

**DIPLOMA (MECHANICAL) – PART FIVE**

**Optional Early Certificate:** - Certificate (Mechanical)

**Syllabus:-**

Sr. No.	Module Code	Name of Module	Credits	Total Marks
1	MC22-21	English-III	5	100
2	MC22-22	Theory of Machines	5	100
3	MC22-23	CNC Machines & Automation	5	100
4	MC22-24	Entrepreneurship Development & Management	5	100
5	MC22-25	Workshop Technology - III	5	100

**Module Name:** English-III

- The Seven C's of the Effective Communication:** Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness.
- Communication:** Its interpretation: Basics, Nonverbal Communication, Barriers to Communication.
- Business Communication at Work Place:** Letter Components and Layouts, Planning a letter, Process of Letter writing, Email Communication, Memo and Memo Reports, Employment Communication, Notice Agenda and Minutes of Meeting, Brochures.
- Report Writing:** Effective Writing, Types of Business Reports, Structure of Reports, Gathering Information, Organization of the Material, Writing Abstracts and Summaries, Writing Definitions, Visual Aids, User Instruction Manual.
- Required Skills:** Reading Skills, Note-making, Précis Writing, Audio Visual Aids, Oral Communication.
- Mechanics of Writing:** Transitions, Spelling Rules, Hyphenation, Transcribing Numbers, Abbreviating Technical and Non-Technical Terms, Proof Reading.

**Module Name:** Theory of Machines

- Simple Machines:** Introduction to Link, Kinematic Pair, Lower and Higher Pair, Kinematic Chain, Mechanism, Inversions, Different Types of Mechanisms (with Examples), Mechanical Advantage of a Linkage, Cams and Followers: Terminology and Classification.
- Friction:** Definition and its Necessity, Horizontal Force Required to Move a Body on an Inclined Plane Both Upward and Downward, Frictional Torque in Screws, Both for Square and V Threads, Screw Jack (Simple Numerical Only), Frictional Clutches Bearing, Friction in Journal Bearing, Different Types of Bearing and Their Application.

3. **Power Transmission:** Transmission Screw: Power Transmitted and Frequency, Flat and V Belt Drive: Ratio of Tensions, H.P. Transmitted, Centrifugal Tension, Condition for Maximum Horse Power, Power Transmitted by Chains: Different Types of Chains and Their Terminology, Gear Terminology, Types of Gears and their Applications, Simple and Compound Gear Trains, Power Transmitted by Simple Spur Gear.
4. **Flywheel:** Principles and Applications of Flywheel, Turning- Moment Diagram of Flywheel for Different Engine (No Numerical), Fluctuation of Speed and Fluctuation of Energy.
5. **Governor:** Principal of Governor, Simple Description and Working of Watt, Porter and Hartnel Governor (No Numerical).
6. **Balancing:** Concept of Balancing, Introduction to Balancing.
7. **Vibrations:** Causes of Vibrations in Machines, their Harmful Effects and Remedies.

**Module Name:** CNC Machines and Automation

1. **Introduction to CNC Machines:** Introduction, Applications of CNC Machine, Types of CNC Machines, CNC Router Machine, CNC Milling, Lathes, Major Cutting Tools for CNC Machines, CNC Controller, CAD/CAM, CNC Machines- Advantages/Disadvantages.
2. **Transmission Systems and Motors:** Introduction, Power Screws, Lead Screw and Nut, Ball Bearing Power Screws, Rotating Nut, Rack and Pinion, Reducers, Timing Belt and Pulleys, Motors, Stepper Motor, Servo Motors, Stepper Versus Servo: Pros and Cons, Encoders.
3. **The CNC Controls System:** Introduction, Classification of CNC System, Open and Closed Loop Control, Elements of CNC System, Developments in CNC System, CNC Controller Hardware, Control Software.
4. **An Overview of CAM/CAD:** Introduction, Flow of a Computer Aided Manufacturing System, CAM System, Benefits of CAM, CAM Software, What is CAD?, Raster to Vector Conversion Utilities, Difference Between 2D and 3D, Listing of CAD Vendors, CAD/CAM Implementation.
5. **Fundamentals of CNC Part Programming:** Introduction, Manual Part Programming Methods, A Foreword on Computer Operating Systems and Applications, G-Code Editors, G-Code, M Codes.
6. **Items Produced on a CNC Router and Advanced Part Programming:** Introduction, Important Examples of Items Produced on a CNC Router, Factors Affecting the Buying Decision of CNC Router, Advanced Part Programming, APT Language Structure, Motion Commands.

**Subject Name:** Entrepreneurship Development and Management

1. **Entrepreneurship:** Definition of Entrepreneur, Internal and External Factors, Functions of an Entrepreneur, Entrepreneurial Motivation and Barriers, Classification of Entrepreneurship, Theory of Entrepreneurship, Concept of Entrepreneurship, Development of Entrepreneurship, Culture, Stages in Entrepreneurial Process.
2. **Creativity and Entrepreneurship Plan:** Idea Generation, Screening and Project Identification, Creative Performance, Feasibility Analysis: Economic, Marketing, Financial and Technical, Project Planning: Evaluation, Monitoring and Control Segmentation, Creative Problem Solving: Heuristics, Brainstorming, Synectics, Value Analysis, Innovation.
3. **International Entrepreneurship Opportunities:** The Nature of International Entrepreneurship, Importance of International Business to the Firm, International Versus Domestic' Entrepreneurship, Stages of Economic Development, Institutional Support for New Ventures: Supporting Organizations, Incentives and Facilities, Financial Institutions and Small Scale Industries, Govt. Policies for SSIs.
4. **The Personal Enterprise Environment:** Family and Non Family Entrepreneur, Role of Professionals, Professionalism Vs Family Entrepreneurs, Role of Woman Entrepreneur, Venture Capital, Nature and Overview, Venture Capital Process, Locating Venture Capitalists.

**Module Name:** Workshop Technology-III

- 1. Foundry Practices:** Pattern Making: Types of Patterns, Pattern Material, Pattern Allowances, Coloring of Patterns, Introduction to Cores, Core Materials and Types of Cores.
- 2. Molding:** Introduction to Molding, Types of Molding Sand and Their Properties, Sand Mixing and Mold Preparation, Molding Defects.
- 3. Melting and Pouring:** Types of Melting Furnaces (Pit, Titing, Cupola) Used, Closing and Pouring of Mold.

**Special Casting Methods:** Introduction to Die Casting, Investment, Centrifugal Casting.