GOVERNMENT POLYTECHNIC PAONTA SAHIB

AT DHAULA KUAN, DISTT. SIRMOUR (HP) - 173031
DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG- DEC 2025
Semester	THIRD
Course Code	MEPC201
Course Name	BASIC MECHANICAL ENGINEERING
Course Type	PROGRAMME CORE
Class	MECHANICAL ENGINEERING
L-P-DCS	3-0-1
Name of Faculty	NITISH SHARMA
Semester Start & End Dates	01-08-2025 TO 26-11-2025

STUDY AND EVALUATION SCHEME

Sr. No.	Name of the Subject	Hours/Weeks			Total hours/ week	Credits	Internal Assessment			External Assessment					Total
		L	P	DCS			Th.	Pr.	Total	Th.	Hrs.	Pr.	Hrs.	Total	
1	BASIC MECHANICAL ENGINEERING	3	0	1	4	3	40	....	40	60	3	....	....	60	100

Date	Topic Details	Delivery Method
Unit-1 : Introduction to Thermodynamics		
Day 1	Thermodynamics and its role in Engineering and science	Chalk Blackboard and using Digital Media
Day 2	Types of Systems, Thermodynamic Equilibrium	
Day 3	Properties, State, Process and Cycle, Zeroth Law of Thermodynamics	
Day 4	First and Second laws of thermodynamics	
Day 5-6	Heat and Work Interactions for various processes	
Day 7	Concept of Heat Engine, Heat Pump & Refrigerator, Efficiency/COP	
Day 8	Kelvin-Planck & Clausius Statement	
Day 9	Carnot Cycle	
Day 10	T-S & PV Diagram, Entropy	
Unit-2 : Heat transfer & Thermal Power Plant		
Day 11	Introduction to Heat Transfer	
Day 12	Modes of Heat Transfer-Conduction, convection and radiation	
Day 13	Fourier Equation, Stefan-Boltzman Law	
Day 14	Numerical Problems	
Day 15	Layout of Thermal Power plant layout	
Day 16	Rankine Cycle	

Day 17	Types of Boiler	Chalk Blackboard and using Digital Media
Unit-3 : Steam Turbines and Internal Combustion Engines		
Day 18	Steam Turbines	
Day 19	Impulse and Reaction Turbines	
Day 20-21	Condensers, Jet Condensers	
Day 22-23	Surface condensers	
Day 24	Cooling towers	
Day 25	Internal Combustion Engines,	
Day 26	Otto Cycle	
Day 27	Diesel Cycle	
Day 28	Dual Cycle	
Day 29	2-Stroke and 4-Stroke I.C. Engines	
Day 30	S.I. and C.I. Engines	
Unit-4 : Materials and Manufacturing Processes		
Day 31	Engineering Materials	
Day 32	Classification of Engineering Materials	
Day 33	Properties of Engineering Materials	
Day 34-35	Manufacturing Processes- Metal Casting, Moulding, Patterns	
Day 36-39	Manufacturing Processes- Metal Working: Hot Working and Cold Working, Metal Forming: Extrusion, Forging, Rolling, Drawing	
Day 40	Gas Welding	
Day 41-42	Arc Welding	
Day 43	Soldering and Brazing	
Unit 5 : Machine Tools and Machining Processes		
Day 44-45	Lathe Machine and its types, Lathe Operations	
Day 46-47	Milling Machine and its types, Milling operations	
Day 48	Difference between Shaper and Planer Machines, Quick Return Motion Mechanism.	
Day 49	Drilling Machine and its operations	
Day 50	Grinding Machine and its operations.	
Day 51-56	**Revision**	

	Name of Book	Author Name	Publication
Prescribed Books	1. Basic Mechanical Engineering	M.P.Poonia & S.C. Sharma	Khanna Publishing House
	2. Elements of Mechanical Engineering	M.L. Mathur, F.S.Mehta and R.P. Tiwari	Jain Brothers

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AT DHAULA KUAN, DISTT. SIRMOUR (HP) - 173031

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG - DEC 2025
Semester	THIRD
Course Code	MEP203
Course Name	MATERIAL SCIENCE & ENGINEERING
Course Type	PROGRAMME CORE COURSE (PC)
L-T-P	3-1-0
Name of Faculty	SANJEEV KUMAR SHARMA
Semester Start & End Dates	01-08-2025 TO 30-11-2025

STUDY AND EVALUATION SCHEME

Sr. No.	Name of the Subject	Th.	Dcs	Pr.	Internal Assessment			External Assessment					Total Marks
					Th.	Pr.	Total	Th.	Hrs.	Pr.	Hrs.	Total	
1	MATERIAL SCIENCE & ENGINEERING	3	1	0	40	0	40	60	3	0	3	100	100

Hours	Unit & Topic of Discussion	Topic Details	Delivery Method
	Unit1: Crystal structures and Bonds:		Chalk & Blackboard And Projector
1Hr	Unit cell and space lattice		
1Hr	Crystal system: The seven basic crystal systems		
1Hr	Crystal structure and coordination no. for metallic elements: Simple cubic		
1Hr	Crystal structure and coordination no. for metallic elements: BCC		
1Hr	Crystal structure and coordination no. for metallic elements: FCC		
1Hr	Crystal structure and coordination no. for metallic elements: HCP		
1Hr	Atomic radius and atomic packing factor for Simple Cubic		Chalk & Blackboard And Projector
1Hr	Atomic radius and atomic packing factor for BCC		
1Hr	Atomic radius and atomic packing factor for FCC		
1Hr	number of atoms for a unit cell		
1Hr	Classification-primary or chemical bond, secondary or molecular bond		
1Hr	Concept of Types of primary bonds: Ionic, Covalent and Metallic Bonds		
	Unit-II:Phase diagrams, Ferrous metals and its Alloys:		
1Hr	Isomorphs, eutectic and eutectoid systems		

1Hr	Iron-Carbon binary diagram; Iron and Carbon Steels	Chalk & Blackboard And Projector
1Hr	flow sheet for production of iron and steel	
1Hr	Iron ores–Pig iron	
1Hr	Classification, composition and effects of impurities on iron	
1Hr	CastIron: classification, composition, properties and uses;	Chalk & Blackboard And Projector
1Hr	Wrought Iron: properties, uses/applications of wrought Iron	
1Hr	Comparison of cast iron, wrought iron and mild steel and high carbon steel	
1Hr	Standard commercial grades of steel as per BIS and AISI	
1Hr	Alloy Steels – purpose of alloying; effects of alloying elements	
1Hr	Important alloy steels: Silicon steel	Chalk & Blackboard And Projector
1Hr	High Speed Steel(HSS),heat resisting steel	
1Hr	Stainless Steel(SS):types of SS	
1Hr	Applications of SS–magnet steel– composition, properties and useS	
	UNIT-III **Non-ferrous metals and its Alloys**	Chalk & Blackboard And Projector
1Hr	Properties and uses of aluminum, copper	
1Hr	Properties and uses of tin, lead, zinc, magnesium and nickel	
1Hr	Properties and uses of magnesium and nickel	
1Hr	Copper alloys: Brasses - composition, properties and uses	
1Hr	Copper alloys: bronzes – composition, properties and uses	
1Hr	Aluminum alloys: Duralumin – composition, properties and uses	
1Hr	Aluminum alloys: Hindalium, magnelium – composition, properties and uses	
1Hr	Nickel alloys: Inconel, monel, nicrome – composition, properties and uses	
1Hr	Anti-friction/Bearing alloys: Various types of bearing	
1Hr	bronzes-Standard commercial grades as per BIS/ASME	Chalk & Blackboard And Projector
	Unit-IV:Failure analysis & Testing of Materials:	
1Hr	Introduction to failure analysis; Fracture	
1Hr	Fracture: ductile fracture	
1Hr	Brittle fracture	
1Hr	Cleavage; notch sensitivity	
1Hr	Fatigue; endurance limit	
1Hr	Creep; creep curve; creep fracture	
1Hr	Destructive testing: Tensile testing; compression testing	
1Hr	Hardness testing: Brinell, Rockwell; bend test; torsion test; fatigue test; creep test	
1Hr	Non-destructive testing: Visual Inspection	
1Hr	Magnetic particle inspection; liquid penetrant test; ultrasonic inspection; radiography	
	Corrosion & Surface Engineering:	
1Hr	Nature of corrosion and its causes	
1Hr	Electrolytes	
1Hr	Factors affecting corrosion: Environment, Material properties and physical conditions	
1Hr	Types of corrosion ,Corrosion control: Material selection, environment control;	

1Hr	Surface engineering processes: Coatings and surface treatments	Chalk & Blackboard And Projector
1Hr	Cleaning and mechanical finishing of surfaces	
1Hr	Electroplating and Special metallic plating	
1Hr	Electro polishing and photo-etching;	
1Hr	Conversion coatings: Oxide, phosphate and chromate coatings	
1Hr	Thin film coatings: PVD and CVD	
1Hr	Hard-facing, thermal spraying and high-energy processes	

	Name of Book	Author Name	Publication
Prescribed Books	A Text Book of Material Science & Metallurgy	O.P. Khanna	Dhanpath Rai andSons, New Delhi. 2003
	Material Science & Engineering	R.K.Rajput	S.K.Kataria&Sons, NewDelhi,2004.
	Material Science	R.S. Khurmi	, S.Chand& Co. Ltd., New Delhi, 2005.

Signature of Subject Incharge

Sajan Kumar Shaw

Signature of Head of Department

GOVERNMENT POLYTECHNIC PAONTA SAHIB

AT DHALLA KLAN, DISTT. SIRMAUR (HP), 173021
DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG - DEC 2025
Semester	THIRD
Course Code	MEPC 205
Course Name	MEASUREMENT & METROLOGY
Course Type	PROGRAMME CORE
L-T-P	3-1-4
Name of Faculty	MUNNESH KUMAR
Semester Start & End Dates	01-08-2025 TO 24-11-2025

STUDY AND EVALUATION SCHEME

S.No	Name of the Subject	Th	DCS	Pr	Internal Assessment			External Assessment					Total Marks
					Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
1	MEASUREMENT & METROLOGY	3	1	0	40	0	40	60	3	0	0	60	100
2	MEASUREMENT & METROLOGY LAB	0	0	2	0	40	40	0	0	60	3	60	100

HOURS	Unit & Topic of Discussion	Topic Details	Delivery Method
	Unit-1(a) : Introduction to measurements		
17 HOURS	Introduction (L1,L2,L3,L4,L5)	Definition of measurement; Significance of measurement; Methods of measurements: Direct & Indirect, Generalized measuring system; Standards of measurements: Primary & Secondary; Factors influencing selection of measuring instruments	
	Terms applicable to measuring instruments (L6,L7,L8)	Precision and Accuracy, Sensitivity and Repeatability, Range, Threshold, Hysteresis, calibration; Errors in Measurements: Classification of errors, Systematic and Random error (introduction only)	
	(b): Measuring instruments		
	Introduction(L9)		
	Thread measurements(L10)	Thread gauge micrometer	
	Angle measurements (L11,L12)	Bevel protractor, Sine Bar	
	Gauges (L13)	plain plug gauge, ring Gauge, snap gauge, limit gauge	
	Comparators (L14)	Characteristics of comparators, Types of comparators	
	Surface finish (L15,L16)	Definition, Terminology of surface finish, Taly surf surface roughness tester	
	Miscellaneous (L17)	Coordinating measuring machine	
	Unit-2(a) : Transducers and Strain gauges		
10	Introduction (L18,L19)	Transducers: Characteristics, classification of transducers	
	Strain Measurements (L20, L21)	Strain gauge, Classification, mounting of strain gauges, (Theoretical aspects)	
	(b) : Measurement of force, torque, and pressure		
	Introduction (L22)		

HOURS	Force measurement (L23,L24)	Spring Balance , Load cell	
	Torque measurement(L25,L26)	Prony brake, Eddy current, Hydraulic dynamometer	
	Pressure measurement (L27)	Mcloed gauge	
	Unit 3 (a): Applied mechanical measurements		
8 HOURS	Speed measurement(L28,L29)	Classification of tachometers, Revolution counters, Eddy current tachometers	CHALK-BLACKBOARD & USING TECHNOLOGICAL PADAGOGY
	Displacement measurement(L30)	Linear variable Differential transformers (LVDT)	
	Flow measurement (L31)	Rotometers, Turbine meter	
	Temperature measurement (L22)	Resistance thermometers, Optical Pyrometer	
	(b) Miscellaneous measurement		
	Humidity measurement (L33)	hair hygrometer	
	Density measurement (L34)	hydrometer	
	Liquid level measurement (L35)	sight glass, Float gauge	
	Unit 4 (a): Limits, Fits & Tolerances		
13 HOURS	(L36,L37,L38)	Concept of Limits, Fits, and Tolerances; Selective Assembly; Interchangeability; Hole And Shaft Basis System; Taylor's Principle	
	(b): Angular Measurement		
	Concept (L39)	Instruments For Angular Measurements; Working and Use	
	Instruments principle and working (L40,L41,L42)	Working and Use of Universal Bevel Protractor, Sine Bar, Spirit Level; Principle of Working of Clinometers; Angle Gauges	
	(c): Screw thread Measurements		
	Introduction (L43)	ISO grade and fits of thread; Errors in threads	
	Measurement of different elements(L44,L45)	major diameter, minor diameter,effective diameter, pitch	
	Methods of measurement (L46,L47,L48)	Two wire method; Thread gauge micrometer; Working principle offloating carriage dial micrometer.	
	Unit 5 (a): Gear Measurement and Testing		
8 HOURS	(L49,L50,L51,L52)	Analytical and functional inspection; Rolling test; Measurement of tooth thickness; Gear tooth Vernier; Errors in gears such as backlash, run out, composite	
	(b): Machine tool testing		
	Concept (L53,L54,L55,L56)	Parallelism; Straightness; Squareness; Coaxiallity; roundness; run out; alignment testing of machine tools as per IS standard procedure.	

	Name of Book	Author Name	Publication
Prescribed Books	Engineering Metrology	R.K.Jain	Khanna Publishers, NewDelhi,2005
	Engineering Metrology	K.J.Hume	Kalyani publishers

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GOVERNMENT POLYTECHNIC PAONTA SAHIB

AT DHAULA KUAN, DISTT. SIRMOUR (HP) - 173031

MECHANICAL ENGINEERING

LESSON PLAN	
Academic Year	AUG - DEC 2025
Semester	THIRD
Course Code	MEPC209
Course Name	THERMAL ENGINEERING-I
Course Type	PROGRAMME CORE
L-T-P	3-1-0
Name of Faculty	ASHISH PATIAL
Semester Start & End Dates	01-08-2025 TO 26-11-2025

STUDY AND EVALUATION SCHEME

Sr. No.	Name of the Subject	Th	Credit	
1	THERMAL ENGINEERING-I	4	3	
Internal Assessment		External Assessment		Total Marks
Th	Total	Th	Total	
40	40	60	60	100

HOURS	Unit & Topic of Discussion	Topic Details	Delivery Method
	Unit-1 : Sources of Energy		
9 HOURS	Brief description of energy Sources	Conventional as well as non-conventional	
	Classification of energy sources	Renewable, Non-Renewable	
	Solar Energy	Solar thermal (SWH) and solar photovoltaic	
	Solar collectors	Flat plate and concentrating collectors & its applications	
	Solar Derived energies	Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy;	
	Miscellaneous	Biogas, Biomass, Bio-diesel; Hydraulic Energy	
	Unit-2: Internal Combustion Engines		
	Introduction to Engines		
	Assumptions made in air standard cycle analysis	Brief description along with derivation of efficiency of Carnot, Otto and Diesel cycles with P-V and T-S diagrams	

11 HOURS	Internal and external combustion engines	classification of I.C. engines; Function of each part and materials used for the component parts - Cylinder, crank case, crank pin, crank, crank shaft, connectingrod, wrist pin, piston, cylinder heads, exhaust valve, inlet valve	
	Working of four-stroke and two-stroke petrol and diesel engines	Comparison of two stroke and four stroke engines; Comparison of C.I. and S.I. engines; Valve timing and port timing diagrams for four stroke and two stroke engines.	
	Unit-3 : I.C. Engine Systems		
12 HOURS	Fuel system of Petrol engines	Principle of operation of simple carburetor	CHALK-BLACKBOARD & USING TECHNOLOGICAL PADAGOGY
	Fuel system of Diesel engines	Plunger type fuel injection pump, fuel feed pump and fuel injector (description with line diagram)	
	Cooling system	Air-cooling, water-cooling system with thermosiphon method of circulation and water-cooling system with radiator and forced circulation (description with line diagram). Comparison of air cooling and water-cooling system	
	Ignition systems	Battery coil ignition and magneto ignition (description and working). Comparison of two systems	
	Lubrication Systems	Types of lubricating systems used in I.C. engines with line diagram	
	Miscellaneous	Objective of turbocharging and supercharging	
	Unit-4 : Performance of I.C. Engines		
11 HOURS	Engine Parameters	Brake power; Indicated power; Frictional power; Brake and Indicated mean effective pressures; Brake and Indicated thermal efficiencies; Mechanical efficiency; Relative efficiency	
	Engine Performance Test	Morse test; Heat balance sheet Methods of determination of B.P., I.P. and F.P.; Simple numerical problems on performance of I.C. engines	
	Unit 5 (a): Air Compressors		
14 HOURS	Air Compression	Functions of air compressor; Uses of compressed air	
	Types of air compressors	Single stage reciprocating air compressor - its construction and working (with line diagram); Multistage compressors–Advantages over single stage compressors; Description of Rotary compressors, Centrifugal compressor, axial flow type compressor and vane type compressors	
	(b) Refrigeration &Air-conditioning (Problems omitted)		
	Refrigeration	Refrigerant; COP; Air Refrigeration system: components, working & applications	
	Vapor Compression system	components, working & applications	
	Air conditioning	Classification of Air-conditioning systems; Window Air Conditioner; Summer Air-Conditioning system, Winter Air-Conditioning system, Year-round Air Conditioning system, Central air conditioning system	

	Name of Book	Author Name	Publication
Prescribed Books	Thermal Engineering	P.L. Ballaney	Khanna Publishers,2002
	Introduction to Renewable Energy	Vaughn Nelson	CRC Press

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DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG - DEC 2025
Semester	THIRD
Course Code	MEPC305
Course Name	MANUFACTURING ENGINEERING
Course Type	PROGRAMME CORE
L-T-P	3-1-0
Name of Faculty	TEJENDER DEV BRARI
Semester Start & End Dates	01-08-2025 TO 26-11-2025

STUDY AND EVALUATION SCHEME

S.No	Name of the Subject	Th	DCS	Pr	Internal Assessment			External Assessment					Total Marks
					Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
1.	THEORY OF MACHINES & MECHANISMS	3	2	0	40	0	40	60	3	0	0	60	100

Course Objectives:

- To understand the importance of cutting fluids & lubricants in machining.
- To study various types of basic production processes.
- To select, operate and control the appropriate processes for specific applications.
- To understand the concept of gear making and list various gear materials.
- To understand the importance of press tools and understand various die operations.
- To understand Grinding and finishing processes.

HOURS	Unit & Topic of Discussion	Topic Details	Delivery Method
12 HOURS	Cutting Fluids & Lubricants Lathe Operations	Introduction; Types of cutting fluids, Fluids and coolants required in turning, drilling, shaping, sawing & broaching; Selection of cutting fluids, methods of application of cutting fluid; Classification of lubricants(solid, liquid, gaseous), Properties and applications of lubricants Types of lathes – light duty, Medium duty and heavy duty geared lathe, CNC lathe (Concept only); Specifications; Basic parts and their functions; Operations and tools–Turning, parting off, Knurling, facing, Boring, drilling, threading, step turning, taper turning	
10 HOURS	Broaching Machines Drilling	Introduction to broaching; Types of broaching machines–Horizontal type (Single ram & duplex ram), Vertical type, Pull up, pull down, and push down; Elements of broach tool; Nomenclature; Tool materials for broaching. Classification; Basic parts and their functions; Radial drilling	

		machine; Types of operations; Specifications of drilling machine; Types of drills and reamers.	
12 HOURS	Welding: Milling	Classification; Gas welding techniques; Types of welding flames; Arc Welding –Principle, Equipment, Applications; Shielded metal arcwelding; Submerged arc welding; TIG / MIG welding; Resistance welding - Spot welding, Seam welding, Projection welding; Welding defects; Brazing and soldering. Introduction; Types of milling machines: plain, Universal, vertical; constructional details – specifications; Milling operations: simple, compound and differential indexing (No Numerical); Milling cutters –types; Teeth materials; Tool signature in ASA; Tool & work holding devices	
12 HOURS	Gear Making: Press working	Manufacture of gears–by Casting, Moulding, Stamping, Coining, Extruding, Rolling, Machining; Gear generating methods: Gear Shaping with pinion cutter & rack cutter; Gear hobbing; Description of gear hob; Operation of gear hobbing machine; Gear finishing processes; Gear materials and specification; Heat treatment processes applied to gears. Types of presses and Specifications, Press working operations-Cutting, bending, drawing, punching, blanking, notching, lancing; Die set components- punch and dieshoe, guide pin, bolster plate, stripper, stock guide, feed stock, pilot; Punch and die clearances for blanking and piercing, effect of clearance.	CHALK-BLACK BOARD & USING TECHNOLOGICAL PEDAGOGY
10 HOURS	Grinding and finishing processes:	Principles of metal removal by Grinding; Abrasives –Natural & Artificial; Bonds and binding processes: Vitrified, silicate, shellac, rubber, bakelite; Factors affecting the selection of grind wheels: size and shape of wheel, kind of abrasive, grain size, grade and strength of bond, structure of grain, spacing, kinds of bind material; Grinding machines classification: Cylindrical, Surface, Tool & Cutter grinding machines; Construction details; Principle of centerless grinding; Advantages & limitations of centerless grinding; Finishing by grinding: Honing, Lapping, Super finishing; Electroplating: Basic principles, 15 Plating metals, applications; Hot dipping: Galvanizing, Tin coating, Parkerising, Anodizing; Metal spraying: wire process, powder process and applications; Organic coatings:;Finishing specifications.	

	Name of Book	Author Name	Publication
Prescribed Books	Manufacturing technology	P N Rao,	Tata Mc Graw Hill Publications
	Elements of workshop Technology (Volume I&II)	S.K. Hajra Chaudary,Bose & Roy	Media Promoters and Publishers Limited

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