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Total No. of Pages : 02

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B.Tech. (ME) (Sem.–3)

THEORY OF MACHINES-I

Subject Code : ME-203

M.Code : 54025

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) Differentiate between machine and mechanism.

b) Enumerate applications of loose and fast pulley arrangement.

c) Enumerate various types of brakes.

d) What do you understand by degrees of freedom?

e) What do you understand by universal joint?

f) What is a kinematic chain?

g) What are relative advantages and disadvantages of chain and belt drives?

h) Why a roller follower is preferred to that of a knife-edged follower?

i) What are the functions of governors?

j) Explain the function of a flywheel.

SECTION-B

2. Explain different kinds of kinematic pairs giving example for each one of them.

3. Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 r.p.m. The coefficient of friction between the belt and the pulley is 0.25, angle of lap 160° and maximum tension in the belt is 2500 N.

4. State the different type of governors. What is the difference between centrifugal and inertia type governors? Why is the former preferred to later?

5. The flywheel of a steam engine has a radius of gyration of 1 m and mass 2500 kg. The starting torque of the steam engine is 1500 N-m and may be assumed constant. Determine: 1. the angular acceleration of the flywheel, and 2. the kinetic energy of the flywheel after 10 seconds from the start.

6. A disc cam is to give SHM to a knife edge follower during out stroke of 50 mm. The angle of ascent is 120°, dwell 60°, and angle of descent 90°. The minimum radius of the cam is 50 mm. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft.

SECTION-C

7. a) Sketch and explain the various inversions of a slider crank chain.

   b) What is the condition of correct steering? Sketch and show the main types of steering gears and discuss their advantages.

8. a) What do you mean by a pantograph and what are its uses? Describe with a neat sketch the principal and working of the pantograph.

   b) A Porter governor has two balls each of mass 3 kg and a central load of mass 15 kg. The arms are all 200 mm long, pivoted on the axis. If the maximum and minimum radii of rotation of the balls are 160 mm and 120 mm respectively, find the range of speed.

9. a) Describe the construction and operation of a prony brake or rope brake absorption dynamometer.

   b) A bicycle and rider of mass 100 kg are travelling at the rate of 16 km/h on a level road. A brake is applied to the rear wheel which is 0.9 m in diameter and this is the only resistance acting. How far will the bicycle travel and how many turns will it make before it comes to rest? The pressure applied on the brake is 100 N and $\mu = 0.05$.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.