

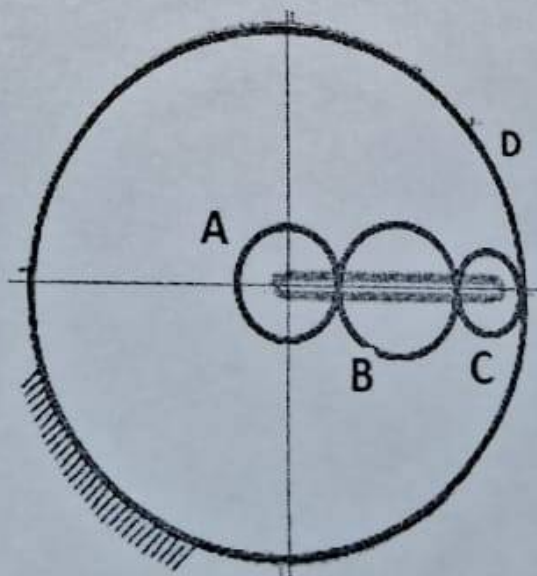
SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2024-2025

Programme Name & Branch : B.Tech. - Mechanical Engineering
Course Code : BMEE207L
Course Name : Kinematics and Dynamics of Machines
Faculty Name(s) : SENTHILNATHAN N, RAJESH M, VENKATESA SRIDARAN K
Class Number(s) : VL2024250503500, 502, 501, 292
Date of Examination : 20-03-2025
Exam Duration : 90 minutes

Maximum

- General instruction(s):**
- Answer All Questions
 - M - Max mark; CO - Course Outcome; BL - Bloom's Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyze, 5 - Evaluate, 6 - Create)
 - Course Outcomes Statements:
 CO. 1: Examine the kinematic behavior of various planar mechanisms.
 CO. 3: Analyze kinematics of cam and gear-train mechanisms.
 CO. 4: Investigate the dynamic forces acting on planar mechanisms.

Q.No	Question	Marks	Course Outcome
1.	Construct the displacement diagram and the cam profile for a cam with roller follower which rises with simple harmonic motion in 150° of cam rotation and returns with SHM in 120° of cam rotation. The angle of dwell between the rise and return of the follower is 30° . The follower axis is offset by 10mm towards right. The lift of the follower is 24mm and the minimum radius of the cam is 25mm. Consider the roller diameter as 7.5mm.	10	
2.	An epicyclic gear train arrangement is shown in figure 1. The number of teeth on gear A, gear B and gear D are 20, 28 and 108 respectively. The gear C meshes with both B and internal gear D, and is carried on an arm which rotates about the centre of D at 300 rpm anticlockwise. If gear D is fixed, determine the speed of gear C and gear B.		





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Fig. 1

3.	A four bar mechanism is to be designed, by using three precision points, to generate the function $y = X^{1.2}$, for the range $1 \leq X \leq 4$. Assuming 30° starting position and 120° finishing position for the input link and 90° starting position and 180° finishing position for the output link, find the values of x , y , θ and ϕ corresponding to the three precision points.	10
4.	Design a slider-crank mechanism to coordinate three positions of the input link and the slider for the following angular and linear displacement of the input link and the slider respectively: $\theta_{12} = 40^\circ$ $S_{12} = 180$ mm $\theta_{13} = 80^\circ$ $S_{12} = 480$ mm	10
5.	The length of crank and connecting rod of a steam engine is 300 mm and 1200 mm respectively. The mass of the reciprocating parts of the steam engine is 250 kg. Its cylinder bore is 0.5 m. When the crank has travelled 60° from IDC, the difference between the driving and the back pressure is 0.35 MPa. If the engine runs at 250 rpm, neglecting the effect of the piston rod diameter, determine: 1. Pressure on slide bars, 2. Thrust in the connecting rod, 3. Tangential force on the crank-pin, and 4. Turning moment on the crankshaft.	