazing of copper tubes.
2. Study the following compressors used in refrigeration system.
(2.1)Reciprocating compressor
(2.2)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.

D**ME-608 SEMINAR ON ADVANCE TOPIC.**

The student will select a topic in emerging areas of Mech. Engg. and study independently. He will give a seminar talk on the same before the committee constituted by the head of the dept. The committee should comprise of at least three faculty members from Thermal, Production & Design specializations.

DME-609 **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.