Name :.....
Roll No:.....

MAR ATHANASIUS COLLEGE OF ENGINEERING
(Government Aided Autonomous Institution)
Kothamangalam, Kerala - 686 666
DEPARTMENT OF MECHANICAL ENGINEERING

**B24ME2T04 THEORY OF MACHINES**

First Sessional Examination February 2026

Duration: 1 hr 30 min | S4 ME A & B BATCH | Max mark: 40

## Part A

(1) What do you mean by degree of freedom (mobility) of a planar mechanism? How is it determined? (CO1) **(3)**

(2) Define the following terms: i) Kinematic link ii) Kinematic pair iii) Mechanism. (CO1) **(3)**

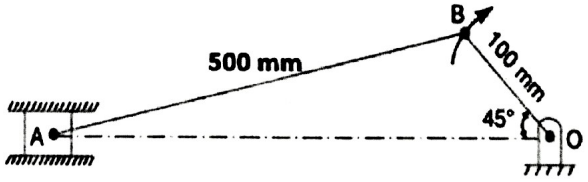
(3) What is kinematic chain? State the conditions required for a kinematic chain to execute constrained motion. (CO1) **(3)**

(4) List down all the inversions of a four bar mechanism. sketch and explain any one inversion.(CO1) **(3)**

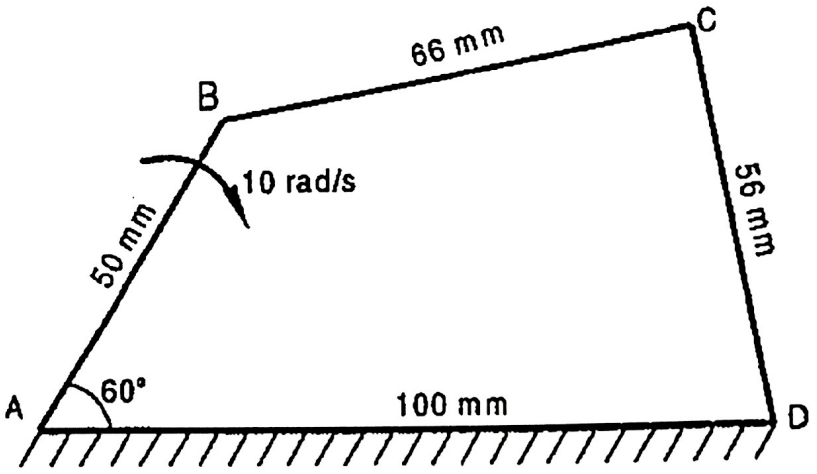
## Part B

(5) a. State and prove Aronhold Kennedy theorem (CO1) **(7)**

b. Locate all the instantaneous centres of the slider crank mechanism as shown in Fig. The lengths of crank OB and connecting rod AB are 100 mm and 500 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find: 1. Velocity of the slider A, and 2. Angular velocity of the connecting rod AB.(CO1) **(7)**




(6) In a four bar chain ABCD, link AD is fixed, the crank AB revolves with a uniform angular velocity of 10 rad/s in a clockwise direction. The lengths of various links are AB = 50 mm, BC = 66 mm, CD = 56 mm and DA = 100 mm. Angle BAD $60^0$. (i) Draw the velocity polygon and (ii) Draw the acceleration polygon. Find the angular acceleration of the links BC and CD. (CO2) **(14)**




## Vision

*Mentoring to Ensure Excellence*

## Mission

1. To facilitate comprehensive and integrated development of students by providing quality education that encourages sustainable practices.
2. To mould disciplined and socially committed engineers capable of assuming professional leadership upholding national integrity.

| Question No. | A1 | A2 | A3 | A4 | B5 a | B5 b | B6 | Max. Marks |
|---|---|---|---|---|---|---|---|---|
| CO Mapping | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |
| Bloom's Taxonomy Level | 2 | 1 | 1 | 1 | 1 | 3 | 3 | |
| Marks | 3 | 3 | 3 | 3 | 5 | 9 | 14 | 40 |