

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December-2023

KINEMATICS OF MACHINERY

(Mechanical Engineering)

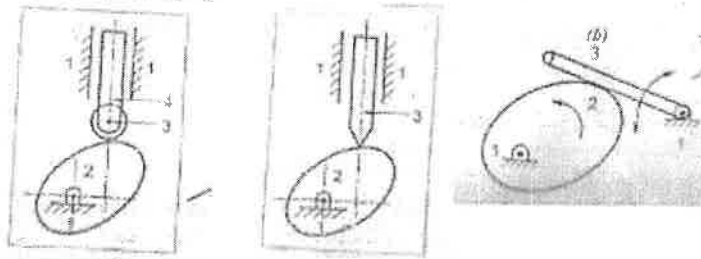
Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- | | | | | |
|---|--|-----|----|----|
| 1 | <p>a Define the following terms
(i) Lower and Higher pairs (ii) Degree of freedom</p> <p>b Find the degrees of freedom for the following linkages.</p> | CO1 | L1 | 4M |
| | | CO1 | L1 | 8M |



OR

- | | | | | |
|---|---|-----|----|----|
| 2 | <p>a Describe the watt mechanism with a neat sketch.</p> <p>b Sketch and Describe the Tchebichef mechanism.</p> | CO2 | L1 | 6M |
| | | CO2 | L1 | 6M |

UNIT-II

- | | | | | |
|---|---|-----|----|----|
| 3 | <p>a What is the condition for correct steering? Write fundamental equation of it.</p> <p>b List out various applications of single and double Hooke's joint.</p> | CO2 | L1 | 8M |
| | | CO2 | L1 | 4M |

OR

- | | | | | |
|---|---|-----|----|----|
| 4 | <p>a Differentiate between the Davis and Ackerman's steering mechanism.</p> <p>b List out the merits and demerits of Davis steering gear mechanism.</p> | CO2 | L4 | 6M |
| | | CO2 | L1 | 6M |

UNIT-III

- | | | | | |
|---|--|-----|----|-----|
| 5 | <p>The dimensions of the mechanism, as shown in Fig. 7.30, are as follows: AB = 0.45 m; BD = 1.5 m; BC = CE = 0.9 m. The crank AB turns uniformly at 180 r.p.m. in the clockwise direction and the blocks at D and E are working in frictionless guides. Draw the velocity diagram for the mechanism and find the velocities of the sliders D and E in their guides. Also determine the turning moment at A if a force of 500 N acts on D in the direction of arrow X and a force of 750 N acts on E in the direction of arrow Y</p> | CO3 | L1 | 12M |
|---|--|-----|----|-----|

OR

- | | | | | |
|---|--|-----|----|-----|
| 6 | <p>An engine mechanism is shown in Fig. 8.5. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, 100 mm from B. In the position shown, the crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s². Find: 1. Velocity of G and angular velocity of AB, and 2. acceleration of G and angular acceleration of AB</p> | CO3 | L1 | 12M |
|---|--|-----|----|-----|

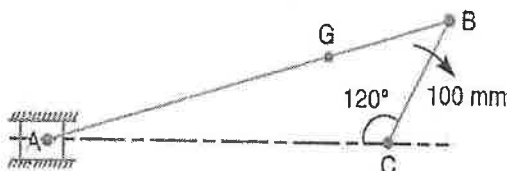


Fig. 8.5

UNIT-IV

- 7 It is required to set out the profile of a cam to give the following motion to thereciprocating follower with a flat mushroom contact face : **CO4 L2 12M**
- (i) Follower to have a stroke of 20 mm during 120° of cam rotation
 - (ii) Follower to dwell for 30° of cam rotation ;
 - (iii) Follower to return to its initial position during 120° of cam rotation;
 - (iv) Follower to dwell for remaining 90° of cam rotation.

The minimum radius of the cam is 25 mm. The out stroke of the follower is performed with simple harmonic motion and the return stroke with equal uniform acceleration and retardation.

OR

- 8 Design a cam for operating the exhaust valve of an oil engine. It is required to give equal uniform acceleration and retardation during opening and closing of the valve each of which corresponds to 60° of cam rotation. The valve must remain in the fully open position for 20° of cam rotation. The lift of the valve is 37.5 mm and the least radius of the cam is 40 mm. The follower is provided with a roller of radius 20 mm and its line of stroke passes through the axis of the cam. **CO4 L5 12M**

UNIT-V

- 9 a What do you understand by 'gear train'? Discuss various types of gear trains. **CO5 L1 6M**
- b How the velocity ratio of epicyclic gear train is obtained by tabular method? **CO5 L1 6M**

OR

- 10 Explain briefly the differences between simple, compound, and epicyclic gear trains. What are the special advantages of epicyclic gear trains? **CO5 L2 12M**

*** END ***