



VIT

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

REG.NO.:

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

SLOT:E1 +TE1

Programme Name & Branch : B.Tech & Mechanical Engineering
 Course Code and Course Name : BMEE207L & Kinematics and Dynamics of Machines
 Faculty Name(s) : Dr Akash Mohanty, Dr Venkatesan S,
 Dr. Narendiranath Babu T, Manikandan M
 Class Number(s) : VL2024250503497, VL2024250503499,
 VL2024250503498, VL2024250503290
 Date of Examination : 20.03.25
 Exam Duration : 90 minutes

Maximum Marks: 5

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the number as per the syllabus copy)
 3. Analyse kinematics of cam and gear-train mechanisms.
 4. Investigate the dynamic forces acting on planar mechanisms.

Q. No	Question	M	CO
1.	A cam, with a minimum radius of 25 mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below : 1. To raise the valve through 50 mm during 90° rotation of the cam ; 2. To keep the valve fully raised through next 40°; 3. To lower the valve during next 90°; and 4. To keep the valve closed during rest of the revolution; The diameter of the roller is 30 mm and the diameter of the cam shaft is 25 mm. Draw the profile of the cam when the line of stroke of the follower is off-set 12.5 mm from the centre of the cam. During the lift, the motion is S.H.M. During the fall the motion is uniform acceleration and deceleration.	10	3
2.	Figure 1 shows a compound epicyclic gear which consists of an annular gear D having internal teeth, a compound gear B-C, the sun gear A and the arm E . The compound gear B-C is also known as planet gear as this gear moves around the sun gear A. The sun gear A and the annular gear D are co-axial. One shaft is connected to sun gear A and the another shaft is connected to arm. These two shafts are co axial. The sun gear A meshes with compound gear C whereas annular gear D meshes with compound gear B. The gears A,B and C are having 50, 35, and 20 external teeth respectively. If all the gears having the same module, find the number of teeth on the fixed annular gear D. Also find the speed of the shaft connected to the arm, if the speed of the shaft connected to sun gear A is 110 rpm.	10	3



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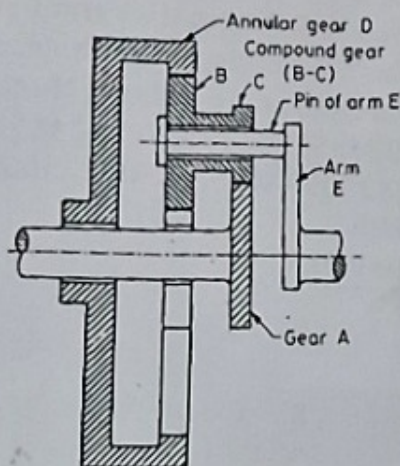


Figure 1

3.	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>i.e.</i> crank angle) and output angle (<i>i.e.</i> 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° . Assume fixed link is 1 unit.	10	4	4
4.	Design a four-bar mechanism using the graphical method. The input and output angles are 45° and 55° . Both input and output cranks should move in the clockwise direction. Assume fixed link is 3 cm.	10	4	4
5.	The ratio of the connecting rod length to crank length for a vertical petrol engine is 4:1. The bore /stroke is 80/100 mm and mass of the reciprocating parts is 1 kg. The gas pressure on the piston is 0.7N/mm^2 when it has moved 10 mm from T.D.C. on its power stroke. Determine the net load on the gudgeon pin. The engine runs at 1800 r.p.m. At what engine speed will this load be zero?	10	4	3
