B.Tech.(ME) (2011 onwards)
B.Tech.(Marine Engineering) (2013 Batch)
(Sem.–3)
THEORY OF MACHINES–I
Subject Code : BTME-302
Paper ID : [A1139]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION 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 has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

l. Write short notes on :

1. Is there any difference between speed and velocity? Give examples.

2. Define 'angular velocity' and 'angular acceleration'. Is there any relation between them?

3. What is meant by simple pendulum? Draw and explain.

4. What is lower pair? Explain with example.

5. A mechanism consists of n links. How many total number of instantaneous centres will it have?

6. Discuss briefly the various types of friction experienced by a body.

7. Which of the two assumptions - uniform pressure or uniform wear, would you make use of in designing friction clutch and why?

8. What is meant by initial tension of a belt?

9. Draw the turning moment diagram of a single cylinder double acting steam engine.

10. What is meant by 'coefficient of insensitiveness' of governors?

SECTION B

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

3. Draw and explain working of Pentograph.

4. Derive the condition for maximum power transmission in a flat belt drive.

5. Describe with a neat sketch a centrifugal clutch and deduce an equation for the total torque transmitted.

6. Explain the terms and derive expressions for 'effort' and 'power' of a Porter governor.

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 three cylinder single acting engine has its cranks set equally at 120° and it runs at 600r.p.m. The torque-crank angle diagram for each cycle is a triangle for the power stroke with a maximum torque of 90 N-m at 60° from dead centre of corresponding crank. The torque on the return stroke is sensibly zero. Determine power developed. Also find coefficient of fluctuation of speed, if the mass of the fly wheel is 12 kg and has a radius of gyration of 80 mm. Also find coefficient of fluctuation of energy and maximum angular acceleration of the flywheel.

9. A cam drives a flat reciprocating follower in the following manner : During first 120° rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with SHM. The follower dwells for the next 90° of cam rotation. The minimum radius of the cam is 25 mm. Draw the profile of the cam.