

GOVT.POLYTECHNICMAYURBHANJ ,LESSONPLAN-2026/27(WINTER)

MECHATRONS ENGG.		Semester:3rdSem	Name of theTeachingFaculty: Shiba Kumar Patra	
SUBJECT:MECHANI CS AND MATERIALS		No.of Days/Perweek classallotted:03	SemesterFromdate:15.07.2026ToDate:5.11.2026	
MONTH	Week	DAY	TOPIC	
JULY	4TH	2ND	Mechanical properties of materials: Engineering materials – Ferrous and non ferrous materials - Definition of mechanical properties such as strength –elasticity, plasticity, ductility, malleability, stiffness, toughness, brittleness, hardness, wear resistance, machinability, castability and weldability	
		4TH	Alloying elements-effect of alloying element Fatigue, fatigue strength, creep –temperature creep – cyclic loading and repeated loading – endurance limit	
	5TH	1ST	Simple stresses and strains: Definition – Load, stress and strain – Classification of force systems – tensile, compressive and shear force systems	
		2ND	Behavior of mild steel in tension up to rupture – Stress – Strain diagram – limit of proportionality – elastic limit – yield stress – breaking stress – Ultimate stress – percentage of elongation and percentage reduction in area	
		4TH	Hooke's law – Definition – Young's modulus - working stress, factor of safety, load factor, shear stress and shear strain - modulus of rigidity.	
	AUGUST	2ND	1ST	Linear strain – Deformation due to tension and compressive force – Simple problems in tension, compression and shear force.
2ND			Definition – Lateral strain – Poisson's ratio – volumetric strain – bulk modulus – volumetric strain of rectangular and circular bars	
4TH			problems connecting linear, lateral and volumetric deformation – Elastic constants and their relationship -Problems on elastic constants	
3RD		1ST	Definition – Composite bar – Problem in composite bars subjected to tension and compression	
		2ND	Properties of sections: Definition – center of gravity and centroid - position of centroids of plane geometrical figures such as rectangle, triangle, circle and trapezium	
		4TH	problems to determine the centroid of angle, channel, T and I sections only	
4TH		1ST	Definition-centroidal axis-Axis of symmetry. Moment of Inertia –Statement of parallel axis theorem and perpendicular axis theorem	
		2ND	Moment of Inertia of lamina of rectangle, circle, triangle, I and channel sections	
		4TH	Definition-Polar moment of Inertia-radius of gyration – Problems computing moment of inertia and radius of gyration for angle, T, Channel and I sections	
5TH		1ST	Thin Shells: Definition – Thin and thick cylindrical shell – Failure of thin cylindrical shell subjected to internal pressure	
		2ND	Derivation of Hoop and longitudinal stress causes in a thin cylindrical shell subjected to internal pressure	
6TH		1ST	simple problems – change in dimensions of a thin cylindrical shell subjected to internal pressure	
SEPTEMBER		1ST	2ND	problems – Derivation of tensile stress induced in a thin spherical shell subjected to internal pressure
			4TH	simple problems – change in diameter and volume of a thin spherical shell due to internal pressure – problems
		2ND	1ST	Classification of beams: Definition – shear force and Bending moment – sign conventions for shear force and bending moment
	2ND		types of loadings –Relationship between load, force and bending moment at a section	
	3RD	4TH	shear force diagram and bending moment diagram of cantilever and simply supported beam subjected to point load and uniformly distributed load (udl)	
		4TH	Determination of Maximum bending moment in cantilever beam and simply supported beam when they are subjected to point load and uniformly distributed load.	
	4TH	1ST	Theory of simple bending – Assumptions – Neutral axis – bending stress distribution – moment of resistance – bending equation – $M/I=f/y=E/R$	
		2ND	Definition – section modulus - rectangular and circular sections – strength of beam – simple problems involving flexural formula for cantilever and simple supported beam	
		4TH	Theory of torsion – Assumptions – torsion equation – strength of solid and hollow shafts – power transmitted	
	5TH	1ST	Definition – Polar modulus – Torsional rigidity – strength and stiffness of shafts – comparison of hollow and solid shafts in weight and strength considerations	
OCTOBER	1ST	2ND	Advantages of hollow shafts over solid shafts – Problems.	
		4TH	Types of springs: Laminated and coiled springs and applications – Types of coiled springs – Difference between open and closely coiled helical springs	
	2ND	1ST	closely coiled helical spring subjected to an axial load	
		2ND	problems to determine shear stress, deflection, stiffness and resilience of closed coiled helical springs	
		4TH	Friction: Definition – force of friction – limiting friction- static – dynamic friction	
	1ST	angle of friction – co-efficient of friction – cone of friction		

OCT		2ND	laws of static and dynamic friction
	3RD	4TH	Gear drives: Introduction – classification of gears
	4TH	4TH	Nomenclature of a gear
		1ST	Explanation and application of Spur, Helical and Bevel gears, Worm and Worm wheel, rack and pinion
		2ND	Velocity ratio of a gear drive
NOVEMBER	5TH	4TH	merits and demerits of gear drive
		1ST	Problems on simple gear train and power transmitted by gear
		2ND	Belt drives: Belt Drive – types – open belt drive – Cross Belt drive – Flat belt drive
	1st	4TH	V Belt drive – Problems on Power transmitted

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