

GOVT. POLYTECHNIC BOLANGIR**Department of Mechanical Engineering**

LESSON PLAN: 2025-26	
Name of the Faculty: Paresh Kumar Mishra (Lecturer Stage-I)	
Subject: THEORY OF MACHINES & MECHANISM (TH1) (MEPC202)	
Program: Diploma in Mechanical Engineering	
Semester: 4 th	
Total Contact Hours: 45	
Total Marks: 100	
Assessment: Progressive –30, End Term – 70	
Credits: 3	

COURSE OBJECTIVES:

After completion of the course, the students will be able to

- 1 Explain different machine elements and mechanisms.
- 2 Analyze kinematics and dynamics of various machines and mechanisms.
- 3 Select suitable drives and mechanisms for specific applications.
- 4 Apply the concepts of balancing and vibration in mechanical systems.
- 5 Develop the ability to generate innovative mechanical design ideas.
- 6 Identify different types of cams and their motions.

UNIT-I: Simple mechanism & Cams and Followers (Total Classes: 7)				
Class No.	Topic	Subtopics Covered	Teaching Aids / Activities	Course Objective
1	Introduction to Simple Mechanism	• Definition of Machine, Mechanism and Structure • Concept of Link • Types of Links (Rigid, Flexible, Fluid)	• Chalk & board explanation • Real-life examples (door hinge, chain drive) • Ask students to identify links in classroom objects	CO1
2	Kinematic Pair	• Definition of Kinematic Pair • Classification of Kinematic Pairs • Lower Pair and Higher Pair with examples	• Diagrams on board • Models/Images of sliding pair, turning pair • Student interaction through examples	CO1
3	Kinematic Chain & Mechanism	• Definition of Kinematic Chain • Difference between Kinematic Chain and Mechanism • Degrees of freedom (basic idea)	• Blackboard sketches • Demonstration using simple link models • Short question-answer session	CO1, CO2
4	Inversion of Mechanism	• Concept of Inversion • Four Bar Link Mechanism • Inversions of Four Bar Link	• Mechanism sketches • Animation/video (if available) • Group discussion on applications	CO1, CO3

		Mechanism (Crank rocker, Double crank, Double rocker)		
5	Introduction to Cams and Followers	• Definition and Concept of Cam and Follower • Applications of Cams and Followers	• Diagram drawing practice • Examples from engines and automatic machines • Show real cam images	CO1, CO6
6	Classification of Cams and Followers	• Types of Cams (Radial, Cylindrical, etc.) • Types of Followers (Knife edge, Roller, Flat faced)	• Chart / PPT images • Blackboard diagrams • Students asked to match cam-follower types with applications	CO6
7	Follower Motion & Displacement Diagrams	• Uniform Velocity Motion • SHM Motion • Uniform Acceleration & Retardation • Basic displacement diagrams	• Step-by-step diagram drawing • Graph explanation on board • Numerical discussion (intro level)	CO2, CO6
UNIT-II: Power Transmission (Total Classes: 11)				
8	Introduction to Power Transmission	• Concept of Power Transmission • Types of Drives – Belt, Chain, Rope, Gear • Comparison of Drives	• Chalk & board explanation • Comparison table • Real-life examples (lathe, bicycle)	CO1, CO3
9	Belt Drives – Types	• Flat Belt Drive • V-Belt Drive • Applications of Belt Drives	• Diagrams on board • Belt samples / images • Student interaction	CO1, CO3
10	Belt Materials & Angle of Lap	• Materials for Flat and V-Belts • Angle of Lap (Open & Cross belt)	• Blackboard sketches • Formula explanation • Practical examples	CO1, CO2
11	Length of Belt & Velocity Ratio	• Length of Belt (Open & Cross belt) • Velocity Ratio	• Formula derivation • Simple numericals • Student problem solving	CO2
12	Slip and Creep	• Slip in Belt Drives • Creep in Belt Drives • Effect on Velocity Ratio	• Diagram-based explanation • Numerical illustration	CO2
13	Belt Tensions	• Tight Side & Slack Side Tension • Ratio of Belt Tensions	• Step-by-step derivation • Solved examples	CO2
14	Centrifugal & Initial Tension	• Centrifugal Tension • Initial Tension • Effect on Power Transmission	• Conceptual explanation • Graph-based discussion	CO2
15	Maximum Power Transmission	• Condition for Maximum Power Transmission • Simple Numericals	• Board derivation • Numerical practice by students	CO2
16	Chain Drives	• Chain Drive – Concept • Advantages & Disadvantages • Selection of Chain and Sprocket	• Bicycle chain example • Images/models • Discussion	CO1, CO3
17	Rope Drives & Lubrication	• Rope Drives – Types • Steel Ropes – Applications, Advantages & Limitations • Methods of Lubrication	• Charts/PPT • Industrial examples (cranes, lifts)	CO1, CO3

18	Gear Drives & Gear Trains	• Spur Gear Terminology • Types of Gears • Gear Trains – Simple, Compound, Reverted, Epicyclic • Law of Gearing, Velocity Ratio & Train Value	• Gear sketches • Numerical problems • Application-based discussion	CO1, CO2, CO3
UNIT-III: Flywheel and Governors (Total Classes: 10)				
19	Flywheel – Concept & Function	• Concept of Flywheel • Function of Flywheel • Applications	• Blackboard explanation • Industrial examples	CO1
20	Turning Moment Diagram	• Turning Moment Diagram for single cylinder 4-stroke I.C. engine • Energy fluctuation (qualitative)	• Stepwise diagram drawing • Engine cycle explanation	CO1, CO2
21	Fluctuation of Energy	• Coefficient of fluctuation of energy • Significance	• Concept explanation using diagram • Oral questioning	CO2
22	Fluctuation of Speed	• Coefficient of fluctuation of speed • Significance	• Blackboard explanation • Practical examples	CO2
23	Introduction to Governors	• Concept of Governor • Function & Applications	• Comparison with flywheel (basic) • Images/models	CO1
24	Types of Governors	• Classification of Governors • Centrifugal Governor – principle	• Neat sketches • Working explanation	CO1, CO6
25	Watt Governor	• Construction • Working • Governor terminology	• Sketch drawing • Part identification	CO1, CO2
26	Porter Governor	• Construction & Working • Sensitivity, Stability, Isochronism	• Comparative explanation • Concept discussion	CO2
27	Numericals on Governors	• Simple numericals on Watt & Porter Governors	• Step-by-step numerical solving	CO2
28	Comparison & Revision	• Comparison between Flywheel & Governor • Unit revision	• Comparison table • Oral quiz	CO1, CO3
UNIT-IV: Brakes, Dynamometers, Clutches & Bearings (Total Classes: 10)				
29	Brakes & Dynamometers – Basics	• Function • Types of Brakes & Dynamometers	• Chalk & board explanation	CO1
30	Brakes vs Dynamometers	• Comparison • Applications	• Comparison chart • Discussion	CO1, CO3
31	Shoe Brake	• Construction & Working • Braking force & torque • Numericals	• Neat sketches • Numerical solving	CO2
32	Band Brake	• Construction & Working • Braking torque • Numericals	• Diagrams • Solved examples	CO2
33	Self-locking & Self-energizing Brakes	• Concept • Practical significance	• Free body diagram explanation	CO2
34	Dynamometers	• Rope Brake Dynamometer • Hydraulic Dynamometer	• Sketches • Industrial photos	CO1

35	Clutch – Basics	• Function & Applications • Uniform pressure & wear theories	• Conceptual explanation	CO1, CO2
36	Single & Multi-plate Clutch	• Construction & Working • Simple numericals	• Diagrams • Numerical practice	CO2
37	Special Clutches	• Centrifugal • Cone • Diaphragm clutch	• Sketch drawing • Application discussion	CO1, CO3
38	Bearings	• Pivot, Collar & Conical pivot bearings • Torque & power loss • Numericals	• Diagrams • Problem solving	CO2
UNIT-IV: Balancing & Vibrations (Total Classes: 7)				
39	Introduction to Balancing	• Concept & need of balancing • Static & dynamic balancing (concept)	• Real-life examples	CO1
40	Single Rotating Mass	• Balancing of single rotating mass • Simple numericals	• Vector diagram • Numerical solving	CO2
41	Graphical Balancing	• Balancing of several masses in same plane • Force polygon	• Graph sheet practice	CO2
42	Vibrations – Basics	• Definition • Terminology (Amplitude, Frequency etc.)	• Diagram explanation	CO1
43	Causes of Vibrations	• Causes in machines	• Industrial examples	CO1, CO4
44	Effects of Vibrations	• Harmful effects on machines	• Case-based discussion	CO4
45	Remedies & Revision	• Remedies of vibrations • Unit revision	• Summary chart • Oral test	CO4, CO5

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