Code No: 19MET401 **R19**

II B. TECH II SEMESTER REGULAR EXAMINATIONS, AUGUST 2021

KINEMATICS OF MACHINERY

(Mechanica1 Engineering)

Time: 3 hours Max. Marks: 60

Note: Answer **ONE** question from each Unit (**5 × 12 = 60 Marks)**

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UNIT - I

1. a) Classify kinematic pair with examples. [6M]

   b) Explain Oldham's coupling with neat sketch. [6M]

(OR)

2. a) Describe the Robert straight-line motion mechanism with neat sketch. [6M]

   b) Explain Ackerman's steering gear mechanism. [6M]

UNIT – II

3. The crank of a slider crank mechanism rotates clockwise at a constant speed of 300rpm. The crank is 150 mm and the connecting rod is 600 mm long. Determine: 1. Linear velocity and acceleration of the midpoint of the connecting rod and 2. Angular velocity and angular acceleration of the connecting rod at a crank angle of 45° from inner dead centre position. [12M]

(OR)

4. In a pin jointed four bar mechanism, as shown in Figure-1, AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 rpm in clockwise. Find the angular velocity of the link BC. [12M]

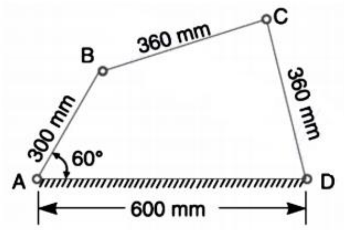

Figure-1

UNIT – III

5. A cam is to be designed for a knife edge follower with the following data: [12M]

   1. Cam lift is 40 mm during 90° of cam rotation with simple harmonic motion.

   2. Dwell for the next 30°.

   3. During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.

   4. Dwell during the remaining 180°. Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft.

   The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 rpm.

(OR)
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6.	a)	Discuss the displacement, velocity and acceleration curves of a uniform acceleration and deceleration follower.	[6M]
	b)	Illustrate the cam nomenclature clearly with neat sketch.	[6M]

UNIT –IV

7.	a)	Derive the condition for maximum power transmission by a belt drive considering the effect of centrifugal tension.	[6M]
	b)	Deduce the expression for length of an open belt drive.	[6M]

(OR)

8.	a)	Derive the expression for ratio of belt tensions.	[6M]
	b)	Discuss initial tension and centrifugal tension in belt drives.	[6M]

UNIT –V

9.	a)	Derive the expression for length of path of contact in meshing gears.	[8M]
	b)	Define module, pitch circle, circular pitch and pressure angle of a gear.	[4M]

(OR)

10.	In an epicyclic gear train, as shown in Figure-2, the number of teeth on wheels A, B, and C are 50, 25, and 52 respectively. If the arm rotates at 420 rpm clock wise, find (a) speed of wheel C when A is fixed, and (b) speed of wheel A when C is fixed.	[12M]

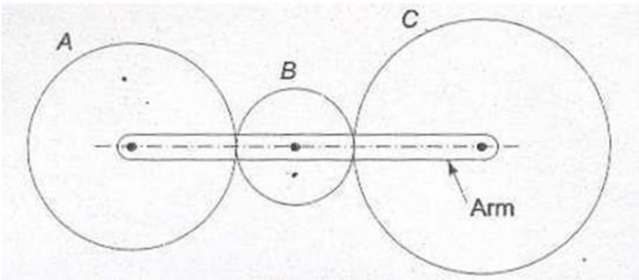

Figure-2

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