UCPES, BERHAMPUR

LESSON PLAN

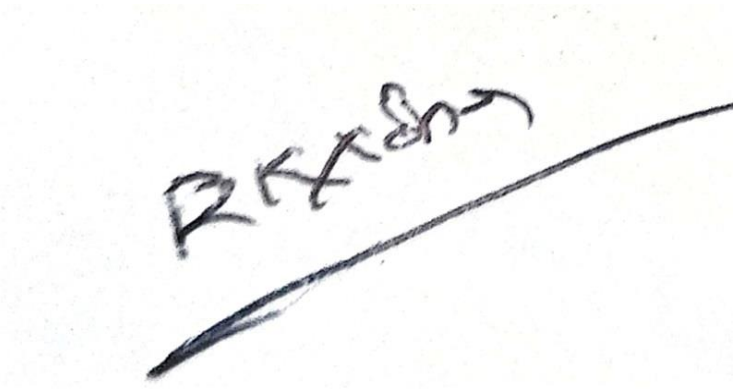
Session (2025-2026)

Discipline: Mechanical Engineering	**Semester:** 3rd, Winter/2025	**Name of the Teaching Faculty:** RAMA KRISHNA SAHU LECTURE STAGE-II DEPARTMENT OF MECHANICAL ENGINEERING
Subject: **MEPC209** Manufacturing Processes, Theory-1	**No. of Days/Week:** 03	**Start Date:** 11/07/2025 **End Date:** 15/11/2025

Week	Class Day	Theory Topics
1st	1st	**Cutting Fluids & Lubricants:** Introduction; Types of cutting fluids,
	2nd	Fluids and coolants required in turning, drilling, shaping, sawing & broaching;
	3rd	Selection of cutting fluids, methods of application of cutting fluid;
2nd	1st	Classification of lubricants (solid, liquid, gaseous),
	2nd	Properties and applications of lubricants
	3rd	**Lathe Operations:** Types of lathes – light duty, medium duty and heavy duty geared lathe,
3rd	1st	CNC lathe; Specifications; Basic parts and their functions;
	2nd	Operations and tools – Turning, parting off, Knurling, facing, Boring, drilling, threading, step turning, taper turning,
	3rd	Operations and tools – Turning, parting off, Knurling, facing, Boring, drilling, threading, step turning, taper turning, -continue
4th	1st	Nomenclature of single point cutting tool of lathe.
	2nd	**Broaching Machines:** Introduction to broaching;
	3rd	Types of broaching machines – Horizontal type (Single ram & duplex ram), Vertical type, pull up, pull down, and push down;

5th	1st	Types of broaching machines – Horizontal type (Single ram & duplex ram), Vertical type, pull up, pull down, and push down; -continue
	2nd	Elements of broach tool;
	3rd	broach teeth details; Nomenclature; Tool materials.
6th	1st	**Drilling:** Classification;
	2nd	Basic parts and their functions; Radial drilling machine;
	3rd	Types of operations; Specifications of drilling machine;
7th	1st	Types of drills and reamers.
	2nd	**Welding:** Classification; Gas welding techniques;
	3rd	Types of welding flames; Arc Welding – Principle, Equipment, Applications;
8th	1st	Shielded metal arc welding; Submerged arc welding;
	2nd	TIG / MIG welding
	3rd	Resistance welding - Spot welding, Seam welding, Projection welding;
9th	1st	Welding defects; Brazing and soldering: Types, Principles, Applications
	2nd	**Milling:** Introduction; Types of milling machines:
	3rd	Plain, Universal, vertical; constructional details – specifications;
10th	1st	Milling operations: simple, compound and differential indexing; Milling cutters – types; Nomenclature of teeth; Teeth materials; Tool signature of milling cutter; Tool & work holding devices.
	2nd	**Gear Making:** Manufacture of gears – by Casting, Moulding, Stamping, Coining Extruding,
	3rd	Rolling, Machining; Gear generating methods: Gear Shaping with pinion cutter & rack cutter;
11th	1st	Gear hobbing; Description of gear hob;
	2nd	Operation of gear hobbing machine; Gear finishing processes;
	3rd	Gear materials and specification; Heat treatment processes applied to gears
12th	1st	**Press working:** Types of presses and Specifications,
	2nd	Press working operations - Cutting, bending, Drawing, punching, blanking, notching, lancing;

	3rd	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.
13th	1st	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. -continue
	2nd	**Grinding and finishing processes:** Principles of metal removal by Grinding
	3rd	Abrasives – Natural & Artificial; Bonds and binding processes: Vitrified, silicate, shellac, rubber, Bakelite; Factors affecting the selection of grind wheels: size and shape of wheel
14th	1st	kind of abrasive, grain size, grade and strength of bond, structure of grain, spacing, kinds of bind material; Standard marking systems: Meaning of letters & numbers sequence of marking,
	2nd	Grades of letters; Grinding machines classification-: Cylindrical, Surface
	3rd	Tool & Cutter grinding machines; Construction details; Principle of centerless grinding; Advantages & limitations of centerless grinding; Finishing by grinding:
15th	1st	Honing, Lapping, Super finishing; Electroplating: Basic principles, Plating metals, applications; Hot dipping: Galvanizing,
	2nd	Tin coating, Parkerizing, Anodizing; Metal spraying: wire process,
	3rd	powder process and applications; Organic coatings: Oil base Paint, Lacquer base, Enamels, Bituminous paints, rubber base coating; Finishing specifications.



Signature of Concerned Teacher

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR

LESSONPLAN

SESSION-2025-26

SUBJECT: STRENGTH OF MATERIAL (THEORY- 02)

DEPARTMENT OF

MECHANICAL ENGINEERING

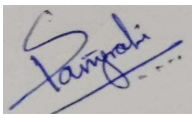
Discipline: Mechanical Engineering	Semester:3rd	Name of the Teaching Faculty: DEBASHISH BISI
Subject (Th-2): Strength of Material	No of Days/Week Class Allotted: 03	No of Week: 15
Week	**Class/Day**	**Theory/Practical Topics**
1st	1st	**CH.1 Simple Stresses and Strains:** Types of forces
	2nd	Stress, Strain and their nature
	3rd	Mechanical properties of common engineering materials
2nd	1st	Significance of various points on stress – strain diagram for M.S. specimens
	2nd	Significance of various points on stress – strain diagram for C.I. specimens
	3rd	Significance of factor of safety
3rd	1st	Elastic constants. Relation between elastic constants
	2nd	Stress and strain values in bodies of uniform section under the influence of normal forces
	3rd	Stress and strain values in bodies of of composite section under the influence of normal forces
4th	1st	Thermal stresses in bodies of uniform section& composite sections
	2nd	Related numerical problems on the above topics.
	3rd	**Strain Energy:** Strain energy or resilience, proof resilience and modulus of resilience; Derivation of Strain energy for the Gradually applied load,
5th	1st	Derivation of Strain energy for the Suddenly applied load , Impact/ shock load
	2nd	Related numerical problems
	3rd	**CH.2 Shear Force & Bending Moment Diagrams:** Types of beams with examples: a)Cantilever beam, b)Simply supported beam, c)Overhanging beam, d)Continuous beam, e) Fixed beam; Types of Loads – Point load, UDL and UVL
6th	1st	Definition and explanation of shear force and bending moment; Calculation of shear force and bending moment
	2nd	Drawing the S.F and B.M. diagrams by the analytical method only for Cantilever with point loads and uniformly distributed load
	3rd	Drawing the S.F and B.M. diagrams by the analytical method only for Simply supported beam with point loads, UDL
7th	1st	Drawing the S.F and B.M. diagrams by the analytical method only for Cantilever with point loads,
	2nd	Drawing the S.F and B.M. diagrams by the analytical method Overhanging beam with point loads at the centre & at free ends,

	3rd	Drawing the S.F and B.M. diagrams by the analytical method Over hanging beam with UDL throughout Combination of point and UDL for the above; Related numerical problems.
8th	1st	**CH.3. Theory of Simple Bending and Deflection of Beams:** Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress, Radius of curvature
	2nd	Assumptions in theory of simple bending;
	3rd	Bending Equation M/I =σ/Y=E/R with derivation
9th	1st	Problems involving calculations of bending stress, modulus of section and moment of resistance; Calculation of safe loads and safe span and dimensions of cross- section
	2nd	Definition and explanation of deflection as applied to beams
	3rd	Deflection formulae without proof for cantilever and simply supported beams with point load only (Standard cases only);
10th	1st	Deflection formulae without proof for cantilever and simply supported beams with UDL only (Standard cases only);
	2nd	Related numerical problems.
	3rd	**Ch iv. Torsion in Shafts and Springs:** Definition and function of shaft
11th	1st	Calculation of polar M.I. for solid shafts & hollow shafts
	2nd	Assumptions in simple torsion. Derivation of the equation $T/J=f_S/R= G\theta/L$
	3rd	Problems on design of shaft based on strength and rigidity
12th	1st	Numerical Problems related to comparison of strength and weight of solid and hollow shafts
	2nd	Numerical Problems related to comparison of strength and weight of solid and hollow shafts
	3rd	Classification of springs; Nomenclature of closed coil helical spring
13th	1st	Deflection formula for closed coil helical spring (without derivation);
	2nd	stiffness of spring
	3rd	Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
14th	1st	Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
	2nd	**Unit-V: Thin Cylindrical Shells:** Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell;
	3rd	Derivation of expressions for the Longitudinal and hoop stress for seamless
15th	1st	Derivation of expressions for the Longitudinal and hoop stress for seamshells
	2nd	Related numerical Problems for safe thickness and safe working pressure
	3rd	*Previous year question discussion.*

LESSON PLAN OF MECHANICAL ENGINEERING DEPARTMENT WINTER 2025

Discipline: MECHANICAL		Semester: 3rd	Name of Faculty: Sushri Priyanka Panigrahi	
Subject: Theory-4 Fluid Mechanics & Fluid Power		No of Days per week class allotted	Semester From: 14th July to 11th November 2025	
Week	**Class No**	**Class days**	**Chapter**	
1st	1	1st	1	Definition of a fluid, classification of fluids, various fluid prop
	2	2nd		viscosity and surface tension and state the units
	3	3rd		fluid pressure, total pressure (hydrostatic force) and locatio
2nd	4	1st		Hydro-static force on horizontal and inclined surfaces by fluid
	5	2nd		Hydro-static force oncurved surfaces by fluid
	6	3rd		working of various measuring devices for pressure, the prin
3rd	7	1st		simple, differential and inverted types of manometer
	8	2nd		principle of buoyancy and floatation.
	9	3rd		Simple numericals on Manometer
4th	10	1st	2	Various types of flow, circulation and vorticity, stream-line,
	11	2nd		Bernoulli's theorem, the limitations of same-application of B
	12	3rd		the working of venturimeter, pitot tube, equation of flow rat
5th	13	1st		The working ofpitot tube
	14	2nd		the working of flowmeter: current meter
	15	3rd		Simple numericals
6th	16	1st	3	Definition –orifice, orifice coefficient such as Cc, Cv, Cd, Relat
	17	2nd		weir and notch, Discharge over rectangular notch and weir,
	18	3rd		Discharge overtriangular notch
7th	19	1st		Simple numericals
	20	2nd		Definition of a pipe. laws of fluid friction, Equation of loss of
	21	3rd		hydraulic gradient and total energy line, Nozzle and its appli
8th	22	1st		Power transmission through nozzle
	23	2nd		The condition of maximum power transmission through noz
	24	3rd		Expression for diameter of nozzle for maximum power trans
9th	25	1st	4	Classification of hydraulic turbines, Selection of turbine on t
	26	2nd		Francis and Kaplan turbines. Draft tubes – types and constru
	27	3rd		Calculation of Work done, Power, efficiency of turbines. Sim
10th	28	1st		Centrifugal Pumps: Principle of working and applications, Ty
	29	2nd		Concept of multistage, Priming andits methods,
	30	3rd		Manometric head, Work done
11th	31	1st		Manometric efficiency, Overall efficiency, Simple numericals
	32	2nd		Reciprocating Pumps: Construction, working principle and a acting reciprocating pumps
	33	3rd		Construction, working principle and applications of doubleac
12th	34	1st		Concept of Slip, Negative slip,
	35	2nd		Cavitation and separation
	36	3rd		Simple numericals
13th	37	1st	5	Definition of fluid power, classification – hydraulic power an

	38	2nd		Hydraulic Systems -Basic principle of enclosed hydraulic s
	39	3rd		direction control valves, flow control valves, actuators (lin
14th	40	1st		accumulator, pipes and fittings
	41	2nd		various positive displacement pumps-gear
	42	3rd		vane, piston
15th	43	1st		drawing of hydraulic circuits - extension of linear actuator
	44	2nd		drawing of hydraulic circuits - retraction of linear actuato
	45	3rd		motion of rotary actuator, holding a job, hydraulic press e



Signature of the faculty

UCPES, BERHAMPUR

LESSON PLAN

Session (2025-2026)

Discipline: Mechanical Engineering	**Semester:** 3rd, Winter/2025	**Name of the Teaching Faculty:** HADU BANDHU DAKUA LECTURE STAGE-I MECHANICAL ENGINEERING DEPARTMENT
Subject: **MEPC209** **Thermal Engineering-I**, Theory-5	**No. of Days/Week:** 03	**Start Date:** 11/07/2025 **End Date:** 15/11/2025

Week	Class Day	Theory Topics
1st	1st	Introduction to Thermodynamics: Thermodynamic Systems (closed, open, isolated)
	2nd	Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy ;, Internal energy and units of measurement)
	3rd	Intensive and extensive properties; Define thermodynamic processes, path, cycle, state, path function, point function.
2nd	1st	Thermodynamic Equilibrium; Quasi-static Process; Laws of thermodynamics (statements only)
	2nd	Sources of Energy: Brief description of energy Sources: Classification of energy sources.
	3rd	Renewable, Non-Renewable; Fossil fuels (CNG & LPG)
3rd	1st	Solar Energy: Flat plate and concentrating collectors
	2nd	& its applications (working principles of Solar Water Heater, Photovoltaic Cell,
	3rd	Solar Distillation); Definitions of Wind Energy
4th	1st	Tidal Energy; Ocean Thermal Energy; Geothermal Energy; Biogas, Biomass, Bio-diesel; Hydraulic Energy, Nuclear Energy; Fuel cell.
	2nd	Internal Combustion Engines: Assumptions made in air standard cycle analysis;
	3rd	Brief description of Carnot, Otto.

5th	1st	and Diesel cycles with P-V and T-S diagrams.
	2nd	Internal and external combustion engines; advantages of I.C. engines over external combustion engines
	3rd	classification of I.C. engines; neat sketch of I.C. engine indicating component parts;
6th	1st	Function of each part and materials used for the component parts - Cylinder, crank case, crank pin, crank, crank shaft, connecting rod, wrist pin, piston
	2nd	cooling pins cylinder heads, exhaust valve, inlet valve; Working of four-stroke and two stroke petrol and diesel engines:
	3rd	Comparison of two stroke and four stroke engines
7th	1st	Comparison of C.I. and S.I. engines; Valve timing and port timing diagrams for four stroke and two stroke engines
	2nd	I.C. Engine Systems: Fuel system of Petrol engines; Principle of operation of simple and Zenith carburetors.
	3rd	Fuel system of Diesel engines; Types of injectors and fuel pumps;
8th	1st	Cooling system: air-cooling, water-cooling system with thermo siphon method of circulation and water cooling system with radiator and forced circulation n.
	2nd	and water-cooling system with radiator and forced circulation.
	3rd	Comparison of air cooling and water-cooling system;
9th	1st	Ignition systems – Battery coil ignition and magneto ignition
	2nd	Comparison of two systems; Types of lubricating systems used in I.C. engines with line diagram;
	3rd	Types of governing of I.C. engines – hit and miss method, quantitative method,
10th	1st	qualitative method and combination methods of governing; their applications; Objective of super charging
	2nd	Performance of I.C. Engines: Brake power; Indicated power;
	3rd	Frictional power; Brake and Indicated mean effective pressures;
11th	1st	Brake and indicated thermal efficiencies.
	2nd	Mechanical efficiency;
	3rd	Relative efficiency.
12th	1st	Performance test;
	2nd	Morse test;
	3rd	Heat balance sheet.
13th	1st	Methods of determination of B,P., I.P. and F.P.; Simple numerical problems on performance of I.C. engines
	2nd	Air Compressors: Functions of air compressor; Uses of compressed air;
	3rd	Types of air compressors; Single stage reciprocating air compressor.

14th	1st	its construction and working (with line diagram) using P-V diagram.
	2nd	Multi stage compressors – Advantages over single stage compressors;
	3rd	Rotary compressors: Centrifugal compressor, axial flow type compressor and vane type compressors
15th	1st	Refrigeration & Air-conditioning: Refrigeration; Refrigerant, COP;
	2nd	Air Refrigeration system: components, working & applications; Vapour Compression system: components, working & applications; Air conditioning;
	3rd	Classification of Air- conditioning systems; Comfort and Industrial Air-Conditioning; Window Air- Conditioner; Summer Air-Conditioning system, Winter Air-Conditioning system, Year-round Air-Conditioning system.

Signature of Concerned teacher