Roll No. | | | | | | | | | | |

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech.(ME) (2018 Batch) (Sem.–3)

THEORY OF MACHINES – I

Subject Code : BTME-302-18

M.Code : 76418

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. Write the various types of links.

b. Differentiate between a machine and a structure.

c. What is the condition for correct steering?

d. What are different types of chains?

e. State laws of fluid friction.

f. Write the different types of brakes.

g. What is stability of a governor?

h. Write the difference between lower and higher pairs.

i. What is quarter turn drive?

j. Name the materials used for making belts.

SECTION-B

2. Explain the different types of constrained motion with suitable examples.

3. Write the classification of Cams with suitable sketch.

4. Distinguish between brakes and dynamometers.

5. Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor.

6. In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever.

SECTION-C

7. Give a neat sketch of the straight line motion 'Hart mechanism'. Prove that it produces an exact straight line motion.

8. For a flat belt, prove that $\frac{T_1}{T_2} = e^{\mu\theta}$ where

   T_1 = Tension in the tight side of the belt,

   T_2 = Tension in the slack side of the belt,

   μ = Coefficient of friction between the belt and the pulley, and

   θ = Angle of contact between the belt and the pulley (in radians.)

9. A certain machine requires a torque of $(5000 + 500 \sin \theta)$ N-m to drive it, where θ is the angle of rotation of shaft measured from certain datum. The machine is directly coupled to an engine which produces a torque of $(5000 + 600 \sin 2\theta)$ N-m. The flywheel and the other rotating parts attached to the engine has a mass of 500 kg at a radius of gyration of 0.4 m. If the mean speed is 150 r.p.m., find: 1. the fluctuation of energy, 2. the total percentage fluctuation of speed, and 3. the maximum and minimum angular acceleration of the flywheel and the corresponding shaft position.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.