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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Supply) - December- 2025
KINEMATICS OF MACHINERY
(MECH)

[Time: 3 Hours] **[Max. Marks: 70]**

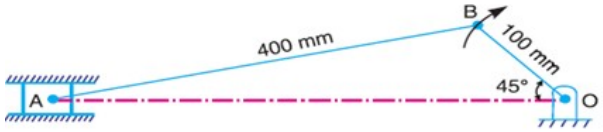
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A (20 Marks)

1.	a)	Define degree of freedom, what is the DOF of structure and 4 bar mechanism.	[2M]
	b)	Differentiate between Machine and Mechanism.	[2M]
	c)	State the kennedy's theorem.	[2M]
	d)	Define instantaneous center and instantaneous axis.	[2M]
	e)	Classify the different types of straight line mechanisms.	[2M]
	f)	State correct steering mechanism and write the expression.	[2M]
	g)	What is mean by cam and write its types?	[2M]
	h)	What are the different motions of the follower?	[2M]
	i)	Write the comparison between cycloid and involute profile.	[2M]
	j)	State module, Addendum and Dedendum.	[2M]

PART-B **(50 Marks)**

2.		Explain the different types of kinematics of pairs with examples.	[10M]
		OR	
3.		Explain the crank and slotted lever quick return motion mechanism with diagram.	[10M]
4.		Four bar mechanism, AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. rotate clockwise. Find the angular velocity of the link BC and BD by using relative velocity method.	[10M]
		OR	
5.		Locate all the instantaneous centers of the slider crank mechanism as shown in figure. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, Find: i) Velocity of the slider A ii) Angular velocity of the connecting rod AB.	[10M]



6.		Explain the function of pantograph with neat sketch.	[10M]
		OR	
7.		Explain the Ackerman steering mechanism with neat sketch.	[10M]

8. A cam operating a Knife-edged follower from the following data: (a) Follower to move outward through (lift) 40 mm during 60° of a cam rotation; (b) Follower to dwell for the next 30° (c) Follower to return its original position during next 60° (d) Follower to dwell 210° of cam rotation. The displacement of the follower is to take place with simple harmonic motion during both the outward and return strokes. The base circle radius is 50mm. Draw cam profile when axis of the follower passes the through the center of axis of the cam (radial). [10M]

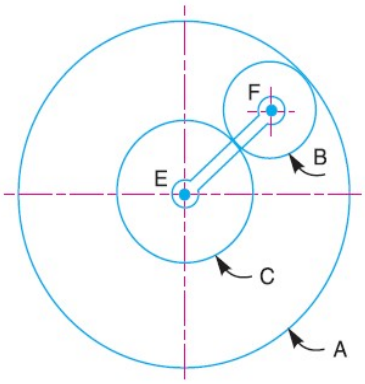
OR

9. Draw the profile of a cam operating a roller reciprocating follower and with the following data: Minimum radius of cam =25 mm; lift=30mm; Roller diameter= 15mm. The cam lifts the follower for 120° with SHM, followed by a dwell period of 30°. Then the follower lowers down during 150° of cam rotation with uniform acceleration and retardation followed by a dwell period. If the cam rotates at a uniform speed of 150 RPM. Calculate the maximum velocity and acceleration of follower during the descent period. [10M]

10. A pair of involute spur gear with 20^0 pressure angle and pitch of module is 6mm in mesh. The number of teeth on pinion is 20 and rotating a speed of 240 rpm. When gear ratio is 2. Find the following i) Addendum on pinion and gear ii) the length of path of contact iii) the maximum velocity of sliding of path of approach and path of races. [10M]

OR

11. An epicyclic gear consists of three gears A, B and C as shown in Figure The gear internal teeth and gear C has 32 external teeth. The gear 'B' meshes with both Aan carried on an arm EF which rotates about the centre of A at 18 r.p.m. If the gear determine the speed of gears B and C. [10M]



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