

**PRAGATI ENGINEERING COLLEGE: SURAMPALEM  
(AUTONOMOUS)**

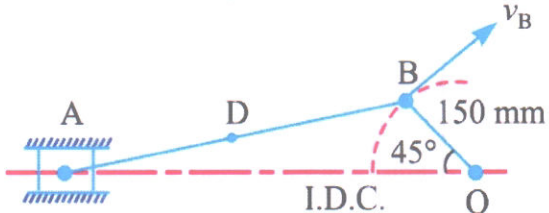
**II B.Tech II Semester Regular/Supplementary Examinations, May-2024**

**KINEMATICS OF MACHINERY  
(ME)**

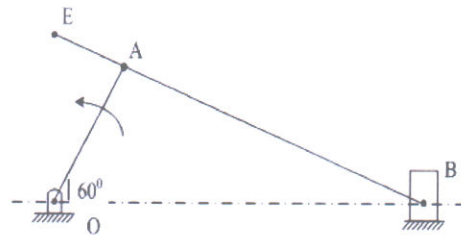
Time: 3 hours

Max. Marks: 70

**Answer ONE Question from each Unit  
All Questions Carry Equal Marks**

Q. No.	Questions	BTL	CO	Marks
<b>UNIT – I</b>				
1.	Explain with neat sketch all inversions of single slider crank mechanisms and give any two applications of inversions of four bar mechanisms.	k3	CO1	14M
<b>OR</b>				
2.	a) How are the kinematic pairs classified? Explain with examples	K2	CO1	8M
	b) What is the difference between an element and a kinematic link of a machine?	K2	CO1	6M
<b>UNIT – II</b>				
3.	a) Sketch and Describe the Watt's and Peaucellier straight-line motion mechanisms.	K2	CO2	7M
	b) Describe the working of Davis steering gear mechanism and derive the condition for correct steering of the above mechanism	K3	CO2	7M
<b>OR</b>				
4.	a) Sketch and Describe the Scott-Russel and Robert's straight-line motion mechanisms	K3	CO2	7M
	b) Derive an expression for the ratio of angular velocities of the shafts of a Hook's joint	K3	CO2	7M
<b>UNIT – III</b>				
5.	<p>The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine :</p> <p>1. Linear velocity and acceleration of the midpoint of the connecting rod, and</p> <p>2. angular velocity and angular acceleration of the connecting rod, at a crank angle of <math>45^\circ</math> from inner dead centre position</p> 	K4	CO3	14M
<b>OR</b>				
6.	a) Define Kennedy's theorem. How is it useful to find out the instantaneous centers of a Mechanism	K2	CO3	4M
	b) In the slider-crank mechanism shown in figure OA = 400 mm, AB =	K4	CO3	10M

1400 mm and  $AE = 400$  mm. When the crank rotates at  $40 \text{ rad/s}$  counter-clock wise and the angle  $AOB = 60^\circ$ , determine (i) the acceleration of the slider at B and (ii) the acceleration of point E.



Figure

## UNIT – IV

7. The following data relate to a circular cam operating a flat faced follower  
 Least diameter = 40 mm, Lift = 12 mm,  
 Angle of action =  $160^\circ$ , Speed = 500 r.p.m.  
 If the period of acceleration of the follower is 60% of the retardation during the lift, determine  
 (a) The main dimension of the cam (b) The acceleration of the main points  
 (c) What is the maximum acceleration and deceleration during the lift?

K4

CO4

14M

## OR

8. Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25 ?

K4

CO4

14M

## UNIT – V

9. a) Derive the expression for minimum number of teeth on the pinion in order to avoid Interference.  
 b) What is the law of gearing? Explain.

K3

CO5

10M

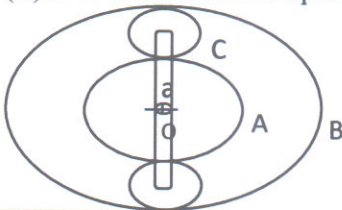
K2

CO5

4M

## OR

10. An epicyclic gear train is shown in the Figure (2) the number of teeth on A and B are 80 and 200. Determine the speed of the arm a  
 (i) if A rotates at 100 rpm clockwise and B at 50 rpm counter-clockwise.  
 (ii) if A rotates at 100 rpm clock wise and B is stationary



K4

CO5

14M