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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

August 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Aerospace Engineering **Duration: 3 hrs.**

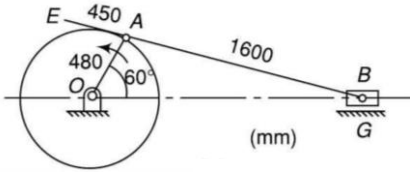
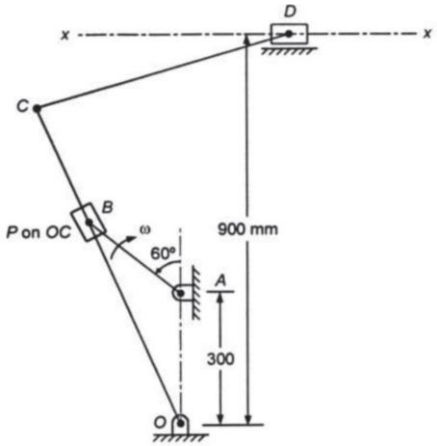
Course Code: 22AS3PCTOM **Max Marks: 100**

Course: Theory of Mechanisms

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Define the following: (i)Links (ii) Joints (iii) DOFs. and (iv)Mechanical Advantage	CO1	PO1	**8**
	b)	Five binary links of length 5 cm, 8cm, 15 cm, 19 cm and 28 cm are available for constructing a crank-rocker mechanism. Select four links required for the construction of this mechanism. Draw a rough sketch of the mechanism and clearly show the fixed link, crank, and rocker.	CO 2	PO1	**12**
		UNIT - II			
2	a)	Obtain the neat kinematic inversion sketches of the slider crank chain by fixing its different links and giving their applications	CO1	PO1	**10**
	b)	With a neat sketch explain the straight-line motion mechanisms.	CO1	PO2	**10**
		UNIT - III			
3	a)	State and prove Kennedy's theorem.	CO1	PO1	**6**
	b)	In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°.	CO3	PO1	**14**
		UNIT - IV			
4	a)	Explain the radial and tangential acceleration of a link.	CO1	PO1	**6**
	b)	A four-bar mechanism ABCD is pin jointed at the ends and the link AD length 600 mm is fixed. The links AB, BC, and CD are 300, 360, and 360 mm respectively. At a certain instant, the link AB makes an angle of 45 degrees with link AD. If the link AB rotates at an angular velocity of 10 rad/sec (CW) and angular	CO3	PO2	**14**

			acceleration of 30 rad/s^2 (CW). Determine the angular velocity and angular acceleration of the midpoint of link BC and CD using the relative velocity method.			
			OR			
	5	a)	Explain with a neat sketch the velocity and acceleration curves of a vehicle in a circular roller coaster.	*CO1*	*PO1*	**8**
		b)	For the below-shown Fig 5b configuration of a slider crank mechanism, calculate the (i) acceleration of the slider at B, (ii) acceleration of the point E, (iii) angular acceleration of the link AB. OA rotates at 20 rad/s CCW.  Fig.5b	*CO3*	*PO2*	**12**
			UNIT - V			
	6	a)	Derive the expression for the Coriolis acceleration of a moving point relative to a fixed body.	*CO1*	*PO1*	**6**
		b)	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: i) linear velocity and acceleration of the midpoint of the connecting rod, and ii) angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from the inner dead center position.	*CO3*	*PO2*	**14**
			OR			
	7	a)	In the crank and slotted lever type quick return motion mechanism shown in Fig.7a, the crank AB rotates at 120 rpm. Determine (i) velocity of ram at D, (ii) magnitude of Coriolis acceleration component, and (iii) acceleration of ram at D. AB = 200 mm, OC =800 mm, CD =600 mm and OA =300 mm.  Fig.7a	*CO3*	*PO1*	**20**

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