



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: A2+TA2

REG. NO.:

SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Vignesh Pillai

Programme Name & Branch : B.Tech Mechanical Engineering
Course Code : BMEE207L
Course Name : Kinematics and Dynamics of Machines
Faculty Name(s) : Dr. M. Manikandan
Class Number(s) : VL2025260102338
Date of Examination : 05.10.2025
Exam Duration : 90 minutes
Maximum Marks: 50

General instruction(s):

- Answer All Questions
- Assume any missing information.
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcome Statements:

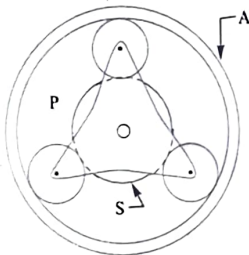
CO 3: Analyse kinematics of cam and gear-train mechanisms.

CO 4: Investigate the dynamic forces acting on planar mechanisms.

Q. No	Question	M	CO	BL
1.	You are part of a design team developing a cam follower system for a high-speed packaging unit. The cam is to be designed with the knife-edge follower moving with the outstroke of Simple harmonic motion and return with Uniform acceleration and retardation. The line of stroke pass through the axis of the cam shaft. Design the CAM Profile. The system must meet the following updated specifications. Assume any missing information. (i) Cam Lift = 50 mm (ii) During the outstroke the cam rotates at 60° (iii) Dwell for the period of 30° (iv) The follower return with 70° (v) The minimum Radius of CAM is 50 mm	10	CO3	4
2	Use the Question No. 1 data, Design the Profile of the cam when the line of stroke of the follower is offset 20 mm from the axis of the cam shaft. The cam rotates at 300 rpm. Determine the maximum velocity and acceleration of the follower during its ascent and descent.	10	CO3	4
3	Two mating involute spur gears of 20° pressure angle have a gear ratio of 2. The number of teeth on the pinion is 20, and its speed is 250 r.p.m. The module pitch of the teeth is 12 mm. If the addendum on each wheel is such that the path of approach and the path of recess on each side are half the	10	CO3	4



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	maximum possible length, find : 1 . the addendum for pinion and gear wheel; 2. the length of the arc of contact; and 3. the maximum velocity of sliding during approach and recess. Assume the pinion to be the driver.			
4.	An epicyclic gear train for an electric motor is shown in Fig. 1. The wheel S has 15 teeth and is fixed to the motor shaft rotating at 1450 r.p.m. The planet P has 45 teeth, gears with fixed annulus A and rotates on a spindle carried by an arm which is fixed to the output shaft. The planet P also gears with the sun wheel S. Find the speed of the output shaft. If the motor is transmitting 1.5 kW, find the torque required to fix the annulus A  Figure 1	10	CO3	3
5.	A four-bar function generator is used to generate the function $y = 1/x$ for $1 \leq x \leq 3$ between the input angle of a crank and the angle the follower makes with the frame. Find the three precision points from Chebyshev's spacing if the initial values of input angle (i.e. crank angle) and output angle (i.e. follower angle) are 30° and 200° respectively. The difference between the final and initial values of the crank and follower angles are each equal to 90°. Find the values of x, y, θ and ϕ corresponding to the three precision points.	10	CO4	3
