Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2012 Onwards)/(MARINE ENGG.) (2013 Onwards)
(Sem.–3)

THEORY OF MACHINES–I

Subject Code : BTME-302

M.Code : 59112

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

Write briefly :

1. Why idler pulleys are used in belt drive?
2. Explain the kinematic chain with the help of suitable example.
3. What is the function of a flywheel? How does it differ from that of a governor?
4. Compare the performance of knife-edge, roller and mushroom followers.
5. What is friction? Is it a blessing or curse? Justify your answer giving examples.
6. Differentiate between brake and dynamometer.
7. What is meant by effort and power of a governor?
8. What is the purpose of fast and loose pulley in belt drive? Also mention its applications.
9. What do you understand by hunting?
10. Find the degree of freedom of a four bar mechanism with help of Kutzbach criterion equation.

SECTION-B

11. Sketch and explain any two inversions of a single slider crank chain.

12. Describe the construction and operation of a Bevis-Gibson torsion dynamometer.

13. A belt runs over a pulley of 800 mm diameter at a speed of 180 rpm. The angle of lap is 165° and the maximum tension in the belt is 2 kN. Determine the power transmitted if the coefficient of friction between the belt and the pulley is 0.3.

14. A double acting steam engine develops 56 kW of power at 210 rpm. The maximum and minimum speeds do not vary more than 1% of the mean speed and the excess energy is 30% of the indicated work per stroke. Determine the mass of the flywheel if the radius of gyration of the flywheel is 500 mm.

15. An Ackermann steering gear does not satisfy the fundamental equation of a steering gear at all positions. Yet it is widely used. Why?

SECTION-C

16. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and retardation. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower.

17. In a Wilson-Hartnell type of governor, the mass of each ball is 5 kg. The lengths of the ball arm and the sleeve arm of each bell-crank lever are 100 mm and 80 mm respectively. The stiffness of each of the two springs attached directly to the balls is 0.4 N/mm. The lever for the auxiliary spring is pivoted at its midpoint. When the radius of rotation is 100 mm, the equilibrium speed is 200 rpm. If the sleeve is lifted by 8 mm for an increase of speed of 6%, find the required stiffness of the auxiliary spring.

18. Write note on :

    a) Link, mechanism and structure.

    b) Elliptical trammel

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.