

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (ME) (Sem.-3)
THEORY OF MACHINES-I
Subject Code : ME-203
Paper ID : [A0802]

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. Write briefly :

- a. What is the requirement of crowning of pulleys?
- b. Why uniform wear theory is used for the design of clutch?
- c. How many turning pairs are there in a scotch-yoke mechanism?
- d. What is stability of governor?
- e. What is the difference between machine and mechanism?
- f. Which is most preferred motion of the follower for the majority of applications?
- g. Explain creep in belt.
- h. What is the difference between brake and dynamometer?
- i. What is the application of cone clutch?
- j. Describe the working of pantograph.

SECTION-B

2. Sketch and describe the working of quick return mechanism. Name at least two applications of quick return mechanism. Derive an expression for the ratio of times taken in forward and return stroke for this mechanism.
3. Derive an expression for the ratio of driving tensions in case of flat belt drives.
4. In a four bar chain ABCD, AD is fixed and is 120 mm long. The crank AB is 30 mm long and rotates at 100 *r.p.m.* Clockwise while the link CD = 60 mm oscillates about D. Find the angular velocity of link CD when angle BAD = 60°. BC = AD.
5. Describe the principles of working of brakes of various types.
6. Name various inversions of single slider crank chain. Explain any one.

SECTION-C

7. A shaft which rotates at a constant speed of 160 *r.p.m.* is connected by belting to a parallel shaft 720 mm apart, which has to run at 60, 80 and 100 *r.p.m.* The smallest pulley on the driving shaft is 40 mm in radius. Determine the remaining radii of the two stepped pulleys for a crossed belt and later for an open belt. Neglect belt thickness and slip.
8. A Proell governor has equal arms of length 300 mm. The upper and lower ends of the arms are pivoted on the axis of the governor. The extension arms of the lower links are each 80 mm long and parallel to the axis when the radii of rotation of the balls are 150 mm and 200 mm. The mass of each ball is 10 kg and the mass of the central load is 100 kg. Determine the range of speed of the governor.
9. Draw the cam profile with knife edge follower having a lift of 30 mm. The cam lifts the follower with SHM for 150° of the rotation followed by a dwell period of 60°. The follower descends for the next 100° rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates with a uniform speed of 120 *r.p.m.* and has a least radius of 20 mm. what will be the maximum velocity and acceleration of the follower during the lift and the return period.