

Code: 22MEMD2T1

I M.Tech - II Semester – Regular Examinations - JULY - 2023

**MECHANISM DESIGN AND SYNTHESIS
(MACHINE DESIGN)**

Duration: 3 hours

Max. Marks: 60

Note: 1. This paper contains 4 questions from 4 units of Syllabus. Each unit carries 15 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Explain in detail various phases in design of mechanisms.	L2	CO1	9 M
	b)	Explain Grubler criterion for spatial mechanism and reduce the form to apply for planar mechanism.	L2	CO1	6 M
OR					
2	a)	Classify various types of spatial mechanisms and mention their applications.	L2	CO1	8 M
	b)	Explain the terms: i) Lower pair ii) Higher pair iii) Kinematic chain iv) Inversion v) Linkage vi) Transmission angle	L2	CO1	7 M

UNIT-II

3	Explain in brief about (a) Guiding a rocker through two distinct positions (b) Guiding a rocker through three distinct positions for the constant crank rotation.	L2	CO2	15 M
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OR

4	a) A crank rocker linkage has a 100 mm frame, a 25 mm crank, 90 mm coupler and a 75 mm rocker. Draw the linkage and find the maximum and minimum value of the transmission angle. Locate both toggle position and record the corresponding crank angle and transmission angle.	L3	CO2	8 M
	b) Explain the procedure for finding position of any point on the Fourbar slider crank mechanism.	L2	CO2	7 M

UNIT-III

5	a) Explain following terms in context to kinematic synthesis: i) Function Generation (ii) Structural Error (iii) Precision points	L2	CO3	7 M
	b) Explain function generation with neat sketch using velocity pole method.	L2	CO3	8 M

OR

6	a)	What is the difference between function generation and path generation?	L2	CO3	5 M
	b)	A four bar mechanism is to be designed, by using three precision points to generate the function $y=x^{1.5}$, for the range $1 \leq x \leq 4$. Assuming 30° starting position & 120° finishing position for the input link and 90° starting position & 180° finishing position for the output link, find the values of x & y.	L3	CO3	10 M

UNIT-IV

7	a)	Derive the expression for the coriolis component of acceleration for any link PQ rotating with an angular velocity ω rad/s about a fixed point O with a point R on it moving along it at a linear velocity v m/s.	L3	CO4	7 M
	b)	Explain how the followers classified. Also compare merits and demerits of them.	L2	CO4	8 M

OR

8		In the toggle mechanism shown in Figure , the slider D is constrained to move in a horizontal path the crank OA is rotating in CCW direction at a speed of 180 rpm. The dimensions of various links are as follows: OA = 180 mm, CB = 240 mm, AB = 360 mm and BD = 540 mm Find: (i) Velocity of slider, (ii) Angular velocity of links AB, CB and BD.	L3	CO4	15 M
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