

Lecture No.	Unit & Topic of Discussion	Topic Details	Delivery Method
1	1. Introduction To Welding	1.1 Principle of welding	Use of Blackboard, verbally, PPT, Use of Digital media
2		1.2 Classification of welding processes	
3		1.3 Advantages, Limitations of welding.	
4		1.4 Welding applications	
5		1.5 Weld ability	
6	2 Gas Welding	2. Gas Welding 2.1 Principle of operation	
7		2.2 Oxyacetylene Flame	
8		2.2.1 Types of flame	
9		2.2.2 Combustion of flame 2.3 Welding Techniques	
10		2.4 Filler rods And fluxes for gas welding	
11		2.5 Gas welding equipment and accessories	
12		2.5.1 Oxygen gas cylinders 2.5.2 Acetylene gas cylinders	
13		2.5.3 Acetylene gas generator 2.5.4 Pressure Regulator	
14		2.5.5 Oxygen and Acetylene Hoses 2.5.6 Welding Torch	
15	3 Arc Welding	3.1 Arc welding process 3.2 Striking the arc	
16		3.3 Arc length 3.2 Arc blow	
17		3.5 Arc welding machines- types and details 3.6 Selection of welding machines	
18		3.7 AC and DC welding and effects of polarity	
19		3.8 Electrodes-classification, specifications and selection	
20		3.9 Coated electrodes 3.10 Welding positions	
21		3.11 Welding procedures 3.12 Welding defects	
22	4 Resistance Welding	4 Resistance Welding	
23		4.1 Principle 4.2 Advantages, disadvantages	
24		4.3 Applications	
25		4.4 Spot welding	
26		4.5 Seam welding	
27		4.6 Projection welding	
28		4.7 Butt Welding 4.7.1 Upset butt welding	
29		4.7.2 Flash butt welding 4.8 Percussion welding	
30	5 Other Welding Processes	Other Welding Processes	
31		5.1 Submerged arc welding	
32		5.2 TIG welding	
33		5.3 MIG welding	
34		5.4 Electro slag welding 5.5 Plasma arc welding	
35		5.6 Ultrasonic Welding 5.7 Thermit Welding	
36		5.8 Atomic hydrogen welding	
37		5.9 Electron Beam Welding	
38		5.10 Laser beam welding 5.11 Automated welding	
39		6 Brazing	
40	6.2 Procedure		
41	6.3 Brazing filler alloys		
42	6.4 Brazing fluxes		
43	6.5 Advantages, Limitations and applications		

44	7 Soldering	7 Soldering 7.1 Principle	Use of Blackboard, verbally ,PPT, Use of Digital media
45		7.2 Solders 7.3 Soldering fluxes	
46		7.4 Soldering Methods	
47		7.5 PCB Soldering	
48		8 Welding Of Different Materials	
49	Welding Of Alloy Steel, tool Steel		
50	Welding Of Aluminium, Magnesium,		
51	Welding Of Stainless, Copper		
52	9 Weld Defects And Testing	Weld Defects And Testing ,9.1 Types of weld Defects; their causes and prevention.	
53		9.2 Destructive testing of welds	
54		9.3 Non Destructive tests- Fluorescent penetration test, magnetic particle test,	
55		Ultrasonic test, radiographic test	
56		Weld Defects And Testing	

Total Lecturers-56

*N Sharma*

Faculty

(NITISH SHARMA)  
Lecturer Mechanical

*[Signature]*

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**GOVERNMENT POLYTECHNIC PAONTA SAHIB**  
 AT DHAULA KUAN, DISTT. SIRMOUR (HP) - 173031  
**MECHANICAL ENGINEERING**  
**LESSON PLAN**

Academic Year	2023-2024
Semester	3RD
Course Code	ME 502
Course Name	THERMAL ENGINEERING - II
Course Type	PROGRAMME CORE
L-T-P	4-0-2
Name of Faculty	ASHISH PATIAL
Semester Start & End Dates	16/08/2023 TO 07/12/2023

**STUDY AND EVALUATION SCHEME**

Sr No	Name of the Subject	Th	Pr	Internal Assessment			External Assessment					Total Marks
				Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
1	THERMAL ENGINEERING - II	4	2	30	20	50	100	3	50	3	150	200

Hours	Unit & Topic of Discussion	Topic Details	Delivery Method
10	1. Power Cycles	1.1 Concept of reversibility, Carnot cycle 1.2 Rankine cycle and its efficiency 1.3 Brayton cycle 1.4 Otto, Diesel and Dual Combustion cycle	Chalk & Blackboard/ Projector
10	2. Principles of I.C. Engines	2.1 Introduction and classification of I.C. Engines 2.2 Working principle of two strokes and four strokes cycle by representing on PV and valve timing diagrams 2.3 Petrol and diesel engines, their comparison and applications 2.4 Location and functions of various parts of I.C. engines and materials used for them 2.5 Concept of IC engine terms: Bore, stroke, dead centres, crank throw, compression ratio, clearance volume, piston displacement and piston speed. Familiarity with ISI specification for I.C. engine parts	Chalk & Blackboard/ Projector
8	3. Carburation and Ignition Systems of Petrol Engine	3.1 Concept of carburetion 3.2 Air fuel ratio 3.3 Simple carburettor and its limitations 3.4 Description of a battery coil and magneto ignitions system	Chalk & Blackboard/ Projector
8	4. Fuel System in Diesel Engines	4.1 Components of Fuel system 4.2 Description and working of fuel feed pump 4.3 Fuel injection pump 4.4 Injector 4.5 Multi Point Fuel Injection Systems	Chalk & Blackboard/ Projector
6	5. Cooling and Lubrication	5.1 Necessity of Engine Cooling 5.2 Cooling systems: their main features 5.3 Thermostat 5.4 Defects in cooling system and their rectification 5.5 Function of lubrication 5.6 Types and properties of Engine lubricants 5.7 Lubrication systems of I.C. engine 5.8 ISI specification and brand names of Engine lubricants 5.9 Fault in cooling and lubrication system and their remedial actions	Chalk & Blackboard/ Projector



14	6. I.C. Engine Testing	6.1 Engine power - indicated and Brake power 6.2 Efficiency - Mechanical, Thermal, Relative and volumetric 6.3 Methods of finding indicated and brake power 6.4 Morse Test 6.5 Heat balance sheet	Chalk & Blackboard/ Projector
8	7. Air Compressors	7.1 Industrial uses of compressed air 7.2 Classification - description of reciprocating and Rotary air compressors 7.3 Fans, Blowers and supercharger 34 7.4 Working principle of reciprocating single and two stage compressors 7.5 Intercooling, volumetric efficiency 7.6 Operation and Maintenance of reciprocating compressors	Chalk & Blackboard/ Projector

Prescribed Books	Name of Book	Author Name	Publication
1	Thermal Engineering	P L. Ballaney	Khanna Publisher
2	Thermal Engineering	P.K. Nag	Tata McGraw Hill, Delhi

  
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**Course outcomes:**

At the end of the course, the student will be able to:

CO1	Understand thermodynamics of power cycles and their usage in physical systems
CO2	Identify and examine the parts of I.C. engines and understand their working
CO3	Understand the concepts of Fuel systems and Ignition systems used in petrol and diesel engines
CO4	Understand the need of Engine cooling and lubrication systems
CO5	Evaluate engine parameters and deduce heat balance sheet
CO6	Understand the principles and working of Air Compressors, Fans, Blowers and Supercharges

  
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**GOVERNMENT POLYTECHNIC POONTA SAHIB**  
 AT DHAULA KUAN, DISTT. SIRMOUR (HP) - 173031  
**MECHANICAL ENGINEERING**  
**LESSON PLAN**

Academic Year	2023- 2024
Semester	5TH
Course Code	ME 501
Course Name	BASICS OF MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT
Course Type	PROGRAMME CORE
L-T-P	4-0-0
Name of Faculty	ASHISH PATIAL
Semester Start & End Dates	14/02/2023 TO 07/12/2023

**STUDY AND EVALUATION SCHEME**

Sr. No.	Name of the Subject	Th	Pr	Internal Assessment			External Assessment					Total Marks
				Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
1	BASICS OF MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	4	0	50	0	50	100	3	0	0	100	150

Hours	Unit & Topic of Discussion	Topic Details	Delivery Method
6	1. Introduction to Management:	1.1 Definitions and concept of Management 1.2 Functions of management- planning, organizing, staffing, coordinating and controlling. 1.3 Various areas of management 1.4 Structure of an Organization	Chalk & Blackboard/ Projector
9	2. Self-Management and Development:	2.1 Life Long Learning Skills, Concept of Personality Development, Ethics and Moral values 2.2 Concept of Physical Development; Significance of health, hygiene, body gestures 2.3 Time Management Concept and its importance 2.4 Intellectual Development: Reading skills, speaking, listening skills, writing skills (Note taking, rough draft, revision, editing and final drafting). Concept of Critical Thinking and Problem Solving (approaches, steps and cases). 2.5 Psychological Management: stress, emotions, anxiety and techniques to manage these. 2.6 ICT & Presentation skills; use of IT tools for good and impressive presentations	Chalk & Blackboard/ Projector
9	3. Team Management:	3.1 Concept of Team Dynamics. Team related skills, managing cultural, social and ethnic diversity in a team. 3.2 Effective group communication and conversations. 3.3 Team building and its various stages like forming, storming, norming, performing and adjourning 3.4 Leadership, Qualities of a good leader 3.5 Motivation, Need of Motivation, Maslow's theory of Motivation	Chalk & Blackboard/ Projector
4	4. Project Management:	4.1 Stages of Project Management; initiation, planning, execution, closing and review (through case studies). SWOT analysis concept.	Chalk & Blackboard/ Projector

9	5. Introduction to Entrepreneurship:	5.1 Entrepreneurship, Need of entrepreneurship, and its concept, Qualities of a good entrepreneur 5.2 Business ownerships and its features, sole proprietorship, partnership, joint stock companies, cooperative, private limited, public limited, PPP mode. 5.3 Types of industries: micro, small, medium and large	Chalk & Blackboard/ Projector
6	6. Entrepreneurial Support System	6.1 District Industry Centers (DICs), State Financial Corporations (SFCs), NABARD, 6.2 MSME (Micro, Small, Medium Enterprises) – its objectives & list of schemes	Chalk & Blackboard/ Projector
6	7. Market Study and Opportunity Identification	Types of market study: primary and secondary, product or service identification, assessment of demand and supply types of survey and their important features.	Chalk & Blackboard/ Projector
7	8. Project Report Preparation	8.1 Preliminary Report, Techno-Economic Feasibility Report, Detailed Project Report (DPR).	Chalk & Blackboard/ Projector

Prescribed Books	Name of Book	Author Name	Publication
1	Engineering Thermodynamics	P.K. Nag	Tata McGraw Hill, Delhi
2	Thermal Engineering	R S Khurmi	S Chand and Co. Ltd., New Delhi

  
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**Course outcomes:**

At the end of the course, the student will be able to.

CO1	Understand the concepts, functions and areas of management in an organisational structure.
CO2	Know the principles of and requirements for project, team, and self management.
CO3	Learn about the idea and necessity of entrepreneurship, different types of firm ownership in different industries and the function of different entrepreneurial support systems.
CO4	Recognize the value of market research and opportunity discovery in relation to the creation of different types of project reports

  
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THEORY NO.	Chapter/ Unit Description	CONTENTS	Referece	Remarks
8 (1-8)	Introduction	Design – Definition, Type of design, necessity of design, Comparison of designed and un-designed work , Design procedure, Characteristics of a good designer Design terminology: stress, strain, factor of safety, factors affecting factor of safety, stress concentration, methods to reduce stress concentration, fatigue, endurance limit. General design consideration, Codes and Standards (BIS standards) Engineering materials and their mechanical properties Properties of engineering materials: elasticity, plasticity, malleability, ductility, toughness, hardness and resilience. Fatigue, creep, tenacity, strength Selection of materials, criterion for material selection	R1,R2,R3,R4	Pedagogical Tool: PPT, GREEN Board
5 (9-13)	Design Failure	Various design failure theories-maximum stress theory, maximum strain theory Classification of loads Design under tensile, compressive and torsional loads	R1,R2,R3,R4	
8 (14-21)	Design of Shafts	Type of shafts, shaft materials, Type of loading on shafts, standard sizes of shafts available Shafts subjected to torsion only, determination of shaft diameter (hollow and solid shaft) on the basis of Strength criterion,Rigidity criterion Determination of shaft diameter (hollow and solid shaft) subjected to bending	R1,R2,R3,R4	
5 (22-27)	Design of Keys	Types of keys, materials of keys, functions of keys Failure of keys (by Shearing and Crushing) Design of keys (Determination of key dimension) Effect of keyways on shaft strength	R1,R2,R3,R4	
24 (28-51)	Design of Joints	Types of joints - Temporary and permanent joints, utility of various joints Temporary Joint, Knuckle Joints – Different parts of the joint, material used for the joint, type of knuckle Joint, design of the knuckle joint Cotter Joint – Different parts of the spigot and socket joints, Design of spigot and socket joint, Permanent Joint Welded Joint - Welding symbols. Type of welded joint, strength of parallel and transverse fillet welds Strength of combined parallel and transverse weld Riveted Joints: Rivet materials, Rivet heads, leak proofing of riveted joint – caulking and fullering Different modes of rivet joint failure Design of riveted joint – Lap and butt single and multi-riveted	R1,R2,R3,R4	
7 (52-59)	Design of Flange Coupling	Necessity of a coupling, advantages of a coupling, types of couplings, design of muff coupling, design of flange coupling (both protected type and unprotected type).	R1,R2,R3,R4	
11 (60-70)	Design of Screwed Joints	Introduction, Advantages and Disadvantages of screw joints, location of screw joints Important terms used in screw threads, designation of screw threads Initial stresses due to screw up forces, stresses due to combined forces Design of bolts for cylinder cover	R1,R2,R3,R4	

## TEACHING RESORCES

- R1. Machine Design by V.B.Bhandari, Tata McGraw Hill, New Delhi  
 R2. Machine Design by Sharma and Agrawal; Katson Publishing House, Ludhiana  
 R3. Design Data Handbook by D.P. Mandali, SK Kataria and Sons, Delhi  
 R4. Machine Design by A.P.Verma; SK Kataria and Sons, Delhi

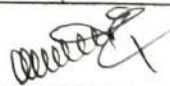
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## PLANNED SYLLABUS COVERAGE (Theory)

<b>GP Paonta Sahib</b>	Department: Mechanical Engg. Subject : MANUFACTURING TECHNOLOGY-III				
	Course : Diploma	Duration: 3 Yrs.			
<b>SYLLABUS</b>	Total Period : 42	Theory : 42			
<b>COVERAGE</b>					
Sr. No.	Period Nos	Topic Details	Instruction Reference	Additional Study Recommended	Remarks
1	12 (1-12)	Milling 1.1 Introduction to milling 1.2 Types of milling machines 1.3 Constructional features of Knee and Column type milling machine 1.4 Specifications of milling machine 1.5 Milling operations- plain, angular, form, straddle and gang milling 1.6 Milling cutters - Geometry and types 1.7 Cutting speed and feeds 1.8 Indexing-simple, compound, differential and angular 1.9 Job holding devices 1.10 Introduction to machining centre	Elements of workshop technology by SK Chaudhry and Hajra, Asia Publishing House	Production Technology by HMT, Tata McGraw Publishers, New Delhi	
2	7 (13-19)	Presses and Press Tools 2.1 Types of Presses, their applications 2.2 Types of dies 2.3 Types of die sets 2.4 Punches 2.5 Pads 2.6 Die clearance 2.7 Stripper plates 2.8 Stops 2.9 Pilots 2.10 Stock Layout	do	do	
3	5 (20-24)	Broaching 3.1 Introduction 3.2 Types of broaching machines 3.3 Types of broaches and their use	do	do	
4	4 (25-28)	Metal Coating Processes 4.1 Metal spraying 4.2 Galvanizing 4.3 Electroplating 4.4 Anodizing	do	do	
5	5 (29-33)	Gear Generating and Finishing Processes 5.1 Gear tooth elements 5.2 Gear milling 5.3 Introduction to gear shaping 5.4 Working principle of gear shaping machine 5.5 Working principle of gear hobbing machine 5.6 Introduction to gear finishing operations	do	do	
6	9 (34-42)	Advanced Welding Techniques 6.1 Working principle, process details, equipment details, advantages, limitations and applications of: 6.2 Thermit Welding 6.3 MIG Welding 6.4 TIG Welding 6.5 Atomic hydrogen Welding 6.6 Electron beam welding 6.7 Laser beam welding 6.8 Introduction to friction welding	do	do	

  
Subject Incharge

  
Head Of Department  
Mechanical Engineering