

कार्यालय प्राचार्य, शासकीय पॉलीटेक्निक जशपुर (छ.ग.)

ग्राम-झरगोव, पोस्ट- मोलेग, तह. जशपुर, जिला- जशपुर (छ.ग.) पिन कोड -490338

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LESSON PLAN SESSION JAN – JULY 2025

SUBJECT: Theory of Machine

SEMESTER: 4th

BRANCH: - MECHANICAL ENGINEERING

UNIT NUMBER	NAME OF THE TOPIC	NO OF CLASS REQUIRED	REMARK
UNIT 01: Popular Planar Mechanisms	1.1 Kinematics of Machines: Introduction to Statics, Kinematics, Kinetics, Dynamics. Mechanism and machine, rigid and resistant bodies, Kinematic links, joints, pairs, chain and its types, degree of freedom, Constrained motion and its types.	03	
	1.2 Four link planar mechanisms and Inversions: (i) Four bar chain: Locomotive coupler, Beam engine and Pantograph. (ii) Single slider Crank chain: Pendulum pump, Rotary I.C. engine mechanism, Oscillating cylinder engine, Whitworth quick return mechanism, Quick return mechanism of shaper. (iii) Double Slider chain: Scotch Yoke mechanism, Elliptical trammels, Oldham's Coupling.	05	
	2.1 Concept of relative velocity and relative acceleration of a point on a link, angular acceleration, inter- relation between linear and angular velocity and acceleration.	01	
Unit 02: Velocity and Acceleration in Mechanisms	2.2 Analytical method and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.	02	
	2.3 Velocity and acceleration diagrams for simple mechanisms.	06	
	2.4 Determination of velocity and acceleration of point on link by relative velocity method (Excluding Coriollis component of acceleration)	02	
	2.5 Mechanical advantage calculation.	01	
Unit 03: Application of Friction	3.1 Clutches: Classification, Functions and Applications, Construction and principle of working of i. Single-plate clutch, ii. Multi-plate clutch, iii. Centrifugal Clutch iv. Cone clutch v. Diaphragm clutch.	03	
	3.2 Calculation of power loss assuming uniform pressure and uniform wear theory.	03	

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	3.3&3.4 Brakes: Functions, Types, Applications		
	Construction and working principle of i. Shoe brake ii. Band brake iii. Internal expanding shoe brake iv. Disc Brake	03	
	3.5 Braking force, braking torque and power for Shoe and band brake.	01	
	3.6 Dynamometer: Meaning need and type.	02	
	3.7 Bearings: Classification of bearings – rolling contact and sliding contact bearings, types of rolling contact bearings and types of sliding contact bearings, advantages and disadvantages of rolling and sliding contact bearing and their application, Designation of bearings.	03	
Unit 04: Cams and Followers	4.1 Introduction to Cams and Followers. Cam and follower terminology. Classification of Cams and Followers. Applications of Cams and Followers.	01	
	4.2 Types of follower motions-uniform velocity, uniform acceleration and S.H.M and their displacement, velocity and acceleration diagrams	04	
	4.3 Drawing of profile of a radial cam based on given motion of reciprocating knife- edge and roller follower with and without offset.	03	
Unit 05: Power Transmission	5.1 Belt Drives – Introduction to Flat belt, V-belt & its applications, materials used for flat and V- belts. Introduction of timing belt and pulley. Angle of lap, length of belt, Slip and creep. Determination of velocity ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission. Merits, demerits and selection of belts for given applications.	02	
	5.2 Chain Drives – Introduction to chain drives, Types of chains and sprockets, Methods of lubrication. Merits, demerits and selection of chains for given applications.	01	
	5.3 Gear Drives – Introduction to gear drives, Classification of gears, Law of gearing, gear terminology,	02	
	5.4 Gear trains- Types of gear, simple, compound, reverted and epicyclic gear train. Computation of velocity ratio in gear train.	03	

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Unit 06: Flywheel and Governors	6.1 Dynamics of reciprocating engine mechanism, inertia force due to reciprocating mass.	02	
	6.2 Piston effort, crank effort, turning moment of crank shaft.		
	6.3 Fluctuation of energy and speed, coefficient of fluctuation of energy and speed. (No derivation)		
	6.4 Principle and application of flywheel.		
Flywheel and Governors	6.5 Governor- Function of governor and its comparison with flywheel.	03	
	6.6 Classification of governor, Watt, Porter, Proell, Hartnell governor their construction and working.		
	6.7 Equation for lift of governors. (No derivation)		
	6.8 Terms related to governor like Sensitivity, stability, Isochronous, Governor effort and power. (No derivation)		
Unit-7.0 Balancing of Rotating and Reciprocating unbalanced masses and vibrations	7.1 Balancing- Need and types of balancing, Effects of unbalanced masses.	01	
	7.2 Balancing of rotating masses in same plane- Analytical and Graphical methods for balancing of several masses revolving in same plane.	05	
	7.3 Balancing of reciprocating masses. (No numerical examples).		
	7.4 Elements of vibrations, natural frequency of single degree of freedom systems.	03	
Total Class Required		65	


 Lecturer Name & Sign: P. R. Gupta.