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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

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

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

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

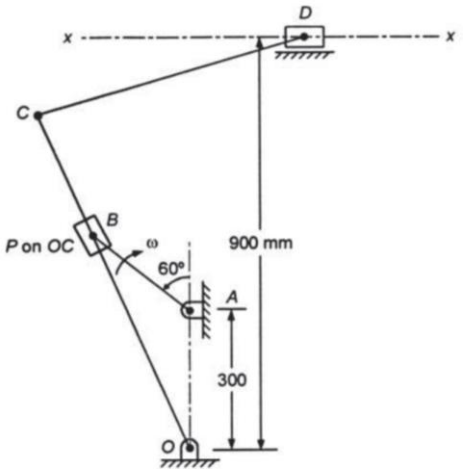
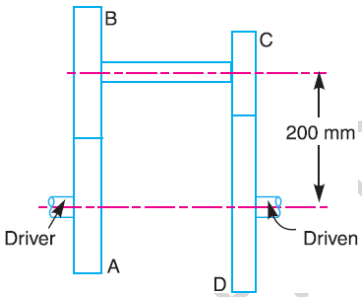
Course: THEORY OF MECHANISMS

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)		Explain the types of constrained motion in detail.	*CO1*	*PO 1*	**06**
	b)		Define Kinematic pairs and discuss various types of kinematic pairs with examples.	*CO1*	*PO1*	**10**
	c)		Explain the types of joints in kinematic motion in detail.	*CO1*	*PO1*	**4**
			OR			
2	a)		Define the following: (i)Links (ii) Joints (iii) DOFs. and (iv)Mechanical Advantage	*CO 1*	*PO1*	**8**
	b)		A four bar mechanism PQRS has lengths PQ = 100 mm, QR =250 mm, RS = 300 mm and PS = 400 mm. Determine the possibility of a full rotation and condition of the resulting mechanism by fixing each link using Grashoff's Law.	*CO 2*	*PO 1*	**12**
			UNIT - II			
3	a)		With a neat sketch, explain the Ackermann steering gear mechanism.	CO2	*PO1*	**08**
	b)		With a neat sketch, explain the Davis steering gear mechanism in detail.	CO2	*PO1*	**12**
			OR			
4	a)		Obtain the neat kinematic inversion sketches of the double slider crank chain by fixing its different links and giving their applications.	*CO 1*	*PO 1*	**10**
	b)		With a neat sketch explain the crank and slotted lever quick return mechanism.	*CO 1*	*PO 2*	**10**

			UNIT - III			
	5	a)	Within a four-bar linkage PQRS, where PS is immobile and spans 150 mm, the crank AB, measuring 40 mm, rotates in a clockwise direction at a rate of 120 rpm. Simultaneously, the link RS, with an 80 mm length, undergoes oscillations around point S. Equally, QR and PS possess identical lengths. Determine the angular velocity of link RS at an angle QPS of 60 degrees, utilizing the Relative Velocity Method.	CO3	PO3	**12**
		b)	In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°. By Relative velocity Method	CO3	PO3	**08**
			OR			
	6	a)	A pin jointed four bar linkage having the following dimensions: Fixed Link AD = 4m Driving Link AB = 1.5m,Driven Link CD = 2.5 m, Connecting Link BC = 3m and < BAD = 60 deg,Link AB rotates at 25 rpm. Determine: (i) Angular Velocity of link CD, (ii) Angular Velocity of Link BC	CO3	PO3	**12**
		b)	Consider a pin-connected four-bar linkage composed of four links characterized by the following dimensions: Fixed Link AD measures 4 meters in length, the Driving Link AB spans 1.5 meters, the Driven Link CD extends 2.5 meters, and the Connecting Link BC is 3 meters long. Furthermore, the angle <BAD is set at 60 degrees, and Link AB rotates at a rate of 25 revolutions per minute. Employing the Instantaneous Centre Method, determine: (i) the Angular Velocity of Link CD, and (ii) the Angular Velocity of Link BC.length. Find the angular velocity of link CD when angle BAD = 60°.	CO3	PO3	08
			UNIT - IV			
	7	a)	Explain with neat sketches and suitable equations about the length of the path of contact and length of the arc of contact	CO4	*PO1*	**08**
		b)	Explain with neat sketches the classification of Cam and followers also explain the classification of gears.	CO4	*PO3*	**12**
			OR			
	8		In the crank and slotted lever type quick return motion mechanism shown in Fig. 8a, the crank AB rotates at 120 rpm. Determine (i) velocity of ram at D, (ii) magnitude of Coriolis acceleration component, and (c) acceleration of ram at D. AB = 200 mm, OC =800 mm, CD =600 mm and OA =300 mm.	CO4	*PO3*	**20**

			 Fig. 8a			
			UNIT - V			
	9	a)	Explain with neat sketch about the compound gear train.	CO4	*PO1*	**08**
		b)	The speed ratio of the reverted gear train, as shown in the figure is to be 12. The module of gears A and B is 3.125 mm and of gears C and D is 2.5 mm. Calculate the suitable numbers of teeth for the gears. No gear is to have less than 24 teeth. 	CO4	*PO3*	**12**
			OR			
	10	a)	Explain with neat sketch about the simple gear train.	CO4	*PO1*	**08**
		b)	Explain with neat sketch about the reverted and epicyclic gear train.	CO4	*PO3*	**12**

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