GOVT. POLYTECHNIC HAMIRPUR

LESSON PLAN FOR : BASIC OF MECHANICAL ENGINEERING **(SESSION: AUGUST-DEC. 2024)**

MECHANICAL ENGINEERING (SEMESTER - 3RD)

S.NO.	MONTH	WEEK	DATE	CONTENT (THEORY)	REMARKS
1	AUGUST	1ST	2,3	**UNIT-I:** Introduction to Thermodynamics - Role of Thermodynamics in Engineering and science, Types of Systems, Thermodynamic Equilibrium, Properties, State, Process and Cycle, Elementary introduction to Zeroth, First and Second laws of thermodynamics, Heat and Work Interactions for various processes; Concept of Heat Engine, Heat Pump & Refrigerator, Efficiency/COP; Kelvin-Planck and Clausius Statements, Carnot Cycle, Carnot Efficiency, T-S and P-V Diagrams, Concept of Entropy	
		2nd	5,6,8,9		
		3rd	12,13,16,17		
		4th	20,23,24		
		5th	27,30,31		
2	SEPT.	1st	2,3,6	**Unit-II:** Heat transfer & Thermal Power Plant: Heat Transfer, Modes of Heat Transfer; Conduction: Fourier Equation, Conduction heat transfer through Composite Walls, Simple Numerical Problems, Convection Heat transfer: : Natural and forced convection, Radiation: Absorption, Reflection and transmission of radiation, Concept of black body, Stefan-Boltzman Law (concept only , No derivation), Thermal Power Plant Layout; Rankine Cycle; Fire Tube and Water Tube boilers, Babcock& Wilcox, Cochran Boilers	
		2nd	9,10,13		
		3rd	16,17,20,21		
		4th	23,24,27,28		
		5th	30		
3	OCT.	1st	1,4,5	**Unit-III:** Steam Turbines: Impulse and Reaction Turbines; Condensers: Jet & Surface Condensers, Cooling Towers; Internal Combustion Engines: Otto, Diesel and Dual cycles; P-V and T-S Diagrams; IC Engines:2-Stroke and 4-Stroke I.C. Engines, S.I. and C.I. Engines.	
		2nd	7,8		
		3rd	14,15,18,19		
		4th	21,22,25,26		
		5th	28,29		
4	NOV.	1st	1	**Unit-IV:** Materials and Manufacturing Processes (derivations and Problems omitted): Engineering Materials, Classification and their Properties; Metal Casting, Moulding, Patterns, Metal Working: Hot Working and Cold Working, Metal Forming: Extrusion, Forging, Rolling, Drawing, Gas Welding, Arc Welding, Soldering, and Brazing.	
		2nd	4,5,8		
		3rd	11,12,16		
		4th	18,19,22,23		
		5th	25,26,29,30	**Unit-V:** Machine Tools and Machining Processes: Machine Tools: Lathe Machine and types, Lathe Operations, Milling Machine and types, Milling Operations, Shaper and Planer Machines: Differences, Quick Return Motion Mechanism , Drilling Machine: Operations, Grinding Machine: Operations	
5	DEC.	1st	2		

Signature of Teacher

HOD (ME)

GOVT. POLYTECHNIC HAMIRPUR

LESSON PLAN : THERMAL ENGINEERING-1 (SESSION: AUG.-DEC. 2024)

MECHANICAL ENGINEERING (SEMESTER - 3RD)

S.NO.	MONTH	WEEK	DATE	CONTENT (THEORY)	REMARKS
1	AUG.	1st	1,3	**UNIT-I:Sources of Energy :** Brief description of energy Sources: Classification of energy sources: Renewable, Non-Renewable; Solar Energy: Flat plate and concentrating collectors & its applications (Solar Water Heater, Photovoltaic Cell); Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy; Biogas, Biomass, Bio-diesel; Hydraulic Energy.	
		2nd	5,6,8		
		3rd	12,13,17		
		4th	19,20,22,24		
		5th	27,29,31	**Unit-II: Internal Combustion 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; 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, connecting rod, 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.	
2	SEPT.	1st	2,3,5,7		
		2nd	9,10,12		
		3rd	16,17,19,21	**Unit III: I.C. Engine Systems :** Fuel system of Petrol engines; Principle of operation of simple carburetor; 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; Types of lubricating systems used in I.C. engines with line diagram; Objective of turbocharging and supercharging.	
		4th	23,24,26,28		
		5th	30		
3	OCT.	1st	1,3,5		
		2nd	7,8,10	**Unit-IV: Performance of I.C. Engines:** Brake power; Indicated power; Frictional power; Brake and Indicated mean effective pressures; Brake and Indicated thermal efficiencies; Mechanical efficiency; Relative efficiency; 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.	
		3rd	14,15,19		
		4th	21,22,24,26		
4	NOV.	1st			
		2nd	4,5,7	**Unit-V: Air Compressors :** 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. **Refrigeration &Air-conditioning (Problems omitted) :** Refrigeration; Refrigerant; COP; Air Refrigeration system: components, working & applications; Vapour 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.	
		3rd	16		
		4th	18,19,21,23		
		5th	25,26,28,30		
5	DEC.	1st	2		

(Lect. Mech. Engg.)

HOD (ME)

Govt. Polytechnic Hamirpur (H.P.)

Lecture Planning

Branch: Mechanical Engineering **Session**: Aug. - Dec.2024

Teacher: Er. Dinesh Kumar Patial, **Subject**: Measurement and Metrology

Sr. No.	Dates	Chapter/ Unit Description	Detail of Contents	Reference Resources
1	01 Aug. to 28 Aug.	**UNIT-I: Introduction to measurements**	Definition of m'ment, Significance of m'ment, Methods of m'ments: Direct & Indirect, Generalized measuring system; Standards of m'ments: Primary & Secondary; Factors influencing selection of measuring instruments. Terms applicable to measuring instruments: Precision and Accuracy, Sensitivity and Repeatability, Range, Threshold, Hysteresis, calibration; Errors in M'ments: Classification of errors, Systematic and Random error. **Measuring instruments**: Introduction, Thread m'ments: Thread gauge micrometre, Angle m'ments: Bevel protractor, Sine Bar; Gauges: plain plug gauge, ring Gauge, snap gauge, limit gauge; **Comparators**: Characteristics of comparators, Types of comparators; Surface finish: Definition, Terminology of surface finish, Taly surf surface roughness tester; Coordinating measuring machine.	R1,R2
2	29 Aug. to 11 Sep.	**Unit-II: Transducers and Strain gauges**	Introduction; Transducers: Characteristics, classification of transducers, Strain m'ments, Strain gauge, Classification, mounting of strain gauges, m'ment of force, torque, and pressure(derivations omitted): Introduction, Force m'ment: Spring Balance, Load cell, Torque m'ment: Prony brake, Eddy current, Hydraulic dynamometer; Pressure m'ment: Mcloed gauge.	R1,R2
3	12 Sep. to 01 Oct.	**Unit-III: Applied mechanical m'ments**	Speed m'ment: Classification of tachometers, Revolution counters, Eddy current tachometers; Displacement m'ment: Linear variable Differential transformers (LVDT); Flow m'ment: Rotometers, Turbine meter; Temperature m'ment: Resistance thermometers, Optical Pyrometer. Miscellaneous m'ments: Humidity m'ment: hair hygrometer; Density m'ment: hydrometer; Liquid level m'ment, sight glass, Float gauge.	R1,R3.
4	03 Oct. To 12 Nov.	**Unit-IV: Limits, Fits & Tolerances**	Concept of Limits, Fits, and Tolerances; Selective Assembly; Interchange ability; Hole and Shaft Basis System; Taylor's Principle. Angular m'ment: Concept; Instruments For Angular m'ments; Working and Use of Universal Bevel Protractor, Sine Bar, Spirit Level; Principle of Working of Clinometers; Angle Gauges. Screw thread m'ments: ISO grade and fits of thread; Errors in threads; m'ment of different elements such as major diameter, minor diameter, effective diameter, pitch; Two wire method; Thread gauge micrometre; Working principle of floating carriage dial micrometre.	R1,R2,R3
5	13 Nov. To 02 Dec.	**Unit-V: Gear Measurement and Testing:**	Analytical and functional inspection; Rolling test; m'ment of tooth thickness; Gear tooth Vernier; Errors in gears such as backlash, run out, composite. Machine tool testing: Parallelism; Straightness; Squareness; Coaxiality; roundness; run out; alignment testing of machine tools as per IS standard procedure.	R1,R2

R1. A text book of Engineering Metrology–I.C.Gupta, Dhanpat Rai and Sons
R2. Engineering Metrology–R.K.Jain, Khanna Publishers
R3. Metrology & Measurement–Anand K.Bewoor,Vinay kulakarni, Tata Mc Graw Hill

01/08/2024.

Signature of Teacher with Date

Signature of H.O.D.

GOVT. POLYTECHNIC HAMIRPUR

LESSON PLAN FOR : MANUFACTURING ENGINEERING (SESSION: AUGUST-DEC 2024)

MECHANICAL ENGINEERING (SEMESTER - 3RD)

S.NO.	MONTH	WEEK	DATE	CONTENT PLANNED	REMARKS
1	AUGUST	1st	1,2	**UNIT-I:** Cutting Fluids & Lubricants: 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. Lathe Operations: 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.	
		2nd	5,7,8,9		
		3rd	12,14,16		
		4th	19,21,22,23		
		5th	28,29,30		
2	SEPT.	1st	2,4,5,6	**Unit-II** Broaching Machines: 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 Drilling: Classification; Basic parts and their functions; Radial drilling machine; Types of operations; Specifications of drilling machine; Types of drills and reamers.	
		2nd	9,11,12,13		
		3rd	16,18,19,20		
		4th	23,25,26,27		
		5th	30,		
3	OCT.	1st	3,4	**Unit-III** Welding: 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. Milling: Introduction; Types of milling machines: plain, Universal, vertical; constructional details	
		2nd	7,9,10,11		
		3rd	14,16,18		
		4th	21,23,24,25		
		5th	28,30		
4	NOV.	1st	1	**Unit-IV:** Gear Making: 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. Press working (derivations and problems omitted): 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.	
		2nd	4,6,7,8		
		3rd	11,13,14		
		4th	18,20,21,22		
		5th	25,27,28,29		
5	DEC.	1st	2	**Unit-V :** 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,Plating metals, applications; Hot dipping: Galvanizing, Tin coating, Parkerising, Anodizing; Metal spraying: wire process, powder process and applications; Organic coatings ;Finishing specifications.	

(Lect. Mech. Engg.)

(HOD/ME)

Govt. Polytechnic Hamirpur (H.P.)

Lecture Planning - Practical

Branch: Mechanical Engineering **Session**: Aug. - Dec.2024

Teacher: Er. Dinesh Kumar Patial, **Subject:** Measurement and Metrology Lab

Sr. No.	Dates	Practical	Detail of Contents	Reference Resources
1.	G2 – 07 & 14 Aug. G1 – 09 &16 Aug.	Practical -1	Measure the diameter of a wire using micrometer and compare the result with digital micrometer.	R1,R2
2.	G2 – 21 & 28 Aug. G1 – 23 & 30 Aug.	Practical -2	Measure the angle of the machined surface using sine bar with slip gauges.	R1,R2
3.	G2 – 04 & 11 Sep. G1 – 07 & 13 Sep.	Practical -3	Measure the angle of a V-block/Taper Shank of Drill/Dove tail using universal bevel protractor.	R1,R3
4.	G2 – 18 & 25 Sep. G1 – 20 & 27 Sep.	Practical -4	Measure the dimensions of ground MS flat/cylindrical bush using Vernier Caliper com- pare with Digital/Dial Vernier Caliper.	R1,R2,R3
5.	G2 – 18 & 25 Sep. G1 – 20 & 27 Sep.	Practical -5	Measure the geometrical dimensions of V-Thread using thread Vernier gauge.	R1,R2
6.	G2 – 09 & 16 Oct. G1 – 04 & 11 Oct.	Practical -6	Measure the thickness of ground MS plates using slip gauges.	R1,R3
7.	G2-23Oct.&06 Nov. G1 – 18 & 25 Oct.	Practical -7	Measure the surface roughness using roughness tester.	R1,R3
8.	G2 – 13 & 20 Nov. G1 – 01 & 08 Nov.	Practical -8	Measurement of geometrical parameters of components like screw, gear etc. using Tool maker's microscope/ profile projector	R1,R2

R1. A text book of Engineering Metrology–I C Gupta, Dhanpat Rai and Sons
R2. Engineering Metrology–R.K.Jain, Khanna Publishers
R3. Metrology & Measurement–Anand K Bewoor,Vinay kulakarni, Tata Mc Graw Hill

01/08/24

Signature of Teacher with Date

Signature of H.O.D.

GOVT POLYTECHNIC HAMIRPUR-177001

LESSON PLAN **Session: Aug-Dec 2024**

(Lab/Workshop)

Name of Teacher: Shalinder Singh	Designation: Workshop Superintendent (Mech. Engg.)
Name of Lab: Thermal Engineering-1 Lab	Class:3rd Sem; Group: G-I, G-II

Sr.No.	Description of Practical/Job		
		Group-I	**Group-II**
1	Flash & Fire point tests using Able's/Cleveland/Pensky Martin Apparatus	7-8-24 14-8-24	2-8-24 9-8-24
2	Calorific value tests using bomb Calorimeter (Solid and liquid fuels).	21-8-24 28-8-24	16-8-24 23-8-24
3	Assembling and disassembling of I.C. Engines	4-9-24 11-9-24	30-8-24 6-9-24
4	Study of Port timing diagram of I.C engine (Petrol/ Diesel)	18-9-24 25-9-24	13-9-24 20-9-24
5	Study of Valve timing diagram of I.C engine (Petrol/ Diesel)	9-10-24	27-9-24 4-10-24
6	Study of petrol and diesel engine components and Models	16-10-24 23-10-24	18-10-24 25-10-24
7	Study of MPFI system.	6-11-24	1-11-24
8	Study of Battery ignition system of multi cylinder petrol engine.	13-11-24	8-11-24
9	Study of Cooling system of I.C. engine.	20-11-24	22-11-24
10	Study of Lubrication system of I.C. engine.	27-11-24	29-11-24

Signature of teacher

HOD