Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 12 – 12-2025 **Time:** 01:00pm – 04:00pm

School: SOE	**Program:** B. TECH	
Course Code: MEC4002	**Course Name:** KINEMATICS OF MACHINES	
Semester: V	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	12	12	22	14	20	20

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

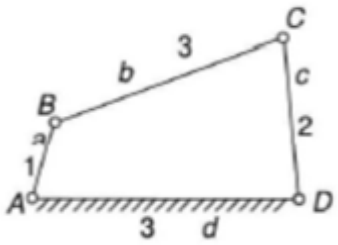
Part A

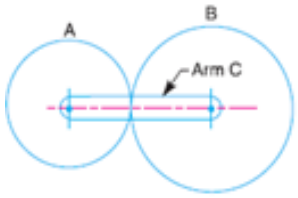
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

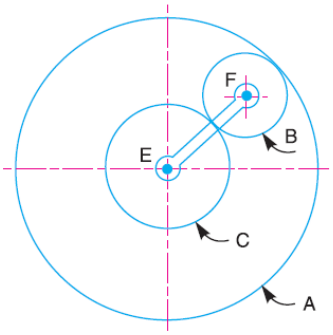
1.	Define a machine and a mechanism. Give one example for each.	**2 Marks**	**L1**	**CO1**
2.	What is the degree of freedom (DOF) in planar motion?	**2 Marks**	**L1**	**CO1**
3.	What is meant by binary and ternary links?	**2 Marks**	**L1**	**CO6**
4.	State Grashof's Law.	**2 Marks**	**L1**	**CO2**
5.	Define velocity ratio of a gear train.	**2 Marks**	**L1**	**CO5**
6.	List the different types of gear trains.	**2 Marks**	**L1**	**CO6**
7.	Name the different types of followers used in cam mechanisms.	**2 Marks**	**L1**	**CO4**
8.	What is a velocity diagram?	**2 Marks**	**L1**	**CO5**
9.	What is the difference between linear velocity and angular velocity?	**2 Marks**	**L1**	**CO3**
10.	What is meant by inversion of a mechanism?	**2 Marks**	**L1**	**CO6**

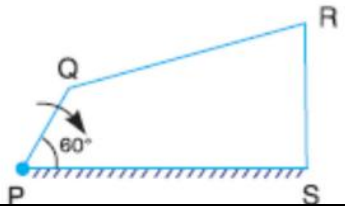
Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Define and classify kinematic pairs. Explain each type with suitable examples and diagrams.	**10 Marks**	**L2**	**CO1**
	b.	Describe the Double Slider Crank Chain and explain:	**10Marks**	**L2**	**CO5**
		Or			
12.	**a.**	Find the maximum and minimum transmission angle for the following mechanism 	**10 Marks**	**L2**	**CO1**
	b.	With a neat sketch explain the working principle of crank and slotted lever quick return mechanism	**10 Marks**	**L3**	**CO5**

13.	a.	With a neat sketch explain epicyclic gear train	**10 Marks**	**L3**	**CO5**
	b	In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm, in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 rpm in the clockwise direction, what will be the speed of gear B? 	**10 Marks**	**L3**	**CO5**
		Or			
14.	**a.**	With a neat sketch explain the classification of gear trains	**10 Marks**	**L3**	**CO5**
	b	An epicyclic gear consists of three gears A,B and C as shown in fig. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on arm	**10 Marks**	**L3**	**CO5**

		EF which rotates about the centre of A at 18rpm.If the gear A is fixed, determine the speed of gears B and C 			

15.		PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ =62.5 mm ; QR = 175 mm ; RS = 112.5 mm ; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle QPS = 60° and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of links QR and RS. 	**20 Marks**	**L3**	**CO3**
		Or			
16.		The crank of a slider crank mechanism rotates clockwise at a constant speed of 200 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. At a crank angle of 45°from inner dead Centre position, Determine: 1. Linear velocity and acceleration of the connecting rod, and 2. angular velocity and angular acceleration of the connecting rod. 	**20 Marks**	**L3**	**CO3**

17.		A cam is to be designed for a knife edge follower with the following data	**20 Marks**	**L3**	**CO4**

		1. Cam lift = 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 (a) the line of stroke of the follower passes through the axis of the cam shaft, and (b) the line of stroke is offset 20 mm from 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 r.p.m.			
		Or			
18.		Draw the cam profile for the following conditions: Follower type= knife edge follower, in line; lift =30mm; base circle radius = 20mm;outside with uniform velocity in 120° of cam rotation ;dwell for 60°,return stroke with uniform velocity during 90°of cam rotation; dwell for the remaining period. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 300 r.p.m.	**20 Marks**	**L3**	**CO4**