

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Automation & Robotics) (2011 & Onward) (Sem.-3)

KINEMATICS OF MACHINES

Subject Code : BTAR-305

Paper ID : [A0134]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

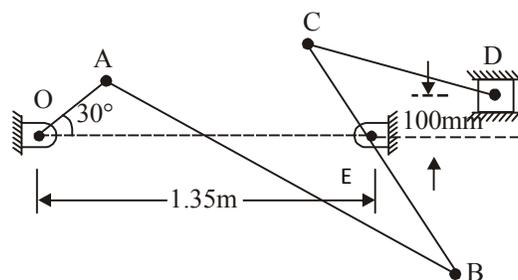
- a) What is a machine? Giving example, differentiate between a machine and a structure.
- b) Mention the properties of instantaneous center.
- c) Define instantaneous axis.
- d) Differentiate between normal and tangential acceleration.
- e) What are acceleration curves?
- f) Write advantages and disadvantages of gear drive.
- g) Define diametral pitch and module.
- h) Define mass moment of inertia.
- i) What is dynamic balancing?
- j) What is robotic mechanism?

SECTION-B

2. Sketch and explain the various inversions of a slider crank chain.
3. Explain, with the help of a neat sketch, the space centrode and body centrode.
4. The number of teeth on each of the two equal spur gears in mesh are 40. The teeth have 20° involute profile and the module is 6 mm. If the arc of contact is 1.75 times the circular pitch, find the addendum.
5. Show the graphical representation of displacement with respect to time when the body move with uniform and variable velocity.
6. In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD 60° .

SECTION-C

7. A mechanism, as shown in Fig. 1, has the following dimensions: OA = 200 mm; AB = 1.5 m; BC = 600 mm; CD = 500 mm and BE = 400 mm. Locate all the instantaneous centers. If crank OA rotates uniformly at 120 r.p.m. clockwise, find :
 - a) The velocity of B, C and D,
 - b) The angular velocity of the links AB, BC and CD.



8. Derive an expression for the magnitude and direction of coriolis component of acceleration.
9. Prove that for two involute gear wheels in mesh, the angular velocity ratio does not change if the centre distance is increased within limits, but the pressure angle increases.