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

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E.
Branch: Aerospace Engineering
Course Code: 23AS3PCTOM
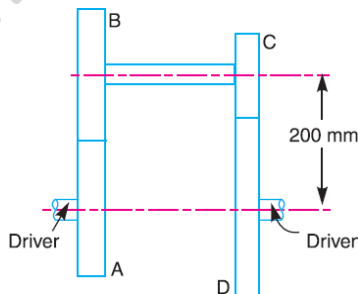**Course: Theory of Mechanisms**

Semester: III
Duration: 3 hrs.
Max Marks: 100

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

				CO	**PO**	**Marks**
			UNIT - I	*CO*	*PO*	**Marks**
1	a)		Explain the inversions of a four-bar chain in detail.	*CO1*	*PO1*	**12**
	b)		State and explain Whitworth's quick return mechanism. Also, derive an equation for the ratio of time taken for return strokes and forward strokes.	*CO1*	*PO1*	**08**
			OR			
2	a)		Define kinematic pairs and discuss various types of kinematic pairs with examples.	*CO1*	*PO1*	**10**
	b)		Explain the pendulum pump with a neat sketch.	*CO1*	*PO1*	**5**
	c)		Explain about the oscillating cylinder engine with a neat sketch.	*CO1*	*PO1*	**5**
			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**
			UNIT - III			
4	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.**(By Instantaneous Centre Method)**	CO3	PO3	**08**
	b)		The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 rpm, the crank is 150 mm and the connecting rod is 600 mm long. Determine: 1.linear velocity and acceleration of the midpoint of the connecting rod, and 2.angular velocity and angular acceleration of the connecting rod, at a crank angle of 45 degree from inner dead centre position.	CO3	PO3	**12**

			UNIT - IV			
5	a)		Explain with a neat sketch about the minimum number of teeth on the pinion to avoid interference.	CO4	*PO1*	**08**
	b)		Two gear wheels mesh externally and are to give a velocity ratio of 3 to 1. The teeth are of involute form; module = 6 mm, addendum = one module, pressure angle = 20°. The pinion rotates at 90 r.p.m. Determine: i.) The number of teeth on the pinion to avoid interference on it and the corresponding number of teeth on the wheel, ii.) The length of path and arc of contact, iii).The number of pairs of teeth in contact, and iv). The maximum velocity of sliding.	CO4	*PO3*	**12**
			OR			
6	a)		Two gears in mesh have a module of 8 mm and a pressure angle of 20°. The larger gear has 57 teeth while the pinion has 23 teeth. If the addenda on the pinion and gear wheel are equal to one module (1m), find a. The number of pairs of teeth in contact and b. The angle of action of the pinion and the gear wheel.	CO4	*PO3*	**08**
	b)		Explain with neat sketches the classification of cam and followers also explain the classification of gears.	CO4	*PO1*	**12**
			UNIT - V			
7	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 7b. 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. Fig. No. 7b	CO4	*PO3*	**12**

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