Faculty of Engineering & Technology

Syllabus

For

Diploma in Engineering

Mechanical Engineering (ME)

(Program Code: ET0131ME)

(2022-23)

Approved by the Academic Council vide resolution no ……

INDEX

1. INTRODUCTION

Technical Education plays a vital role in Human Resource Development of the country by creating skilled man power, enhancing Industrial productivity. Diploma in Engineering 3 year (6 Semester) programme is a professional course for learning of fundamental concepts. It helps to provide trained man power to carry out various trades in engineering. It also promotes entrepreneurial skills among the students. Jagan Nath University presently offers 3-Year Diploma programme in (i) Civil Engineering, (ii) Computer Science Engineering, (iii) Electrical Engineering and (iv) Mechanical Engineering with Choice Based Credit System (CBCS).

2. DURATION OF THE DIPLOMA PROGRAM

(a) There shall be a 3-Year (6 Semester) Program leading to the diploma of engineering

(b) Each Academic Year shall be divided into two Semesters, i.e. July to November / December and January to May / June.

(c) Each Semester shall consist of minimum 18 weeks.

3. TYPES OF COURSES

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
HS	Humanities & Social Sciences Courses
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Program Elective Courses
OE	Open Elective Courses
SI	Summer Internship
PR	Project
SE	Seminar

4. PROGRAM STRUCTURE DIPLOMA IN ENGINEERING (MECHANICAL ENGINEERING)

SEMESTER I

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
DIP101	Applied Physics -I	BS	3	1	-	30	70	100	4
DIP102	Computer Fundamental	ES	3	1	-	30	70	100	4
DIP103	Applied Mathematics-I	BS	3	1	-	30	70	100	4
DIP104	English and communication Skills	HS	3	1	-	30	70	100	4
DIP105	Applied Chemistry	BS	3	1	-	30	70	100	4
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
DIP106	Physics Lab-I	BS	-	-	2	30	20	50	1
DIP107	Computer Fundamental Lab	ES	-	-	2	30	20	50	1
DIP108	Engineering Drawing Lab	ES	-	-	2	30	20	50	1
DIP109	Basic Workshop Practice Lab – I	ES	-	-	2	30	20	50	1
DIP110	Chemistry Lab	BS	-	-	2	30	20	50	1
DIP111	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	50	1
TOTAL			**15**	**5**	**10**	**350**	**450**	**800**	**26**

SEMESTER II

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
DIP201	Applied Physics II	BS	3	1	-	30	70	100	4
DIP202	Advanced English	HS	3	1	-	30	70	100	4
DIP203	Engineering Mechanics	ES	3	1	-	30	70	100	4
DIP204	Applied Mathematics II	BS	3	1	-	30	70	100	4
DIP205	Environmental Sciences	BS	3	1	-	30	70	100	4
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
DIP206	Physics Lab-II	BS	-	-	2	30	20	50	1
DIP207	English and Communication Lab	HS	-	-	2	30	20	50	1
DIP208	Basic Workshop Practice Lab - II	ES	-	-	2	30	20	50	1
DIP209	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	50	1
TOTAL			**15**	**5**	**6**	**290**	**410**	**700**	**24**

SEMESTER III

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME301	Strength of Materials	PC	3	1	-	30	70	-	100	4
DIPME302	Basic Mechanical Engineering	ES	3	-	-	30	70	-	100	3
DIPME303	Fluid Mechanics & Machines	PC	3	1	-	30	70	-	100	4
DIPME304	Theory of Machines	PC	3	1	-	30	70	-	100	4
DIPME305	Machine Drawing & CAD	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME306	Strength of Materials	PC	-	-	2	30	20	-	50	1
DIPME307	Fluid Mechanics & Machines	PC	-	-	2	30	20	-	50	1
DIPME308	Theory of Machines	PC	-	-	2	30	20	-	50	1
DIPME309	Machine Drawing & CAD	PC			2	30	20	-	50	1
DIPME310	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-		50	1
TOTAL			**15**	**3**	**8**	**320**	**430**	**-**	**750**	**23**

SEMESTER IV

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME401	Material Science & Metallurgy	PC	3	1	-	30	70	-	100	4
DIPME402	Processes in Manufacturing	PC	3	-	-	30	70	-	100	3
DIPME403	Thermal Engineering	PC	3	1	-	30	70	-	100	4
DIPME404	I. C. Engine	PC	3	-	-	30	70	-	100	3
DIPME405	Workshop Technology	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME406	Material Science Lab	PC	-	-	2	30	20	-	50	1
DIPME407	Production Lab	PC	-	-	2	30	20	-	50	1
DIPME408	I C Engine Lab	PC	-	-	2	30	20	-	50	1
DIPME409	Workshop Practice	PC		-	2	30	20	-	50	1
DIPME410	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	-	50	1
Total			**15**	**02**	**08**	**320**	**430**	-	**750**	**22**

SEMESTER V

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME501	Refrigeration & Air Conditioning	PC	3	-	-	30	70	-	100	3
DIPME502	Production Engineering	PC	3	-	-	30	70	-	100	3
DIPME503	Heat Transfer	PC	3	-	-	30	70	-	100	3
DIPME504	CNC Machine & Automation	PC	3	-	-	30	70	-	100	3
DIPME505	Automobile Engg.	PC	3	-	-	30	70	-	100	3
DIPME506	Mechanical Estimation & Costing	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME507	RAC Lab	PC	-	-	2	30	20	-	50	1
DIPME508	Production lab	PC	-	-	2	30	20	-	50	1
DIPME509	Heat Transfer Lab	PC	-	-	2	30	20	-	50	1
DIPME510	Automation Lab	PC	-	-	2	30	20	-	50	1
DIPME511	Automobile Lab	PC	-	-	2	30	20	-	50	1
DIPME512	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	-	50	1
TOTAL			**18**	**-**	**10**	**380**	**520**	**-**	**900**	**24**

SEMESTER VI

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME601	Power Generation	PC	3	1	-	30	70	-	100	4
DIPME602	Machine Design	PC	3	1	-	30	70	-	100	4
DIPME603	Industrial Engineering	PC	3	-	-	30	70	-	100	3
DIPME604	Advanced Workshop Technology	PC	3	1	-	30	70	-	100	4
DIPME605	Operation Management	PC	3	-	-	30	70	-	100	3
DIPME606	Renewable Energy Sources	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME607	Machine Design Lab	PC	-	-	2	30	20	-	50	1
DIPME608	IE Lab	PC	-	-	2	30	20	-	50	1
DIPME609	Technical Seminar	SE	-	-	2	30	20	-	50	1
DIPME610	Practical Training cum Project	PR	-	-	-	30	20	-	50	3
DIPME611	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	-	50	1
TOTAL			**18**	**3**	**6**	**350**	**500**	**-**	**850**	**28**

Note-: The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to the project should be delivered one after starting of semester .The progress will be monitored through seminars and progress reports.

- The Total Number of credits of the Diploma in Mechanical Engineering program=**147**.
- The award of the degree a student shall be required to earn the minimum of **147** credits

5. DETAILED SYLLABI OF DIPLOMA IN ENGINEERING (ME)

SEMESTER I

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
DIP101	Applied Physics -I	BS	3	1	-	30	70	100	4
DIP102	Computer Fundamental	ES	3	1	-	30	70	100	4
DIP103	Applied Mathematics-I	BS	3	1	-	30	70	100	4
DIP104	English and communication Skills	HS	3	1	-	30	70	100	4
DIP105	Applied Chemistry	BS	3	1	-	30	70	100	4
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
DIP106	Physics Lab-I	BS	-	-	2	30	20	50	1
DIP107	Computer Fundamental Lab	ES	-	-	2	30	20	50	1
DIP108	Engineering Drawing Lab	ES	-	-	2	30	20	50	1
DIP109	Basic Workshop Practice Lab – I	ES	-	-	2	30	20	50	1
DIP110	Chemistry Lab	BS	-	-	2	30	20	50	1
DIP111	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	50	1
TOTAL			**15**	**5**	**10**	**350**	**450**	**900**	**26**

DIP101: APPLIED PHYSICS-I

Course Contents:

Unit I: **Measurement:** Physical Quantities, Units for Measurement, Fundamental and Derived Units, Systems of Units, SI Units, Dimensional Analysis, Uses of Dimensional Analysis, Limitations of Dimensional Analysis, Accuracy in Measurement, Errors in Measurement, Combination of Errors, Order of Magnitude, Significant Digits.

Unit II: **Motion and Force:** Distance and Displacement, Speed and Velocity, Relative Velocity, Acceleration and Retardation, Uniformly Accelerated Motion, Equations of Motion, Force and Inertia, Momentum, Impulse, Newton's Law of Motion with examples, Law of Conservation of Momentum, Friction, Laws of Friction, Sliding and Rolling Friction.

Unit III: **Gravitation:** Law of Universal Gravitation, Acceleration due to Gravity, Variation in the value of 'g', Inertial and Gravitational Mass, Gravitational Field, Gravitational Potential Energy, Gravitational Potential, Escape Velocity, Artificial Satellite, Geostationary Satellite, Polar Satellite, Weightlessness in Satellites, Kepler's Laws of Planetary Motion.

Unit IV: **Properties of Matter:** Elasticity, Stress, Strain, Hooke's Law, Young's Modulus, Bulk Modulus, Modulus of Rigidity, Poisson's Ratio, Surface Tension, Surface Energy, Cohesive and Adhesive Force, Angle of Contact, Capillarity, Stream Line and Turbulent Flow, Viscosity, Coefficient of Viscosity, Reynold's Number.

Unit V: **Transfer of Heat:** Modes of Heat Transfer, Isothermal Surface and Temperature Gradient, Coefficient of Thermal Conductivity, Black Body, Reflecting Power, Absorbing Power, Transmitting Power and Emissive Power, Kirchhoff's Law, Wein's Displacement Law, Stefan's Law, Planck's Law of Radiation, Newton's Law of Cooling.

Reference books:

1. Applied Physics Vol. I & II, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by R K Gaur; Dhanpat Rai Publications
3. Simple Course in Electricity and Magnetism by C L Arora, S Chand and Co, New Delhi
4. Fundamental Physics- Vol. I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
5. Concepts in Physics by HC Verma, Bharti Bhawan Ltd., New Delhi
6. Physics XI &XII, NCERT, New Delhi
7. Physics XI &XII Rajasthan Board, Ajmer

DIP102: COMPUTER FUNDAMENTALS

Course Objective:

- To give the basic knowledge of Computer hardware and application software to the students.
- Students able to learn how computers work and how they can be used to make your work more efficient.
- Also Course the basic utilization of the MS Office software package.

Course Contents:

Unit I: Computer System: Basics of computer systems, history, types and Generation of computer, capability and limitations of computer systems. Hardware organization: Anatomy of a digital computer; Internal architecture of CPU.

Unit II: Memory Units: Memory Hierarchy, Primary Memory, Secondary Memory, cache memory. Storage Devices, Input and Output Devices.

Unit III: Number system & Conversions: decimal, binary, octal and hexadecimal number systems and their inter conversions, 1's and 2's complement representation, Binary Arithmetic operations: addition, subtraction, multiplication, division.

Unit IV: Word processor: Introduction to MS-Word, Starting MS-Word, Opening Document, Typing and Editing, Copying, Inserting, Moving, Deleting, Copying from One Document to Others, Undo, Redo, Spell Check, Find and Replace, Formatting, Characters and Fonts, Spacing, Removing Characters Formatting, Inserting Symbols, Paragraphs, Page Setting, Header and Footer, Page Breaks, Borders and Shading, Print Preview and Printing; Tables and Columns

Unit V: Electronic Spread Sheet: Introduction to MS-Excel, Working with Spread Sheet, Editing the Worksheet, Worksheet Formatting, Formula Entering, Saving and Printing Work Book

References:

1. Sinha, P.K. Computer Fundamentals (BPB Publications).
2 Niranjan Mansal and Jayshri Saraogi Computer Made Easy For Beginners (Hindi)
3 Satish Jain, Shashank Jain and Madhullika Jain. It Tools and Applications (BPB Publications)
4 MS Office 2000. Joe Habraken
5 Rapidex Computer Course (Pustak Mahal)
6 Davinder Singh Minhas- Dynamic Memory Computer Course (Fusin Books), New Delhi

DIP103: APPLIED MATHEMATICS-I

Course Contents:

Unit-I: **Introduction to Different Types of Expansion:** Factorial Notation , Meaning of C(n, r), P(n, r) , Binomial Theorem for Positive Index, any Index , Exponential Theorem , Logarithm Theorem, Complex umber: Definition of Complex Number , Operations on Complex Number (Add., Sub., Multiplication, Division) , Conjugate Complex Number , Modulus and Amplitude of a Complex Number , Polar form of a Complex Number

Unit-II: **Trigonometry:** Allied Angle(sin (180±A), sin (90±A) etc., Sum and Difference Formula (without proof) and their Application Product Formula and C-D Formula , T-Ratios of Multiple and Sub-Multiple Angles (2A, 3A, A/2) , Solution of Trigonometric Equations : sin X = 0, tan X = 0, cos X = 0, sin X=A, cos X =A & tan x = A

Unit-III: **Matrices and Determinants:** Definition and Properties of Determinants , Definition and Types of Matrix , Transpose of a Matrix, Symmetric, Skew Symmetric Matrices, Orthogonal matrices, , Minors and Cofactors , Adjoint and Inverse of a Matrix , Cramer's Rule , Solution of Simultaneous Linear Equations by Inverse Matrix Method. Numerical Integration : Trapezoidal Rule , Simpson's 1/3 Rule , Simpson's 3/8 Rule , Newton - Raphson Rule

Unit-IV: **Two Dimensional Coordinate Geometry:** General Introduction , Distance Formula and Ratio Formula , Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle , Area of Triangle , Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form , Angle between Two Lines , Perpendicular Distance of a Line from a Point

Unit- V: **Conic:** Definition and Standard Equations , Equations of Tangent and Normal at a Point (simple problems) , Parabola : Definition and Standard Equations , Equations of Tangent and Normal at a Point (Simple problems) , Ellipse and Hyperbola : Definition and Standard Equations , Equations of Tangent and Normal at a Point (simple problems)

Reference Books :

1. Mathematics XI & XII — NCERT, New Delhi
2. Mathematics XI & XII — Rajasthan Board, Ajmer
3. Polytechnic Mathematics — H. K. Dass

DIP104 : ENGLISH AND COMMUNICATION SKILLS

Course Contents:

Unit I: Grammar

1. Usage of Tense.
2. Articles (A, an, the)
3. Active & Passive voice
4. Direct & Indirect Speech.
5. Modal Verbs.

Unit II: Comprehension

1. The Luncheon: W.S. Maugham
2. How Much Land Does a Man Need?: Leo Tolstoy
3. The Last Leaf: O. Henry
4. If : Rudyard Kipling

Unit III: Composition

1. Paragraph Writing.
2. Letter Writing.
3. E-Mails
4. Resume Writing.

Unit IV Elements of Communication

1. Communication: Meaning, Importance and Process
2. Functions/Objectives of Communication
3. Barriers to Communication**.**
4. Qualities of good Communication

Unit V Types of Communication

1. Verbal and Non- Verbal Communication
2. Formal and Informal Communication
3. Professional Communication
4. Interpersonal Communication and Methods to Improve It.

Recommended Books:

1. English for Competitive Examinations, Prof. R.P.Bhatnagar, Macmillan Publications.
2. "Current English Grammar and Usage with Composition" by R.P. Sinha, Oxford University Press (New Delhi).
3. Effective Technical Communication By M Ashraf Rizvi Tata McGraw-Hill Companies, New Delhi.
4. Communication Skills by sanjay kumar & Pushp Lata. Oxford University Press (New Delhi)

DIP105 : APPLIED CHEMISTRY

Course Contents:

Unit-I **Atomic Structure**: Constituents of the Atom**,** Bohr's Model of the Atom, Quantum Number and Electronic Energy Levels, Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, $n + l$ Rule, Electronic Configuration of Elements (s,p,d Block Elements)

Development of Periodic Table: Modern Periodic Law, Long form of Periodic Table.Study of Periodicity in Physical and Chemical Properties with special reference to : - Atomic and Ionic Radii, Ionisation Potential. Electron Affinity. Electronegativity. Variation of Effective Nuclear Charge in a Period. Metallic Character.

Unit-II **Carbon Chemistry:** Definition of Organic Chemistry. Difference between Organic and Inorganic Compounds. Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (upto C5). **New Engineering Materials:** Superconductors, Organic Electronic Materials, Fullerences, Optical Fibres

Unit-III **Metals and Alloys:** General Principles and Terms listed in Metallurgy, Metallurgy of Iron and Steel, Different forms of Iron, Effect of Impurities on Iron and Steel, Effect of Alloying Elements in Steel. Extraction of Fe, Cu, Al and their important ores.

Kinetic Theory of Gases: Postulates of kinetic Theory, Ideal Gas Equation, Pressure and Volume Corrections, Vender Walls Equations, Liquefaction of Gases, Critical Pressure and Critical Temperature for Liquefaction. Liquefaction of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method

Unit-IV **Water:** The sources of water, common Impurities, soft and hard water, Hardness of water, degrees of hardness and its effects, determination of hardness by various techniques, Municipal Water supply, requisites of drinking water, purification of water by sedimentation, filtration, reverse osmosis (RO), sterilization, chlorination. treatment by preheating, lime-soda process, permutit de-ionizer or demineralization.

Unit-V **Electrochemistry:** Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells;

Reference Books:

1. Engineering Chemistry II- Mathur and Agarwal
2. Chemistry of Engineering Materials C.V. Agarwal
3. Engineering Chemistry P.C. Jain and Monika
4. Engineering Chemistry M.M. Uppal
5. Engineering Chemistry V.P.Mehta Jain Bros. Jodhpur
6. Hand book of Technical Analysis Bannerji Jain Bros.Jodhpur
7. Inorganic Chemistry Shivhare & Lavania.
8. Organic Chemistry Kumar & Mehnot
9. A Text book of Engineering Chemistry S. K. Jain & K. D. Gupta
10. Engineering Chemistry Dr. K.L. Menaria & Dr Praveen Goyal

DIP106: PHYSICS-I LAB

List of Experiments:

1. To study of least count, error analysis and curve fitting.
2. Conversion of a Galvanometer into an Ammeter.
3. Conversion of a Galvanometer into Voltmeter.
4. To determine the acceleration due to gravity by using a simple pendulum.
5. To determine the diameter of given material using Screw gauge.
6. To determine the internal diameter, outer diameter and depth of a calorimeter by using Vernier caliper.
7. To determine the height of given spherical surface by using Spherometer.
8. To determine the wavelength of He -Ne Laser beam.
9. To determine minimum deviation angle for different light using prism and spectrometer

DIP107 : COMPUTER FUNDAMENTAL LAB

Course Objective:

- To Understand the Basics of Operating systems
- To Undestand how to use software packages in day to day activities.
- To to identify word processing terminology and concepts, Create technical documents, Animation and Design document, format and edit documents, use simple tools and utilities, Mail merge,Graph ,Chart, Reports and Mathematical expressions.

List of Experiments :

1. Create simple news letter in ms word.
2. Create greeting card in ms word.
3. Create a mail merge letter in MS Word.
4. Create a cover page of the project report.
5. Create a simple presentation in MS Power Point to list simple dos commands, hardware, software.
6. In Power Point create an animation with video and sound.
7. In MS Excel create a report containing the pay details of the employee with followings:

   It contains: sl no, name, employee id

   Enter the following formula to calculate the respective values.

   da (60% of basic)

   hra (7.5% of basic)
8. Create a student result sheet.
9. Create a pie chart for a sample data and give legends
10. Create a macro which creates a line chart using the data in the worksheet.

DIP108 : ENGINEERING DRAWING

List of Experiments:

Preparation of following on Imperial Size Drawing Sheet:

1.1 Lines, Letters and Scales

1.2 Geometrical Constructions and Engineering Curve

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.

Preparation of following Drawings in Sketch Book (Home Assignment) :

2.1 Lettering (On Graph Sheet)

2.2 Projections of Points in Different Quadrants

2.3 Isometric Projections of Various Planes

DIP109: BASIC WORKSHOP PRACTICE - I

Electrical Workshop

1. Study of the various electrical symbol.
2. Study of the tools used in electrical works with diagram.
3. Study of the electrical apparatus, multimeter, ammeter, voltmeter, and wattmeter.
4. Study the various type of electrical wiring (1) Batten wiring (2) Casing- capping wiring (3) C**on**duit wiring
5. Study of the electrical iron and electrical rod.
6. Study of the electrical fan.
7. Study of the electrical heater.
8. Study of the various type of lamps.
9. Study of the florescent lamp.

10 Study of the electrical energy meter (single phase).

Electronic Workshop

1. Explain and measurement of the resistant.
2. Study and measurement of the electronic component and symbols.
3. Study of the types of switches.
4. Study of the function generator.
5. Study of the cathode Ray oscilloscope.
6. Practice of the soldering-de soldering iron.

DIP110 : CHEMISTRY LAB

List of Experiments :-

1. To determine the strength of a given unknown copper sulphate solution (Iodometrically) with titrate Hypo (sodium thiosulphate) solution.
2. To determine the strength of a given unknown FAS solution with titrate potassium dichromate solution using N-phenyl anthranilic acid (internal indicator).
3. To determine the viscosity and viscosity index of a given sample of lubricating oil using Redwood viscometer No.1
4. To determine the flash and fire point of a given sample of lubricating oil using Pensky Marten's apparatus.
5. Determine the cloud and pour point of a given sample of lubricating oil.
6. Determination of hardness of water by complexometric method (using EDTA).
7. To estimation the amount of sodium hydroxide and sodium carbonate in the given alkali mixture solution (or in water sample) by titrating against an intermediate hydrochloric acid using phenolphthalein and methyl orange indicator.
8. Determine the pH of an acid (strength of an acid) pH – metrically.
9. Determine the strength of a given unknown HCl solution by titrating it against NaOH solution (Conductometric analysis).
10. To determine the moisture and ash content in a given sample of coal by proximate analysis**.**

DIP111: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

SEMESTER II

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
DIP201	Applied Physics II	BS	3	1	-	30	70	100	4
DIP202	Advanced English	HS	3	1	-	30	70	100	4
DIP203	Engineering Mechanics	ES	3	1	-	30	70	100	4
DIP204	Applied Mathematics II	BS	3	1	-	30	70	100	4
DIP205	Environmental Sciences	BS	3	1	-	30	70	100	4
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
DIP206	Physics Lab-II	BS	-	-	2	30	20	50	1
DIP207	English and Communication Lab	HS	-	-	2	30	20	100	1
DIP208	Basic Workshop Practice Lab - II	ES	-	-	2	30	20	100	1
DIP209	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	50	1
TOTAL			**15**	**5**	**6**	**290**	**410**	**700**	**24**

DIP201: APPLIED PHYSICS-II

Course Contents:

Unit I: **Electrostatics and Magnetism:** Electric Charge, Conservation of Charge, Coulomb's Law, Principle of Superposition, Electric Field and Potential, Electric Field and Potential due to Point Charge, Electrostatic Potential Energy, Current, Resistance, Ohm's Law, Magnetic Field, Biot-Savart's Law and its Applications.

Unit II: **Semiconductor Physics:** Solids, Energy Bands in Solids, Conductors, Insulators and Semiconductors, Intrinsic and Extrinsic Semiconductors, Conductivity and Resistivity of Semiconductors, P-N Junction Diode, Biasing and Characteristic Curves, Rectifier, Solar Cell, Zener Diode, LED.

Unit III: **Alternating Current:** Peak Value, Average Value and Root Mean Square Value of Alternating Voltage and Current, Reactance and Impedance, AC Circuits containing R, C, L, R-C, R-L, L-C and L-C-R, Resonant Circuits and their Characteristics, Power of an AC Circuit, Choke Coil, Transformer, Dynamo, D. C. Motor, Starter.

Unit IV: **Optics:** Reflection and Refraction of Light, Laws of Refraction, Critical Angle, Total Internal Reflection,Refraction of Light at a Spherical Surface, Image, Mirrors, Lenses and Prism, Formation of Image by Lenses, Lens Formula, Linear Magnification, Refractive Index of medium of Prism, Dispersion of Light, Spectrum, Angular Dispersion.

Unit V: **Oscillation and Waves:** Periodic Motion, Simple Harmonic Motion, Displacement Equation, Phase and Phase difference, Velocity, Acceleration and Energy of SHM, Simple Pendulum, Wave Motion, Transverse and Longitudinal Waves, Progressive and Stationary Waves, Principle of Superposition of Waves, Sound Waves, Interference of Sound Waves.

Reference books:

1. Applied Physics Vol. I & II, TTTI Publication Tata McGraw Hill, Delhi

2. Basic Applied Physics by R K Gaur; DhanpatRai Publications

3. Simple Course in Electricity and Magnetism by C L Arora, S Chand and Co, New Delhi

4. Fundamental Physics – Vol. I and II by Gomber and Gogia; Pardeep Publications, Jalandhar

5. Concepts in Physics by HC Verma,BhartiBhawan Ltd., New Delhi

6. Physics XI &XII, NCERT,New Delhi

7. Physics XI &XII Rajasthan Board,Ajmer

DIP202 : ADVANCED ENGLISH

Course Contents:

Unit-I (Grammar)

1. Modal
2. Preposition
3. Conjunction

Unit-II (Composition)

1. Resume writing
2. Report writing
3. Advertisement

Unit-III (Personality)

1. Define Personality
2. Types of Personality
3. How to develop one's personality

Unit-IV (Elements of Communication)

1. Meaning
2. Barriers to communication
3. Functions / Objectives of Communication

Unit-V (Poems)

1. 'No men are foreign' – by James Kirk up
2. 'Death, Be not Proud' – by John Donne

DIP203: ENGINEERING MECHANICS

Course Contents:

Unit I **Force System:** Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force, moment of force about a line. Varigon's theorem, Lami's theorem. Force body diagram.

Unit II **Centroid & Moment of Inertia:** Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section, Polar Moment of inertia, Lifting Machines: Mechanical advantage, Velocity Ratio,

Unit III **Friction:** Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.

Unit IV **Kinematics of Particles and Rigid Bodies:** Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular Acceleration, Radial and transverse velocities and accelerations,

Unit V **Work, Energy and Power:** Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Nonconservative Force, Conservation of energy.

References Books:

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.
6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.
7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

DIP204 : APPLIED MATHEMATICS-II

Course Contents:

Unit-I **Function:** Definition of Function , Range and Domain of Function , Types of Function , Absolute Value Function , Exponential value Function , Identity Function , Reciprocal Function , Rational and Irrational Function , Increasing and decreasing Function , Limits , Concept of Limit , L.H.L., R.H.L. , Limit of Standard Functions, Concept of Continuity and Differentiability at a Point (simple Problems)

Unit-II: **Differential Calculus :** Standard Formulae (Except Hyperbolic Function) Derivative of Sum, difference, Multiplication and Division of two Functions ,Differentiation of Function of a Function , Logarithmic Differentiation , Differentiation of Implicit Functions , Differentiation of Parametric Functions , Differentiation by Trigonometric Transformations , Differentiation of a Function w.r.t. Another Function , Second Order Derivative

Applications of Differential Calculus: Tangents and Normals , Angle of Intersection between two Curves , Derivative as a Rate Measurer , Maxima and Minima of Function with one Variable

Unit-III: **Integral Calculus:** General Introduction of Integral Calculus , Integration of Sum and difference of Functions , Integration by Simplification , Integration by Substitution , Integration by Parts , Integration of Rational and Irrational Functions ,Integration of Trigonometric Functions , Definite Integral and its Properties

Unit IV: **Differential Equations:** Definition of differential Equation, Order, Degree and Solution of a differential Equation, Solution of a differential Equation of First Order and First Degree using: Variable Separable Method , Homogenous Form , Reducible to Homogenous Form , Linear differential Equation , Bernoulli's Equation , Exact differential Equation .

Unit V: Solution of Linear Differential Equation of Higher order with Constant Coefficients, Vector Algebra: Definition, Addition and Subtraction of Vectors , Scalar and Vector Product of two Vectors , Scalar Triple Product and Vector Triple Product , Applications of Vectors in Engineering Problems

Reference Books:

1. Mathematics XI & XII NCERT, New Delhi
2. Mathematics XI & XII Rajasthan Board, Ajmer
3. Polytechnic Mathematics H. K. Dass
4. Text Book on Differential Calculus Chandrika Prasad
5. Text Book on Integral Calculus Chandrika Prasad
6. Differential Calculus M. Ray, S. S. Seth, & G. C. Sharma
7. Integral Calculus M. Ray, S. S. Seth, & G. C. Sharma

DIP205: ENVIRONMENTAL SCIENCE

Course Contents:

Unit-I Ecosystem: concepts and functions

Ecosystem- Definition and Introduction of Ecosystem- Abiotic and Biotic components, types of Ecosystems, Food chain, Food web, Ecological pyramids, Energy flow in Ecosystem. Types values, threats and conservation methods of biodiversity.

Unit-II Environmental Pollutions and Disaster management

Causes, Effects and Control measures of: Air pollution, Water pollution, Noise pollution, Disaster management: Floods, earthquake, cyclone and landslides.

Unit-II Solid Waste Management

Introduction, Classification of solid waste, Composition and characteristics of solid waste, collection, conveyance and disposal methods of solid waste, Reuse, Recycle and Recovery of waste.

Unit-IV Non-conventional Energy sources

Introduction, Renewable Sources of Energy: Solar energy, wind energy, Energy from ocean, energy from biomass, geothermal energy and Nuclear Energy.

Unit-V Social Issues and Environment

Sustainable development, urban problems related to energy, water shed management and Rain water harvesting, Environmental Education and Public awareness. Environment Protection Act- 1986, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest conservation Act.

Recommended Reference Books:

1. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
3. Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. , Environmental Encycolopedia, Jaico Publishing House, Mubmbi, 2001.
4. De. A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Agarwal, K.C. 2001 Environmental Biology, Nidhi Publ. Ltd. Bikaner.
6. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut.
7. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
8. Shikha Agarwal and Suresh Sahu, Environmental Engineering, Dhanpat rai and co. (P) LTD. 2009.

DIP206 : PHYSICS LAB -II

List of Experiments:

1. To study of least count, error analysis and curve fitting.
2. To determine the value of ‘g’ with help of Compound Pendulum.
3. To study Zener diode as a constant voltage regulator
4. To Study the inverse square law using photocell.
5. To determine the numerical aperture of optical fiber.
6. To study the charging of a condenser.
7. To study the discharging of a condenser.
8. To determine the Planck’s constant using LED.
9. Study of the variation of magnetic field at the center of coil when radius remains constant and current vary fitted with the compass box.

DIP207: ENGLISH & COMMUNICATION SKILLS LAB

Topics to be covered:

1. Introducing yourself.
2. Role Plays.
3. Words often mis-spelt and Mis- Pronounced.
4. One word for many.
5. Synonyms and Antonyms.
6. Seminar Presentation.
7. Group Discussion.
8. Job Interview.

DIP208 : BASIC WORKSHOP PRACTICE Lab - II

Fitting Shop

1. Finishing of two sides of a square piece by filing and to cut a Square notch using hacksaw.
2. To drill three holes and Tapping on the given specimen.

Welding Shop

3. To prepare Lap Joint with the help of Arc welding
4. To prepare Butt Joint with the help of arc Welding
5. Gas welding practice by students on mild steel flat

Machine Shop Practice

6 Job on lathe M/C with centering
7. Job on lathe M/C with step turning
8. Job on lathe M/C with grooving.
9. Study of Shaper M/C.

DIP209: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

SEMESTER III

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME301	Strength of Materials	PC	3	1	-	30	70	-	100	4
DIPME302	Basic Mechanical Engineering	ES	3	-	-	30	70	-	100	3
DIPME303	Fluid Mechanics & Machines	PC	3	1	-	30	70	-	100	4
DIPME304	Theory of Machines	PC	3	1	-	30	70	-	100	4
DIPME305	Machine Drawing & CAD	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME306	Strength of Materials	PC	-	-	2	30	20		50	1
DIPME307	Fluid Mechanics & Machines	PC	-	-	2	30	20		50	1
DIPME308	Theory of Machines	PC	-	-	2	30	20		50	1
DIPME309	Machine Drawing & CAD	PC			2	30	20		50	1
DIPME310	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-		50	1
TOTAL			**15**	**3**	**8**	**320**	**430**		**750**	**23**

DIPME 301: STRENGTH OF MATERIALS

Course Contents:

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**,** Rupture strength**,** Nominal stress**,** Proof stress**,** Working stress and factor of safety**,** Stress and strain calculations**,** Principle of superposition**,** Bar of homogeneous section, Bar of uniform cross-section Bar of steeped cross-section,

Unit II. **Compound Stress:** Introduction, Stress components on an inclined plane, Mohr's circle, Principal stresses and planes, Strain Energy, Strain energy from stress - strain diagram, Proof resilience, Types of loading - gradual, sudden, impact

Unit III. **Bending moment and shear force:** Basic concept, Types of support, Types of beam, Types of load, Shear force and bending moment, Bending moment and shear force diagrams, Concept of moment of Inertia, Radius of gyration, Moment of Inertia of various section, Concept of bending stress, Theory of simple bending, Calculation of max bending stress in beams of rectangular, circular, I and T section, Shear stress in beams, Shear stress distribution diagram of various sections.

Unit IV. Concept of deflection of a beam, Use of standard formula for calculating deflection, Concept of column and struts, Modes of failure, Types of column; long and short, Buckling loads, Slenderness ratio, Euler's formula (without proof), Concept of torsion, Relation between power and torque, Combined stress due to bending and torsion in solid and hollow shaft,

Unit V. Introduction and classification of springs, Flat carriage springs, Determination of number of leaves and their sections, deflection and radius of curvature, Quarter elliptical spring, Determination of deflection, angle of twist, number of coils and stiffness under axial loading in closely coiled helical springs. Thin cylindrical shells, Stresses due to internal pressure, Design of thin cylinders - calculation of the various dimensions of a thin cylinder, Combined Direct and Bending Stress, Effect of eccentricity, Stress due to eccentric load, Middle third rule, Quarter rule

Reference Books :

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

DIPME302: BASIC MECHANICAL ENGINEERING

Course Contents:

Unit-1 Mechanical Properties of Metals :

1.1 Definitions -

1.1.1 Elasticity

1.1.2 Plasticity

1.1.3 Ductility

1.1.4 Brittleness

1.1.5 Toughness

1.1.6 Hardness

1.1.7 Malleability

1.1.8 Fatigue

1.2 Examples of applications of above terms related to electrical engineering.

Unit-2 Basic Concept of Thermal Engineering :

2.1 Energy

2.2 Internal energy

2.3 Potential energy

2.4 Kinetic energy

2.5 Heat

2.6 Work and enthalpy

2.7 Specific heat

2.8 Specific heat ratio

2.9 Characteristics gas equation

2.10 Universal gas constant

2.11 First law of thermodynamics

2.12 Second law of thermodynamics

Unit-3 Pressure Measuring Devices :

3.1 Manometers

3.1.1 Simple manometers

3.1.2 Differential manometers

3.1.3 Inverted 'U' tube

3.2 Pressure gauges

3.3 Continuity equation

Unit-4 Pumps & turbine :

4.1 Types of pumps

4.2 Centrifugal pump

4.3 Reciprocating pump

4.4 Their relative advantages and performance

4.5 Working principles and types of water turbines

4.6 Selection of turbines

4.7 Brief idea of turbine

4.7.1 Pelton wheel turbine

4.7.2 Francis turbine

4.7.3 Types of steam turbine

4.7.4 Working principle of steam turbine

4.7.5 Uses and advantages of steam turbine

Unit-5 Boilers :

5.1. Classification of boilers

5.2 Working of common boilers

5.2.1 Babcox and Wilcox

5.2.2 Chichram boiler

5.3 Boiler mounting and their accessories

5.4 Introduction to modern high pressure boiler for thermal power station (Lamont boiler, weffler boiler, Benson boiler and Velox boiler)

Reference Books:

1. Thermodynamics & Heat Power Engg. Mathur & Mehta
2. Thermal Engg.P.L. Ballaney
3. Hydraulics & Hyd. Machines Khurmi
4. Strength of Materials G.C.Singh
5. Heat Engines Pande & Shah

DIPME303: FLUID MECHAICS & MACHINES

Course Contents:

Unit I. Fluids and solids, Liquid, gas and vapour, Fluid mechanics, Fluid properties, Newton's law of Viscosity, Dynamic and Kinematic Viscosity, Compressibility, Surface tension - soap bubble, drop, Capillarity, Vapour pressure and its importance, Fluid and its pressure, Pascal's law, Kinds of Pressure, Law of hydrostatic pressure, Brahma's press, Pressure measurement, Manometers, Mechanical gauge

Unit II. Hydrostatics, Total pressure, Centre of pressure & its cases, Working of lock gates, sluice gate, Pressure on masonry dams of rectangular and trapezoidal sections and their condition of stability, Description of fluid flow, Eular approach, Lagrangian approach, Definition of path line, stream line, Types of flow, Continuity equation, Energy of fluid - pressure, kinetic and potential, Bernoulli's theorem, Pitot-tube, Venturimeter, Orificemeter

Unit III. Orifices, Definition and classification, Discharge through small orifices, Coefficient of contraction, Coefficient of velocity, Coefficient of discharge, Coefficient of resistance, Time of emptying a vessel of uniform cross section through an orifice at bottom. Types of flow in pipes (Reynold's experiment), Law of fluid friction, Loss of head due to friction, Darcy's Weisbach equations, Chezy's formula, Manning formula, Other energy losses in pipe, Pipe arrangement, Transmission of power through pipes, Siphon, Water hammer

Unit IV. Impulse momentum equation, Force exerted by a fluid jet on stationery flat plate, Force exerted by fluid jet on moving flat plate, Force exerted by fluid jet on stationary curved vane, Force exerted by a fluid jet on moving curved vane. Jet strikes at the centre of symmetrical cured vane, Jet strikes tangentially at one, Classification of water turbines, Pelton turbine, Francis turbine and Kaplan turbine, Draft tube, Cavitation, Governing of Turbines, Surge tank, Turbine performance, Numerical problems on turbines

Unit V. Centrifugal pump, Introduction and working principles, Advantages over reciprocating pump, Classification, Constructional features, 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, Reciprocating pump, Types of pump, Main components and working, Slip, Work down by a reciprocating pump, Acceleration of piston, Air vessel, Hydraulic accumulator, Hydraulic intensifier, Hydraulic press, Hydraulic coupling and torque converter

Reference Books :

1.	Fluid Mechanics & Machines	Dr. Jagdish Lal
2.	Fluid Mechanics & Machines	Dr. R.K.Bansal
3.	Fluid Mechanics & Machines	R.S.Khurmi.
4.	Hydraulics & Pneumatics	H.L. Stewart.
5.	Fluid Machines	S.S. Ratan

DIPME304: THEORY OF MACHINES

Course Contents:

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, 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, coriolis components

Unit II. **Dynamics of Reciprocating Parts:** Analytical method for velocity and acceleration of piston, Piston effort, crank pin effort, turning moment diagrams, Fluctuation of energy and speed, Energy of a flywheel, Calculating the weight of flywheel. Friction of collars and pivots, Friction clutches-plate clutch and centrifugal clutch, Friction in journal bearings, Rolling friction,

Unit III. Flat and V-belt drives, Velocity ratio of belt drives, slip in belt, and creep in belt, Length , 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

Unit IV. Balancing, Static and dynamic balancing, need of balancing, Balancing of single rotating mass by a single mass in the same plane, by two masses rotating in different planes., Partial primary balancing of a single cylinder reciprocating engine, Causes of vibrations in machine, their effects and method of reducing the, Free or natural vibration, Forced vibration, Damped vibration.

Unit V. **Governors (o derivation & numerical) :**Introduction and classification**,** Methods of governing (Quality, Quantity and hit and miss governing)**,** Dead wt governors (watt , porter and proell)**,** Spring control governors (Hartnell and Wilson Hartnell)**,** Concept of sensitivity, stability, isochronism , hunting, effort and power, .Brakes and Dynamometer:, Introduction, function, capacity of brakes :Block and shoe brake, Band brake, Internal expanding brake, Functions of dynamometer, Prony brake, Rope brake and Froude's hydraulic dynamometer.

Gyroscope – Introduction and principle, Gyroscopic couple

Reference Books :

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

DIPME 305 : MACHINE DRAWING & CAD

Course Contents:

Unit I. **Machining Symbols and Tolerances :** Introduction of limits, fits, tolerances.
Machining symbol Application of machining symbol Indication of machining allowance Indication of surface roughness Tolerancing Unilateral and Bilateral tolerance Standard tolerance Symbols for tolerance, deviation and fits

Unit II **Working Drawing :**Piston and Connecting rod Crankshaft Bush bearing, ball bearing and roller bearing Lathe spindle **Assembly Drawing:** Drilling jigs, milling jigs Stepped pulley, fast and loose pulley, V – belt pulley, Footstep bearing, Plummer block and Universal coupling
Lathe tail stock and Shaper tool heat Fuel injector and Fuel injection pump (jerk type) Machine vice and screw jack

Unit III **Gear tooth profile** Gear types and gear nomenclature (spur, helical and bevel gears) Drawing involute tooth profile (spur gear Approximate method Prof. Unwin's method)
Cam profile Types of cams and followers, Types of follower motions , Construction of disc cam profile with knife edge follower

Unit IV **Computer Graphics :** Application software :- Introduction of CAD and similar software application like CATIA , Pro / Engineer and other **,** Getting Started – I
Starting AutoCAD – AutoCAD screen components – Starting a drawing: Open drawings, Create drawings (Start from scratch, Use a template & Use a wizard) – Invoking commands in

Unit V DWGPROPS Editing Dimensions
Editing dimensions by stretching – Editing dimensions by trimming & extending – Editing dimensions: DIMEDIT command – Editing dimension text: DIMTEDIT command – Updating dimensions – Editing dimensions using the properties window – Creating and restoring Dimension styles: DIMSTYLE

Reference Book :

1. AutoCAD for Windows Bible (with Applications) / Sham Tickoo / Galgotia Publications Pvt. Ltd.
2. Advanced AutoCAD Robert M. Thomas / Sybex BPD
3. AutoCAD Part – 1 & 2 Banglay Prokashito Tutorial / CD Media / Sonolite, 55, Elliot Road, Kolkata
4. Auto CAD George omura
5. Machine drawing P. S. Gill
6. Machine drawing Laxmi narayan
7. Machine drawing R. B. Gupta
8. Machine Drawing N.D. Bhatt

DIPME306: SOM Lab

PRACTICALS

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.
8. Determination of deflection for various types of loading
9. Torsion test on brass and mild steel
10. Determination of stiffness of close coiled spring

DIPME307: Fluid Mechanics & Machine Lab

PRACTICALS.

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. Determination of coefficient of friction for pipes
7. Determination of slip, coefficient of Discharge for a reciprocating pump
8. Study of construction and working of following :
   - 8.1 Centrifugal pump
   - 8.2 Pelton wheel turbine
   - 8.3 Francis turbine
9. Study of model of Kaplan turbine
10. Study of submersible pump, jet pump, deep well pump.

DIPME308: Theory of Machine Lab

List of Exercise

1. To study inversions of four bar chain and slider crank mechanism and their practical applications.
2. To study Steering Mechanisms: Davis and Ackerman.
3. Study of quick return mechanism and its practical applications.
4. Study of inversion of Double slider chain: Oldham Coupling, Scotch Yoke and Elliptical Trammel.
5. Study of various cam-follower arrangements. To plot displacement v/s angle of rotation curve for various cams
6. To determine co-efficient of friction using two roller oscillating arrangement.
7. Study of various types of dynamometers, Brakes and Clutches.
8. Study of differential gear box.

DIPME309: Machine Drawing & CAD Lab

List of Exercise

1. Starting AutoCAD – AutoCAD screen components – Starting a drawing: Open drawings, Create drawings (Start from scratch, Use a template & Use a wizard) – Invoking commands in AutoCAD – Drawing lines in AutoCAD – Co-ordinate systems: Absolute co-ordinate system, Relative co-ordinate system – Direct distance method – Saving a drawing: Save & Save As – Closing a drawing – Quitting AutoCAD
2. Opening an existing file – Concept of Object – Object selection methods: Pick by box, Window selection,
3. Crossing Selection, All, Fence, Last, Previous, Add, Remove – Erasing objects: OOPS command, UNDO /
4. REDO commands – ZOOM command – PAN command, Panning in real time – Setting units – Object snap, running object snap mode – Drawing circles Draw Commands
5. ARC command – RECTANG command – ELLIPSE command, elliptical arc – POLYGON command (regular polygon) – PLINE command – DONUT command – POINT command – Construction Line: XLINE command, RAY command – MULTILINE command
6. Editing Commands 6 MOVE command – COPY command – OFFSET command – ROTATE command – SCALE command – STRETCH command – LENGTHEN command –TRIM command – EXTEND command – BREAK command – CHAMFER command – FILLET command – ARRAY command – MIRROR command – MEASURE command – DIVIDE command – EXPLODE command – MATCHPROP command – Editing with grips: PEDIT Drawing Aids
7. Layers – Layer Properties Manager dialog box – Object Properties: Object property toolbar, Properties Window – LTSCALE Factor – Auto Tracking – REDRAW command, REGEN command Creating Text Creating single line text – Drawing special characters – Creating multiline text – Editing text – Text style 6.8 Basic Dimensioning

DIPME310: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

SEMESTER IV

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME401	Material Science & Metallurgy	PC	3	1	-	30	70	-	100	4
DIPME402	Processes in Manufacturing	PC	3	-	-	30	70	-	100	3
DIPME403	Thermal Engineering	PC	3	1	-	30	70	-	100	4
DIPME404	I. C. Engine	PC	3	-	-	30	70	-	100	3
DIPME405	Workshop Technology	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME406	Material Science Lab	PC	-	-	2	30	20		50	1
DIPME407	Production Lab	PC	-	-	2	30	20		50	1
DIPME408	I C Engine Lab	PC	-	-	2	30	20		50	1
DIPME409	Workshop Practice	PC		-	2	30	20		50	1
DIPME410	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-		50	1
Total			**15**	**02**	**08**	**320**	**430**		**750**	**22**

DIPME401 Material Science & Metallurgy

Course Contents:

Unit I: Classifications of materials, Crystal, Unit Cell, Space Lattice, crystal structure, crystal lattice of BCC,HCP, Closed packed hexagonal, crystallographic notation of atomic planes polymorphism and allotropy,

Unit II: Crystal imperfection, phenomenon of slip, twinning and dislocation. Identification of crystallographic possible slip planes and direction in FCC, BCC, HCP. Recovery and recrystallization, preferred orientation causes and effects on the property of metals.

Unit III: History and development of iron and steel, Different iron ores. Steels and alloy steel, Classification of plain carbon steels ,Cast Iron: Different types of Cast Iron, manufacture and their usage, Heat treatment of steels: Physical principles involved in chemical heat treatment procedure for carburizing, Nitriding, Cyaniding, carbo-nitriding of steel.

Unit IV: Effects produced by Alloying element on the structures and properties of steel Distribution of alloying elements (Si, Mn, Ni, Cr, Mo, Co, W, Ti, Al) in steel, structural classes of steel. Classification of steels, BIS Standards.fibre reinforced plastic composites**:** Various fibres and matrix materials, basic composite manufacturing methods, applications of composite materials

Unit V: Important sources of plastics, Classification-thermoplastic and thermo set and their uses, Various Trade names of engg. Plastics, Plastic Coating, Miscellaneous Materials: Properties and uses of Asbestos, Glass wool, thermocole, cork, mica. Overview of tool and die materials, Materials for bearing metals, Spring materials, Materials for Nuclear Energy, Refractory materials

Reference Books :

1. Material Science by V Raghwan

DIPME402: Process in Manufacturing

Course Contents:

Unit I: **Conventional Metal Cutting Processes :** Metal Cutting Elementary theory of metal cutting, chip formation, continuous chip, continuous chips with B.U.E., discontinuous chips Mechanism of chips formation, geometry of chip formation forces on chip. Merchant's diagram

Unit II: Forging Forging process, open die forging, closed die forging drop forging Press forging, upset forging, Swaging, up setters, roll forgin Cold and hot forging, forging defects and their remedies

Unit III: Elementary theory of rolling, types of rolling mills Roll passes, rolling defects and remedies Press forming Types of presses, working, selection of press dies, die material. Press operations – shearing, piercing, trimming, punching, Notching, shaving, embossing, stamping , Deep Drawing Extrusion Types of extrusion - Hot and Cold, Direct and Indirect Drawing Pipe drawing, Tube drawing

Unit IV: Tool life, Economics of tool life Machinability Factors affecting Machinability Broaching Machine : Classification and description of broaching machines Elements of broach Types of boraches Gear manufacturing processes : Gears hobbing Gear shaping Gear Finishing methods :External threading processes :Die heads, thread milling Thread grinding, thread rollin Mechanical Processes

Unit V: Ultrasonic Machining (USM) : Introduction, fundamental principles, process, advantages and Limitation, application Abrasive jet machining (AJM) - Introduction, principles, process, advantages and Limitation, application Electro Chemical Processes Electro chemical machining (ECM) - Fundamental principles, process, applications Electro chemical grinding (ECG) - Fundamental principles, process, applications Electrical Discharge Machining (EDM) - Introduction, mechanism of metal removal basic EDM circuit , LBM, EBM, PAM

Reference Books :

Production Engineering	R.K. Jain
Manufacturing Science	Amitabha Ghosh & A.K. Mallik
Production Technology	Pandey.Singh
Manufacturing Technology	Gupta & Adithan
Modern Machining Methods	M. Adithan

DIPME403: Thermal Engineering

Course Contents:

Unit1 : 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, mol, universal gas constant and molar specific heats

Unit II: Zeroth law of thermodynamics ,First law of thermodynamics. Second law of thermodynamics Concept of entropy Constant volume, constant pressure, isothermal, adiabatic polytropic processes, throttling and free expansion, work done during these processes, Available and unavailable energy Effectiveness Irreversibility in flow and non-flow process. 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.

Unit III: 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.

Unit IV: 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 V: Steam Generators: Definition of boiler according to I.B.R., classification of boilers, Comparison of water tube and fire tube boilers. Special characteristics of high-pressure boilers. Introduction to Indian Boiler Act. Boiler Performance: Actual evaporation, Equivalent evaporation, Factor of evaporation, Boiler efficiency. Heat losses in boiler plants, Boiler power, Energy balance sheet of boiler.

Reference Books :

1. Thermal Engineering by R S Khurmi

DIPME404: I.C.Engine

Course Contents:

Unit I: Principles of Internal Combustion Engines . Introduction and Classification of I.C Engines. I.C. engine terms - Bore, stroke, dead centres, crank throw, compression ratio, clearance volume, piston displacement and piston speed . 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.Valve timing diagrams (Theoritical & Actual), firing order. Super charging of I.C. engines.

Unit II: **Gas Power Cycles:** Otto cycle, Diesel cycle, Dual combustion cycle, Atikinson cycle, Joule / Brayton cycle. Air standard efficiency. Effect of compression ratio on efficiency. Numerical Problems

Unit III: **Petrol Engines:** Concept of Carburation, Air fuel ratio. Simple carburetors and its limitations. Description of Solex carburetors. Multi point fuel injection system. Mechanical and electrical feed pump. Description of coil ignition system and Magneto ignition system.

Unit IV: Diesel Engines. Description and working of Fuel feed pump. Injection of fuel, air and airless injection and fuel injectors. Introduction to swirl and open combustion chambers.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. Properties of lubricants

Unit V: **Governing methods of I.C. Engines. Engines Performance:** Introduction to basic performance parameters. Measurement of brake power by rope brake, prony brake and hydraulic dynamometer. Measurement of Indicated power by engine indicator and Morse test method. Energy balance sheet of I.C. engines and finding various efficiencies

Reference Books :

1. I C Engine by V Ganeshan

DIPME405 Workshop Technology

Course Contents:

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 and 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, Various operations of drilling machines e.g. drilling, reaming, boring, counter-boring, counter sinking, spot facing, tapping. Selection of drill

Unit4: **Shaping, Planning and Slotting Machines:** Specification, constructional features working and uses of various types of shapers, planers and slotters, Mechanism used in shaper - crank and slotted link, whitworth quick return and hydraulic mechanism,

Unit V: **Cutting Fluids and Cooling Process:** Types of cutting fluids and coolants, Functions of cutting fluid and its action, Difference between cutting fluid and coolant, Selection of cutting fluids for different material and operations.

DIPME406 Material Science Lab

List of Experiments

1. Material types and their characteristic properties
   a. A comparative study – qualitative
   b. Examples of materials and their applications
2. Common Engineering materials and properties
   a. A comparative study - quantitative
3. Study of Metallurgical Microscope
4. Preparation of metallographic specimen
5. Study of homogeneous and heterogeneous microstructures
   a. Study of grain size and shape in homogeneous structures
   b. Study of heterogeneous structure – number of phases, types of distribution, size and shape of different phases
6. Space lattice and crystal structures – b.c.c., f.c.c. and h.c.p. structures, examples of metals belonging to these structures, co-relation of structure and properties.
7. To calculate the effective number of atoms, co-ordination number, packing factors, c/a ratio for hcp structures, stacking sequence in hcp and f.c.c. structures, octahedral & tetrahedral voids in f.c.c. & b.c.c. structures.
8. To study the Iron-Carbon equilibrium diagram and differentiation between steel and cast iron with the help of their microstructures.
9. Study of microstructures of hypo, hyper and eutectoid steel. Effect of carbon percentage on the hardness of steel.
10. Study of microstructure and hardness of the eutectoid steel at different rates of cooling from austenite.
11. Annealing of steel – effect of annealing temperatures and time on hardness.
12. Hardening of steel, effect of quenching medium on the hardness of the same.
13. Study of microstructures of Grey, White, Nodular and Malleable cast irons.
14. Study of dislocations through models.
15. Study of ductile and brittle fracture.

DIPME407: Production Practice Lab

List of Experiments:

1. Study of lathe machine, lathe tools cutting speed, feed and depth of cut.
2. To perform step turning, knurling and chamfering on lathe machine as per drawing.
3 Taper turning by tailstock offset method as per drawing.
4 To cut metric thread as per drawing.
5 To perform square threading, drilling and taper turning by compound rest as per drawing.
6 To study shaper machine, its mechanism and calculate quick return ratio.

Foundry Shop

7. To prepare mould of a given pattern requiring core and to cast it in aluminum.
8. Moisture test and clay content test.
9. Strength Test (compressive, Tensile, Shear Transverse etc. in green and dry conditions) and Hardness Test (Mould and Core).
10. Permeability Test.
11. A.F.S. Sieve analysis Test

DIPME408 I. C. Engine Lab

1. Study of working of four stroke petrol engine and four stroke diesel engine with the help of cut section models.
2. Study of working of two stroke petrol and two stroke diesel engine with the help of cut section models.
3. Study of fuel supply system of a petrol engine (fuel pump and simple carburetor)
4. Study of fuel supply system of a Diesel engine (fuel pump and fuel injector)
5. Study of Ignition systems of an IC Engine (Battery and Magneto ignition system) and Electronic ignition system.
6. Study of cooling systems of an IC Engine (air cooling and water cooling)
7. To conduct a performance test on diesel engine to draw heat balance sheet for given load and speed
8. To determine friction power of diesel engine by Willan's line or fuel rate extrapolation method.
9. To calculate the indicated power, friction power and mechanical efficiency of four stroke four cylinder petrol engine at full load and rated speed by Morse test.
10. To draw the valve timing diagram of a Four stroke S.I. or C.I. Engine using experimental setup.
11. Analysis of engine exhaust gases using Orsat apparatus / gas analyzer

DIPME409 Engineering workshop

FITTING AND SHEET METAL SHOP

1. Finishing of two sides of a square piece by filing and to cut a Square notch using hacksaw.
2. To drill three holes and Tapping on the given specimen.
3. Tin smithy for making mechanical joint and soldering of joint

WELDING SHOP

4. To prepare Lap Joint with the help of Arc welding
5. To prepare Butt Joint with the help of arc Welding
6. Gas welding practice by students on mild steel flat

MACHINE SHOP PRACTICE

7. Job on lathe M/C with centering and one step turning
8. Job on lathe M/C with grooving and chamfering operations

DIPME410: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

SEMESTER V

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME501	Refrigeration & Air Conditioning	PC	3	-	-	30	70	-	100	3
DIPME502	Production Engineering	PC	3	-	-	30	70	-	100	3
DIPME503	Heat Transfer	PC	3	-	-	30	70	-	100	3
DIPME504	CNC Machine & Automation	PC	3	-	-	30	70	-	100	3
DIPME505	Automobile Engg.	PC	3	-	-	30	70	-	100	3
DIPME506	Mechanical Estimation & Costing	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME507	RAC Lab	PC	-	-	2	30	20		50	1
DIPME508	Production lab	PC	-	-	2	30	20		50	1
DIPME509	Heat Transfer Lab	PC	-	-	2	30	20		50	1
DIPME510	Automation Lab	PC	-	-	2	30	20		50	1
DIPME511	Automobile Lab	PC	-	-	2	30	20		50	1
DIPME512	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-		50	1
TOTAL			**18**	**-**	**10**	**380**	**520**		**900**	**24**

DIPME501: REFIGERATION AND AIR CONDITIONING

Course Contents:

Unit I Refrigeration systems, Refrigeration effect and unit of Refrigeration, Heat pump, reversed Carnot cycle. Analysis of simple vapour compression Refrigeration cycle by p-h and T-S diagram.

Unit II Necessity of cooling of air craft, Basic cycle, boot strap, regenerative type air craft refrigeration cycle. Application, air compressor system, Individual compressor, compound compression, cascade system.

Unit III Description of system components,i.e. generator, rectifier, condenser, absorber, heat exchanger and water pump., Aqua ammonia, lithium bromide-water and electrolux refrigeration systems

Unit IV Psychrometric properties, psychometric relations, psychometric charts, psychometric processes, cooling coils, By-pass factor and air washers

Unit V Heating, cooling, humidifying and dehumidifying requirements. Calculation of cooling, load, building transmission, infiltration, air changes, heat gain from people, light, power and duct heat gains

Books for Reference:

1. C.P. Arora, "Refrigeration & Air Conditioning" Tata McGraw Hill Publishing Co. Ltd.New Delhi.
2. Roy J. Dossat: 'Principles of Refrigeration' Addison Wesley Longman Pvt. Ltd. Delhi.
3. Manohar Prasad ' Refrigeration & Air-conditioning' Wiley Eastern Ltd. New

DIPME502: PRODUCTION ENGINEERING

Course Contents:

Unit I **Patterns practices:** Types of patterns, allowances and material used for patterns, moulding materials, moulding sands, Moulding sands; properties and sand testing; grain fineness; Moulding practices**:** Green, dry and loam sand moulding, pit and floor moulding; shell moulding; permanent moulding; carbon dioxide moulding.

Unit II Fundamental of metal casting, sand casting, Shell-Mould casting, mold casting (plaster and ceramic), investment casting, vacuum casting, Permanent mould casting, slush casting, pressure casting, die casting, centrifugal casting, continuous casting, squeeze casting, casting alloys, casting defects

Unit III Principle of welding, soldering, brazing and adhesive bonding. Survey of welding and allied processes. Arc welding: power sources and consumables. Gas welding and cutting: Processes and equipments. Resistance welding: principle and equipments. Spot, projection and seam welding process

Unit IV Powder manufacturing, mechanical pulverization, sintering, Electrolytic Process, chemical reduction, atomization, properties of metal powders, compacting of powders sintering, advantages and applications of P/M.

Unit V Introduction, Classification of Plastics, Ingredients of Moulding compounds, General Properties of Plastics, Plastic part manufacturing processes such as compression moulding, transfer moulding, injection moulding, extrusion moulding, blow moulding, calendaring, thermoforming, slush moulding, laminating

Recommended Reference Books:

1. Production Engineering by P.C. Sharma

2. Production Engineering by Pandey Singh

3 Rao P. N – Manufacturing Technology –TMH.

4 Campbell J.S. – Principles of manufacturing materials & processes TMH.

DIPME503: HEAT TRANSFER

Course Contents:

Unit I Engineering heat transfer, Heat transfer mechanisms, Units, Dimensions and Conversion factors ,Fourier's law of heat conduction, thermal conductivity, thermal conductivity of solids, liquids and gases, effect of temperature on thermal conductivity.

Unit II **Conduction:** General heat conduction equation. Boundary condition and initial condition. Dimensionless groups for conduction. One-dimensional steady-state conduction-simple plane walls & composite plane walls, hollow & composite cylinders & spheres. Thermal contact resistance. Critical radius of Insulation.

Unit III **Natural convection:** Dimensional analysis, Granhoff number, boundary layers in external flows (flow over a flat plate only), boundary layer equations and their solutions, heat transfer correlations.

Unit IV **Thermal Radiation:** Plank distribution law, Kirchhoff's law; radiation properties, diffuse radiations; Lambert's law. Radiation intensity

Unit V **Heat Exchanger:** Classification of Heat Exchangers, Overall heat transfer coefficient, The LMTD Method for Heat exchanger analysis Correction for LMTD for use with cross flow & multipass exchangers ,ε – NTU method for heat exchanger analysis

Recommended Reference Books:

1. Heat and Mass Transfer by D.S. Kumar
2. Heat and Mass Transfer by Arora Domkundwar
3 Holman J.P: Heat Transfer, McGraw-Hill

DIPME504: CNC MACHINES & AUTOMATION

Course Contents:

Unit I **Principles of NC, Types of NC machines, Classification of NC:** Motion control, control loops, power drives, positioning systems, NC, CNC, DNC, Combined CNC/DNC systems. Components of NC machines

Unit II Block format and codes, tool length and radius compensation, manual and interactive part programming, tool path simulation of lathe and milling, post processor and auxiliary statements./

Unit III Introduction about Mechatronics, scope of Mechatronics, Definitions of mechatronics, the mechatronic design process, mechatronic systems and components. application, process control automation and N/c Machines

Unit IV Evolution of Robots and Robotics, Laws of Robotics, What is and What is not a Robot, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects

Unit V Types of manufacturing systems, machine tools and related equipment, material handling systems, computer control systems, human labor in manufacturing systems, CIMS benefits..automated guided vehicle (AGV), automated storage and retrieval systems (AS/RS), flexible manufacturing systems (FMS).

Reference Books :

1.	CNC Machine- Programming & Application	Adithan & Pabla New Age International
2.	CNC Machine	Dhanpat Rai & Sons
3.	CAD/CAM	Groover (TMH)
4.	Computer Aided Manufacturing	Rao, Kundra, Tiari (TMH)
5.	CAM	Vikram Sharma (S. K. Kataria & Sons)
6.	CAM	S. Vishal (S. K. Kataria & Sons)

DIPME 505: AUTOMOBILE ENGINEERING

Course Contents:

Unit I **Frame & Body:** Layout of chassis, types of chassis frames and bodies, their constructional features and materials. Clutch; single plate, multiplate, cone clutch, semi centrifugal, electromagnetic, vacuum and hydraulic clutches. Fluid coupling

Unit II Gear boxes, Sliding mesh, constant mesh, synchromesh and epicyclic gear boxes, Automatic transmission system; Hydraulic torque converter; overdrive, propeller shaft, universal joints, front wheel drive, differential

Unit III Steering system, steering gear boxes, Steering linkages, steering mechanism, under and over steering. Steering Geometry, effect of camber, caster, king pin inclination, toe in and toe out; power steering

Unit IV Battery construction, Charging and testing, battery types, Starting and Battery Charging System : Starter motor construction, types of drive, Alternator construction, regulation and rectification.

Unit V Ignition System: magneto and coil ignition systems, System components and requirements, automotive lighting: Wiring systems Electrical instruments; head lamp, electric horn, fuel level indicator.

Recommended Reference Books:

1. The Motor Vehicles by Newton & Steeds
2. Automotive Mechanics by Crouse
3. Automotive Mechanics by Heitner
4. Automobile Engineering by KM Gupta
5. Automobile Engineering by Kirpal Singh Vol. I & II

DIPME 506: MECHANICAL ESTIMATING AND COSTING

Course Contents:

Unit I.

Introduction : Estimating, Definition Importance of estimating, Aims and functions, Estimating procedure, Costing, Definition, Aims of costing, Procedure of costing, Difference between estimating and costing, Elements of Costs : Material cost, Labour cost, Expenses, Direct expenses, Indirect expenses, Component of cost, Overhead cost, Allocation of on cost,

Unit II. **Break Even Analysis and Equipment Replacement Analysis :** Break even analysis (cost, volume, profit analysts), determination of Break even point, break even point, theory, Equipment Replacement Analysts, Regions, Policy, Guide line, Various methods, Hire Purchasing, Estimation of Material Cost, Estimation of volumes, weights and cost of materials for, Pulley, Spindle, Lathe centre, Fly wheel, Crank shaft ,

Unit III. **Labour Costing :** Type of Wage and Incentive, Wage Differentials, Methods of wage Payments, Job Evaluation, Estimation in Machining : Cutting speed, feed and depth of cut, Setup time, operation time, machining, time tear down time, handling time, Allowances, Estimation of machining time for various lathe operations : Turning, Facing, Threading, Drilling, Chamfering, Estimation of machining time for Milling operation, Estimation of machining time for Shaping operation, Estimation of machining time for Grinding operation, Metal removal rates,

Unit IV. **Estimation in Welding Shop:** Estimation of electric are welding cost, Estimation of gas welding, Estimation of gas cutting, Factors affecting welding cost, Estimation in Forging Shop : Hand forging, Machine forging, Estimation of losses in forging operation , net weight, Time, Estimation of cost of forging operation,

Unit V. **Estimation in Pattern Making and Foundry Shop:** Pattern allowances, Estimation of pattern cost, Estimation of foundry shop, Estimation in Sheet Metal Shop :Sheet metal operations, Sheet metal joints, Estimation of time and cost in sheet metal operations, Blank layout, Capacity for power press.

Reference Books :

1. Estimating & Costing Banga & Sharma
2. Mechanical Estimating & Costing O.P. Khanna
3. Mechanical Estimating & Costing T.T.T.I.Madras

DIPME 507 REFRIGERATION & AIR CONDITIONING LAB

List of Experiments:

1. To find out the Coefficient of performance of a Heat pump.
2. To find out the Coefficient of performance of a device, which is working on vapour absorption cycle?
3. To find out the Coefficient of performance of a refrigerator and also find the sensible heat factor.
4. To study about the evaporative cooler.
5. To perform experiment on three ton air conditioner test rig.
6. To study about the air distribution system.
7. To calculate the heat load for a given setup .
8. To study about the central air conditioning plant.
9. To study about the solar refrigeration system.

DIPME508 Production Practice Lab

1. Study of different types of patterns
2. To prepare mould of a given pattern requiring core and to cast .
3. Moisture test and clay content test.
4. trength Test (compressive, Tensile, Shear Transverse etc. in green and dry conditions) and Hardness Test (Mould and Core).
5. Permeability Test.
6. A.F.S. Sieve analysis Test.
7. To perform various welding operations.
8. To make a different joints with help of welding operation.

DIPME509: Heat and Mass Transfer Lab

Experiments List:

1. To Determine Thermal Conductivity of Insulating Powders.
2. To Determine Thermal Conductivity of a Good Conductor of Heat (Metal Rod).
3. To Measure the thermal Conductivity of Liquid.
4. To determine the transfer Rate & Temperature Distribution for a Pin Fin.
5. To Measure the Emissivity of the Test plate Surface.
6. To Determine Stefan Boltzman Constant of Radiation Heat Transfer.
7. To Determine the Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection.
8. Determination of Heat Transfer Coefficient in Drop Wise & Film Wise condensation.
9. To Determine Critical Heat Flux in Saturated Pool Boiling.
10. To Study Performance of Simple Heat Pipes.

DIPME510: Automation Lab

1. To prepare part programming for turning operation in absolute mode.
2. To prepare part program in inch mode for plain turning operation.
3. To prepare part program for taper turning operation.
4. To prepare part program for threading operation.
5. To prepare part program for slot milling operation.
6. To determine 5 Axis Robotic Arm movement and its degree of rotation.
7. To study various Robotic Arm Configurations.
8. To study Pick and Place Robot

DIPME511: Automobile Lab

List of Experiments:

1. Study of two stroke engines.
2. Study of four stroke petrol engines.
3. Study of four stroke diesel engines.
4. Cooling system of an automotive vehicle
5. Study of ignition system.
6. Demonstration of steering system
7. Trouble shooting in braking system.
8. Fault diagnosis in transmission system including clutches, gear box assembly and differential.
9. Replacing of ring and studying the method of replacing piston after repair.

DIPME512: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

SEMESTER VI

THEORY PAPERS		Type	No. of Teaching Hours			Marks Allocation				
Code	**Subject/Paper**		**L**	**T**	**P**	**IA**	**EA**	**PR**	**Total**	**Credits**
DIPME601	Power Generation	PC	3	1	-	30	70	-	100	4
DIPME602	Machine Design	PC	3	1	-	30	70	-	100	4
DIPME603	Industrial Engineering	PC	3	-	-	30	70	-	100	3
DIPME604	Advanced Workshop Technology	PC	3	1	-	30	70	-	100	4
DIPME605	Operation Management	PC	3	-	-	30	70	-	100	3
DIPME606	Renewable Energy Sources	PC	3	-	-	30	70	-	100	3
PRACTICALS/VIVA-VOCE			**No. of Teaching Hours**			**Sessional**	**Practical**		**Total**	**Credits**
DIPME607	Machine Design Lab	PC	-	-	2	30	20		50	1
DIPME608	IE Lab	PC	-	-	2	30	20		100	1
DIPME609	Technical Seminar	SE	-	-	2	30	20		100	1
DIPME610	Practical Training cum Project	PR	-	-	-	30	20		100	3
DIPME611	Social Outreach, Discipline & Extra Curricular Activities	HS	-	-	-	50	-	-	100	1
TOTAL			**18**	**3**	**6**	**350**	**500**		**850**	**28**

DIPME601: POWER GENERATION

Course Contents:

Unit-I **Introduction :** Different types of conventional sources of energy, Base load and peak load plants, Scope of conventional energy sources in India, Status of conventional power plants in India

Unit-II **Thermal Power Plants :** General layout and working, Factors of site selection, Methods of coal handling, Unloading devices, Ash handling system, Concept of super thermal power plants, Combustion equipment, Basic requirements, Methods of coal burning

Unit-III **Hydro-Electric Power Plant :** Advantages and application of hydroelectric power plants, Elements of hydroelectric power plant, Plant layout of low head and high head intake, Combination of Hydel – Thermal power plants, Hydro electric power plants in India.

Unit-IV **Nuclear Power Plant:** Introduction to nuclear reactions and nuclear fuels, Site selection of nuclear power plants, Nuclear reactors : various elements of nuclear reactors. Comparison of nuclear power plant with thermal and hydel power plants, Common types of nuclear reactors, Pressurized water reactor, Boiling water reactor, Gas cooled reactors, Liquid metal cooled reactor, Fast breeder reactor, Nuclear power plants in India, Hazards in nuclear power plants and safety measures, Nuclear waste disposal

Unit-V **Diesel Power Plants:** Elements of a diesel power plant, Building and general layout, Use of diesel engine with steam power plants, Applications of diesel power plants, Limitation of diesel power plants

Reference Books:

1. Power Plant Engineering Dr. Mahesh Verma
2. Power Plant Engineering Keshwani
3. Power Plant Engineering Domkumdwar
4. Power Plant Engineering (Hindi) Prakash & Kumar

DIPME602: MACHINE DESIGN

Course Contents:

Unit I **Materials:** Properties and IS coding of various materials, Selection of material from properties and economic aspects.

Manufacturing Aspects in Design: Selection of manufacturing processes on the basis of design and economy, Influence of rate of production, standard size, Influence of limits, fits tolerances and surface finish, Change in the shape of the designed element to facilitate its production, design of castings, working drawing.

Unit II **Design for Strength:** Allowable stresses, detailed discussion on factor of safety (factor of ignorance), Stress concentration, causes and mitigation, Introduction of various design considerations like strength, stiffness, weight, cost, space etc. concept of fatigue failures, design of machine elements subjected to direct stress, pin, cotter and keyed joints, design of screw fastening.

Unit III **Design of Members in Bending:** Beams, levers and laminated springs.

Unit IV **Design of Members in Torsion:** Shafts and shaft couplings.

Unit V **Design of Shafts and Brackets under Combined Stresses:** calculation of transverse and torsional deflections, screw fasteners subjected to eccentric loading.

List of Recommended Books

1. Mechanical Machine Design, Bahl and Goel, Standard Publishers Distributors.
2. Design of Machine Elements, Bhandari V.B, Tata McGraw-Hill, New Delhi.
3. Machine Design, Sharma and Aggarwal, S.K.Kataria and Sons, Delhi.
4. Mechanical Engg Design, Shigley, Mischke, Budynas and Nisbett, Tata McGraw-Hill.

DIPME603 Industrial Engineering

Course Contents:

Unit l Evolution of management, Scientific management, Contribution to scientific management (Taylor, Fayol, Mayo) Levels of Management ,functions of management,

Unit II Forms of Business :Single proprietorship, Partnership, Joint stock company, Private Ltd- Companies and public limited companies, ,Line organization, Functional Organization, Line Staff organization , Line Staff Committee organization,

Unit III Introduction and needs of Finance, Kinds of Capital Sources of fixed capital, Shares. Borrow capital, Surplus profits, Sources of Working capital, Management of working capital,

Unit IV Interest and Depreciation: Interest meaning, Compound interest, depreciation meaning and causes, need of depreciation calculation, methods of depreciation, straight line methods, sinking funds methods, sum of years digits method

Unit V Labour Relations and Legislation: Profit sharing, fringe benefits etc. Trade Unions, Methods of setting disputes, Collective bargaining, Conciliation, Mediation, Arbitration industrial disputes in India,

List of Recommended Books

1. Works Organisation and Management, Basu S.K., Sahu K.C., Datta N.K., Oxford and IBH.
2. Principles of Industrial Organization, Dexter S. Kimball, Read Books.
3. Principles of Industrial Management, Alford and Beatty, Revised Edition, Ronald Press Co
4. Essentials of Industrial Management, McGraw-Hill industrial organization and management series, Lawrence L. Bethel, McGraw-Hill.

DIPME604: Advanced Workshop Technology

Course Contents:

Unit I **Jigs And Fixtures:** Introduction, definition and difference, usefulness of jigs and fixtures, design considerations, materials used, principles and methods of location, clamping elements, fixtures for milling turning, boring and welding, assembly fixtures, indexing devices

Unit II **Precision Measurement:** Standards of linear measurements, linear and angular measurements, screw thread measurement, measurement of effective diameter, pitch and thread angles, measurement of tooth profile, tooth thickness and pitch, Measurement of surface roughness,

Unit III **Precision Measuring Instruments:** Comparators types, working principles applications and limitations of various comparators, optical flat, autocollimator indicators, slip gauges, bevel protector.

Unit IV **Single Point Cutting Tools:** Introduction; functions of various tool angles, design of single point turning tool, parting tool, empirical determination of force components, optimum value of tool angles.

Unit V **Machine Tool Element:** Design of Lathe bed, Material and construction feature, various bed section, Theoretical aspect of design of guide ways, Material and construction features,

List of Recommended Books

1. Manufacturing Science, Ghosh and Mallik, Tata McGraw-Hill
2. Manufacturing Technology II, Rao P.N., Tata McGraw-Hill
3. Production Technology, Jain R.K., Khanna Publisher.
4. Production Technology, HMT Banglore, Tata McGraw-Hill
5. Mechanical Measurement and Metrology, Jain R.K., Khanna Publisher.
6. Metal Cutting Principles, Shaw M.C., Oxford
7. Manufacturing Tool Design, Mehta N.K., Tata McGraw Hill.

DIPME605 Operation Management

Course Contents:

Unit I: Scope of Operations Management, operations manager and the management process, Operations Strategy, Competitiveness and Productivity.

Unit II: Mass, Batch, Job shop production, Product and process matrix, Process planning and Process analysis. Defining and measuring capacity,

Unit III: Production planning objective and functions, Bill of material, Planning levels, long range, Intermediate range and Short range planning, MRP

Unit IV: Capacity control and priority control, production control functions, Routing, scheduling, dispatching, Techniques of production control in job shop production, batch production and mass production systems.

Unit V: Objectives, scope and functions of material management, planning, Purpose of inventory, inventory cost, Selective inventory control systems, EOQ, Lead time and reorder point.

List of Recommended Books:

1. Operations Management: A System Model Building Approach, Vollman T.E., Addison Wesley Publication.
2. Operation Management: The Management of Productive System, Buffa E.S., John Willey and Sons.

DIPME605: Renewable Energy Sources

Course Contents:

Unit I: **Introduction:** World Energy Use ,Reserves of Energy Resources, Environmental Aspects of Energy Utilization ,Renewable Energy Scenario in India and around the World, Potentials , Achievements Applications , Economics of renewable energy systems. Biomass Energy

Unit II: **Solar Energy:** Solar Radiation – Measurements of Solar Radiation – Flat Plate and Concentrating Collectors – Solar direct Thermal Applications, Solar Cells ,Applications.

Unit III: **Wind Energy:** Wind Data and Energy Estimation, Types of Wind Energy Systems Performance – Site Selection – Details of Wind Turbine Generator – Safety and Environmental Aspects

Unit IV: **Energy Audit, types of energy audit; Energy Audit approach:** optimizing the input energy requirement; Energy audit instruments. Energy Management: Concept of energy management, energy demand and supply,

Unit V: **Energy conservation Act. Energy Conservation:** Basic concept, energy conservation in Household, Transportation, Agricultural, service and Industrial sectors, Lighting, Heating Ventilation & Air Conditioning.

Text Books:

1. Rai. G.D., "Non Conventional Energy Sources", Khanna Publishers, New Delhi, 2011.
2. Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK, 2006.
3. Hand book of Energy Audits by Albert Thuman, P.E.,C.E.M.
4. Energy Management and Conservation Handbook by Kreith & Goswami.

DIPME607 MACHINE DESIGN LAB

1. Selection of material and IS coding
2. Selecting fit and assigning tolerances
3. Examples of Production considerations.
4. Problems on
    a. Knuckle and Cotter joints
    b. Torque: Keyed joints and shaft couplings
    c. Design of screw fastening
    d. Bending: Beams, Levers etc.
    e. Combined stresses: Shafts, brackets, eccentric loading.
    f. Design for rigidity (Transverse / Torsional)

DIPME608 INDUSTRIAL ENGINEERING LAB.

1. Determination of time standard for a given job using stopwatch time-study.
2. Preparation of flow process chart, operation process chart and man-machine charts for an existing setup and development of an improved process.
3. Study of existing layout of a workstation with respect to controls and displays and suggesting improved design from ergonomic viewpoint.
4. To carry out a work sampling study.
5. To conduct process capability study for a machine in the workshop.
6. To design a sampling scheme based on OC curve.
7. To conduct Shewart's experiments on known population
8. Generation of random numbers for system simulation such as facility planning, job shop scheduling etc.

DIPME609: Technical Seminar

Student seminars in the field of engineering diploma serve multiple purposes. Firstly, they provide a platform for students to showcase their research, projects, and innovative ideas, fostering presentation and communication skills. Additionally, seminars facilitate knowledge exchange, exposing students to diverse perspectives and advancements in the engineering domain. Engaging in seminars enhances critical thinking, research abilities, and overall academic and professional development, preparing students for the challenges and opportunities in their future careers.

DIPME610: Practical Training cum Project

Engaging in a major project is pivotal for diploma engineering students as it provides a hands-on application of theoretical knowledge, enhancing practical skills and problem-solving abilities. This experiential learning fosters critical thinking, teamwork, and project management skills, preparing students for real-world challenges and bolstering their employability in the competitive engineering landscape.

DIPME611: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

6. ATTENDANCE PROVISION FOR END TERM SEMESTER EXAMINATION

6.1 No student shall be allowed to appear in the end term semester examination in a paper if he/ she has not attended minimum of **75%** of the classes held in the paper concerned including tutorials, special lectures, study visits, practical trainings etc. conducted in respect of that paper.

6.2 If a student for any exceptional reason fails to attend **75%** of the classes held in any paper, the Dean / HoD of the department may allow him/ her to take the examination if he/she attended at least 65% of the classes held in the paper concerned and attended 75% of classes in all the papers taken together.

Provided that if the percentage of attendance is deficient on account of:-

(i) Participation in Inter-University, University or Inter-Collegiate Sports tournaments/Youth Festivals /University Level Debates/ Cultural Activities, National and International Tournaments, with the previous sanction of the Dean/HoD of Faculty Engineering & Technology

(ii) Voluntary donation of blood certified by a Government Doctor of Gazetted rank or University medical officer.

(iii) Attendance and/or participation in International/National / State level competitions;

(iv) Attendance at the extension lecture (s) organized by the Faculty of Engineering & Technology.

Credit may be given for the number of days on which lectures were delivered or sessional or sessional/practical work done during the period of attendance or participation aforesaid, provided that the total period of absence shall not exceed 15 days in a semester.

7. CRITERION FOR AWARDING GRADING SYSTEM

7.1 CRITERION for Awarding SGPA and CGPA: The criterion for awarding the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) for the entire professional programme shall be as follows:

a) The criterion for passing in a subject is that a student should secure minimum 40% marks in individual paper.

b) A student obtaining less than pass marks as specified above, in each subject (sum of internal and End-Term examinations) he will be declared fail in that subject and will have to re-appear in a End-Term examination of the course in subsequent odd / even semester end term examination, subject to maximum permissible period of n+2 years / n+4 semesters to complete the course.

c) The University has adopted Absolute Grading System for converting marks into grades. The formula of 10- point grading system for conversion of marks obtained into Letter Grades and converting Letter Grades to Grade Point is given below:

Table 1: Marks, Letter Grades and Grade Points

Marks	Letter Grade	Grade Points
91-100	O (Outstanding)	10
81-90	A+(Excellent)	9
71-80	A(Very Good)	8
61-70	B+(Good)	7
51-60	B(Above Average)	6
46-50	C(Average)	5
40-45	P (Pass)*	4
0-39	F(Fail)	0
-	AB (Absent)	0

***Passing Marks: Diploma- 40% in individual paper**

d) ***While converting the marks into Letter Grade, the rounding off marks must be considered.***

e) A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

f) For non credit courses "Satisfactory" or Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

7.2 Computation of SGPA and CGPA : The university has adopted UGC recommended procedure for computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

a) The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the papers/ courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

SGPA (Si) = Σ (Ci x Gi) / ΣCi

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course. The university shall issue Semester Grade Card to the student.

b) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

CGPA = Σ (Ci x Si) / Σ Ci

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

c) The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

a) Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course/Paper 1	3	A	8	3x8=24
Course/Paper 2	4	B+	7	4x7=28
Course/Paper 3	3	B	6	3x6=18
Course/Paper 4	3	O	10	3x10=30
Course/Paper 5	3	C	5	3x5=15
Course/Paper 6	4	B	6	4x6=24
	20			**139**

Thus, SGPA= 139/20= 6.95

b) Illustration for CGPA

Semester-1	Semester-2	Semester-3	Semester-4	Semester-5	Semester-6
Credit: 20 SGPA:6.9	Credit: 22 SGPA:7.8	Credit: 25 SGPA:5.6	Credit: 26 SGPA:6.0	Credit: 26 SGPA:6.3	Credit: 25 SGPA:8.0

Thus, CGPA= $\frac{20x6.9+22x7.8+25x5.6+26x6.0+26x6.3+25x8.0}{144}$ = **6.73**

8. CRITERION FOR CREDIT

(a) In case a student secures minimum passing marks (40% and above) in a Theory / Practical paper, he / she will earn the assigned credit of that particular paper.

(b) A student is eligible for the award of diploma, if he / she earn minimum credits required for that particular programme. However if the student has not acquired minimum credits required for obtaining the diploma, he / she will have to appear in some of the papers in which he has not got credit to fulfill the minimum requirement of Credits.

(c) **MAXIMUM & MINIMUM CREDITS**

The total number of the credits of the Diploma 3-Year Programme is 147

Each student shall be required to appear for examination in all courses. However, for the award of the Diploma a student should secure at least 147 credits.

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