# GOVT. POLYTECHNIC SUNDER NAGAR

**LESSON PLAN : BASIC OF MECHANICAL ENGINEERING** **(SESSION: AUGUST-DEC. 2025)**

**MECHANICAL ENGINEERING (SEMESTER - 3RD)**

| S.NO. | MONTH | WEEK | DATE | CONTENT (THEORY) | REMARKS |
|---|---|---|---|---|---|
| 1 | AUG. | 1st | 2 | **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 | 4,6,7,9 | | 9(HOLIDAY) |
| | | 3rd | 11,13,14,16 | | 16(HOLIDAY) |
| | | 4th | 18,20,21,23 | | |
| | | 5th | 25,27,28,30 | | |
| 2 | SEPT. | 1st | 1,3,4,6 | **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 | 8,10,11,13 | | 13(HOLIDAY) |
| | | 3rd | 15,17,18,20 | | |
| | | 4th | 22,24,25,27 | | |
| | | 5th | 29 | | |
| 3 | OCT. | 1st | 1,2,4 | **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. | 2(HOLIDAY) |
| | | 2nd | 6,8,9,11, | | 11(HOLIDAY) |
| | | 3rd | 13,15,16,18 | | |
| | | 4th | 20,22,23,25 | **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. | 20(HOLIDAY) |
| | | 5th | 27,29,30 | | |
| 4 | NOV. | 1st | 1 | | |
| | | 2nd | 3,5,6,8 | | 5,8(HOLIDAY) |
| | | 3rd | 10,12,13,15 | **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 | |
| | | 4th | 17,19,20,22 | | |
| | | 5th | 24,26 | | |

31/07/2025

VISHAL CHANDEL

(Lect. Mech. Engg.)

HOD(ME) 01/8/2025.

| LESSON PLAN FOR MATERIAL SCIENCE & ENGINEERING (SESSION: AUG-DEC 2025 ) MECHANICAL ENGG. 3RD SEMESTER | | | | | |
|---|---|---|---|---|---|
| S.NO. | MONTH | WEEK | DAY | PARTICULARS | REMARKS |
| 1 | Aug | 1ST | NIL | **Crystal structures and Bonds:** Unit cell and space lattice: Crystal system: The seven basic crystal systems; Crystal structure for metallic elements: BCC, FCC and HCP; Coordination number for Simple Cubic, BCC and FCC; Atomic radius: definition, atomic radius for Simple Cubic, BCC and FCC (Formula for the above terms without Derivation); Atomic Packing Factor for Simple Cubic, BCC, FCC and HCP ( derivations omitted) | |
| | | 2ND | 4,5,6,7 | | |
| | | 3RD | 11,12,13,14 | **Bonds in solids:** Classification-primary or chemical bond, secondary or molecular bond; Concept of Types of primary bonds: Ionic, Covalent and Metallic Bonds | |
| | | 4TH | 18,19,20,21 | **Phase diagrams, Ferrous metals and its Alloys:** Introduction of Isomorphs, eutectic and eutectoid systems; Iron-Carbon binary diagram; Iron and Carbon Steels. | |
| | | 5TH | 25,26,27,28 | | |
| 2 | Sept | 1ST | 1,2,3,4 | Iron ores–Pig iron: classification, composition and effects of impurities on iron ; Cast Iron: classification, composition, properties and uses; Wrought Iron: properties, uses/applications of wrought Iron; standard commercial grades of steel as per BIS and AISI; Alloy Steels – purpose of alloying; effects of alloying elements, Important alloy steels: Silicon steel, High Speed Steel(HSS),heat resisting steel, spring steel, Stainless Steel(SS) | |
| | | 2ND | 8,9,10,11 | | CT1 |
| | | 3RD | 15,16,17,18 | | |
| | | 4TH | 22,23,24,25 | **Non-ferrous metals and its Alloys:** Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel; Copper alloys: Brasses, bronzes – composition, properties and uses; Aluminum alloys: Duralumin, hindalium, magnelium | |
| | | 5TH | 29,30 | | |
| 3 | Oct | 1ST | 1 | composition, properties and uses; Nickel alloys: Inconel, monel, nicrome – composition, properties and uses. Anti-friction/Bearing alloys: Various types of bearing, bronzes-Standard commercial grades as per BIS/ASME. | |
| | | 2ND | 6,8,9 | **Failure analysis & Testing of Materials:** Introduction to failure analysis;Fracture: ductile fracture, brittle fracture; cleavage; notch sensitivity; fatigue; concept of endurance limit; concept of creep; creep curve; creep fracture; Destructive testing: Tensile testing; compression testing. | |
| | | 3RD | 13,14,15,16 | | CT2 |
| | | 4TH | 21,22,23 | Hardness testing: Brinell, Rockwell; bend test; torsion test; fatigue test; creep test; Non-destructive testing: Visual Inspection; magnetic particle inspection; liquid penetrant test; ultrasonic inspection; radiography | |
| | | 5TH | 27,28,29,30 | | |
| 4 | Nov | 1ST | NIL | **Corrosion & Surface Engineering:** Nature of corrosion and its causes;;Electrolytes; Factors affecting corrosion: Environment, Material properties andphysical conditions; Types of corrosion; Corrosion control: Material selection, environment control; | |
| | | 2ND | 3,4,6 | | HT |
| | | 3RD | 10,11,12,13 | Surface engineering processes: Coatings and surface treatments; Cleaning and mechanical finishing of surfaces; Electroplating and Special metallic plating; Electro polishing and photo-etching;–Conversion coatings: Oxide, phosphate and chromate coatings; Thin film coatings: PVD and CVD; Hard-facing, thermal spraying and high-energy processes. | |
| | | 4TH | 17,18,19,20 | | |
| | | 5TH | 24,25,26 | | |

Prepared by
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Approved by
Er. F.H.Kazmi
HOD, MED
01/08/2025

# LESSON PLAN

**Name of the teacher**: *Farah Naaz Kazmi*

**Subject:** *MEASUREMENT & METROLOGY*
**Sem:** 3rd Sem, Mech Engg. (Aug - Dec 2025).

| S.No. | Month | Date | Name of the chapter | Contents to be taught |
|---|---|---|---|---|
| 1 | Aug | 1 - 8 | UNIT I | **INTRODUCTION TO MEASUREMENT:** Def.of measurement, signifiance, methods, standards of measurement. |
| | | 11- 14 | | Factors influencing selection of measuring inst.Terms applicable to measu. Inst.Errors and its classification. |
| | | 18 - 23 | | **MEASURING INSTRUMENTS:**Thread measurement, Thread gauge micrometer, angle measurement. Bevel Protector,Sine bar, Gauges, Comparators, Surface finish. |
| | | 25 - 30 | UNIT II | **TRANSDUCERS & STRAIN GAUGES:** Introduction, Characteristics of transducers. |
| 2 | Sept. | 1 - 6 | | Classification of transducers,Strain measurement,Strain gauge. |
| | | 8 - 12 | | **MEASUREMENT OF FORCE, TORQUE AND PRESSURE:** Intro: Force measurement, Spring Balance,load cell. Torque measurenent. Pressure measurement. |
| | | 15 - 20 | UNIT III | **APPLIED MECHANICAL MEASUREMENTS:** Speed measurement: Classification of tachometer, Revolution counters, Eddy current tachometers. |
| | | 22 - 30 | | Displacenent measurement: Linear variable Diff. transformers (LVDT), Flow measurement, Temperature measurement |
| 3 | Oct. | 1 - 4 | | **MISCELLANEOUS MEASUREMENTS:** Humidity measurement,density measurement,liquid level measurement. |
| | | 6 - 10 | UNIT IV | **LIMITS, FITS & TOLERANCES:** Concept, Selective assembly,Interchangeability, hole and shaft basis system. |
| | | 13 - 18 | | Taylor's Principal. **ANGULAR MEASUREMENT:** Concept, Instruments for angular angular measurement, Principle of Clinometers, Angle gauges. |
| | | 20 - 25 | | **SCREW THREDA MEASUREMENTS:** ISO grades and fits of threads, Errors in threads.Measurement of elements ot threads. |
| | | 27 - 31 | | Thread gauge mocrometer, working Principle of Floating carriage dial micrometer. |
| 4 | Nov. | 1 - 7 | UNIT V | **GEAR MEASUREMENT & TESTING:** Analytical and physical inspection, Rolling test,Measurement of tooth thickness. |
| | | 10 - 15 | | Gear tooth vernier, Errors in gear. **MACHINE TOOL TESTING:** Parallesim, Straightness Squareness. |
| | | 15 - 26 | | Coaxiallity, roundness run out alignment testing of machine as per IS standard procedure. |
| | | | | **REVISION.** |

Teacher
01/08/2025
(F.N. Kazmi, HOD MECH.)

# GOVT. POLYTECHNIC SUNDERNAGAR

LESSON PLAN : MANUFACTURING ENGINEERING (SESSION: AUG.-NOV. 2025)

MECHANICAL ENGINEERING (SEMESTER - 3RD)

| S.NO. | MONTH | WEEK | DATE | CONTENT (THEORY) | REMARKS |
|---|---|---|---|---|---|
| 1 | AUG. | 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 | | |
| | | 3rd | 12,14 | | |
| | | 4th | 19,21,22,23 | | |
| | | 5th | 26,28,29,30 | **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. | |
| 2 | SEPT. | 1st | 2,4,5,6 | | |
| | | 2nd | 9,11,12 | | |
| | | 3rd | 18,19,20 | **Unit-III: Welding:** Classification; Gas welding techniques; Types of welding flames; Arc Welding –Principle, Equipment, Applications; Shielded metal arc welding; 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 – specifications; Milling operations: simple, compound and differential indexing (No Numerical); Milling cutters –types; Teeth materials; Tool signature in ASA; Tool & work holding devices. | |
| | | 4th | 23,25,26,27 | | |
| | | 5th | 30 | | |
| 3 | OCT. | 1st | 3,4 | | |
| | | 2nd | 9,10 | **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 die shoe, guide pin, bolster plate, stripper, stock guide, feed stock, pilot; Punch and die clearances for blanking and piercing, effect of clearance. | |
| | | 3rd | 14 | | |
| | | 4th | 21,23,24,25 | | |
| | | 5th | 28,30,31 | | |
| 4 | NOV. | 1st | 1 | | |
| | | 2nd | 4,6,7 | **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. | |
| | | 3rd | 11,13,14,15 | | |
| | | 4th | 18,20,21,22 | | |
| | | 5th | 25 | | |

Workshop Supdt.

HOD (ME) 01/8/2025

GOVT. POLYTECHNIC SUNDERNAGAR

LESSON PLAN

SUBJECT : THERMAL ENGINEERING - I | SESSION:- AUG.2025 - DEC. 2025

TRADE: MECHANICAL ENGINEERING | SEMESTER :- 3RD

| S.NO. | MONTH | WEEK | DATE | CONTENT | REMARKS |
|---|---|---|---|---|---|
| 1 | AUG. | 1st | 4,5,6,7 | **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 | 11,12,13,14 | | |
| | | 3rd | 18,19,20,21 | | |
| 2 | | 4th | 25,26,27,28 | **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. | |
| | SEPT | 1st | 1,2,3,4 | | |
| | | 2nd | 8,9,10,11 | | 1st CLASS TEST |
| | | 3rd | 15,16,17,18 | | |
| 3 | | 4th | 22,23,24,25 | **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. | |
| | | 5th | 29,30 | | |
| | OCT. | 1st | 1,2 | | |
| | | 2nd | 6,7,8,9 | | |
| 4 | | 3rd | 13,14,15,16 | **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. | 2nd CLASS TEST |
| | | 4th | 20,21,22,23 | | |
| | | 5th | 27,28,29,30 | | |
| 5 | NOV. | 1st | 3,4,5,6 | **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 AirConditioner; Summer Air-Conditioning system, Winter Air-Conditioning system, Year-round Air Conditioning system, Central air conditioning system. | |
| | | 2nd | 10,11,12,13 | | HOUSE TEST |
| | | 3rd | 17,18,19,20 | | |
| | | 4th | 24,25,26 | | |

LOVE KISHORE
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H.O.D
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01/8/2025

GOVT. POLYTECHNIC SUNDERNAGAR

LESSON PLAN

SUBJECT : THERMAL ENGINEERING - I (LAB) SESSION:- AUG.2025- DEC. 2025

TRADE: MECHANICAL ENGINEERING SEMESTER :- 3RD

| S.NO. | MONTH | WEEK | DATE | | CONTENT | REMARKS |
|---|---|---|---|---|---|---|
| | | | G-I | G-II | | |
| 1 | AUG. | 1st | | 1 | Introduction | |
| | | 2nd | 7 | 8 | Introduction | |
| | | 3rd | 14 | 15 | I Flash & Fire point tests using Able's/Cleveland/Pensky Martin Apparatus | |
| | | 4th | 21 | 22 | I Flash & Fire point tests using Able's/Cleveland/Pensky Martin Apparatus | |
| | | 5th | 28 | 29 | II Calorific value tests using bomb Calorimeter ( Solid and liquid fuels). | |
| 2 | SEPT. | 1st | 4 | 5 | III Assembling and disassembling of I.C. Engines | |
| | | 2nd | 11 | 12 | III Assembling and disassembling of I.C. Engines | 1st CLASS TEST |
| | | 3rd | 18 | 19 | IV Study of Port timing diagram of I.C engine(Petrol/ Diesel) | |
| | | 4th | 25 | 26 | IV Study of Port timing diagram of I.C engine(Petrol/ Diesel) | |
| 3 | OCT. | 1st | 2 | 3 | V Study of Valve timing diagram of I.C engine(Petrol/ Diesel) | |
| | | 2nd | 9 | 10 | VI Study of petrol and diesel engine components and Models | |
| | | 3rd | 16 | 17 | VII Study of MPFI system. | 2nd CLASS TEST |
| | | 4th | 23 | 24 | VIII Study of Battery ignition system of multi cylinder petrol engine. | |
| | | 5th | 30 | 31 | VIII Study of Battery ignition system of multi cylinder petrol engine. | |
| 4 | NOV. | 2nd | 6 | 7 | IX Study of Cooling system of I.C. engine. | HOUSE TEST |
| | | 3rd | 13 | 14 | X Study of Lubrication system of I.C. engine. | |
| | | 4th | 20 | 21 | X Study of Lubrication system of I.C. engine. | |

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| LESSON PLAN FOR - MEASUREMENTS & METROLOGY LAB (SESSION :- AUG -DEC 2025) | | | | | |
|---|---|---|---|---|---|
| MECHANICAL ENGINEERING (SEMESTER - 3RD) | | | | G1 | |
| S.NO. | MONTH | WEEK | DATE | DESCRIPTION OF PRACTICAL / JOB | REMARKS |
| 1 | AUG | 1st | ~ | ~~~ | |
| | | 2nd | 8 | Introduction | |
| | | 3rd | ~ | ~~~ | |
| | | 4th | 22 | Measure the diameter of a wire using micrometer and compare the result with digital micrometer | 1 |
| | | 5th | 29 | Measure the angle of the machined surface using sine bar with slip gauges. | 2 |
| 2 | SEPT | 1st | 5 | Measure the angle of a V-block/Taper Shank of Drill/Dove tail using universal bevel protractor | 3 |
| | | 2nd | 12 | Continue | |
| | | 3rd | 19 | Measure the dimensions of ground MS flat/cylindrical bush using Vernier Caliper com- pare with Digital/Dial Vernier Caliper. | 4 |
| | | 4th | 26 | Continue | |
| | | 5th | ~ | ~~~ | |
| 3 | OCT | 1st | 3 | Measure the geometrical dimensions of V-Thread using thread Vernier gauge. | 5 |
| | | 2nd | 10 | Measure the thickness of ground MS plates using slip gauges | 6 |
| | | 3rd | ~ | Diwali Vacation | |
| | | 4th | 24 | Continue | |
| | | 5th | 31 | Measure the surface roughness using roughness tester. | 7 |
| 4 | NOV | 1st | ~ | ~~~ | |
| | | 2nd | 7 | House Test | |
| | | 3rd | 14 | Measurement of geometrical parameters of components like screw, gear etc. using Tool makers microscope/ profile projector. | 8 |
| | | 4th | 21 | Continue | |
| | | 5th | ~ | ~~~ | |

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01/8/2025