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

Total No. of Questions : 09

B.Tech.(ME) (2011 Onwards) (Sem.–4)

THEORY OF MACHINES – II

Subject Code : BTME-402

M.Code : 59130

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

Q1. Write briefly :

a. What is free body diagram?

b. What is dynamically equivalent system?

c. Classify gears based on the position of teeth on wheel.

d. Reciprocating masses cannot be balanced completely. Why?

e. Give two applications of worm gears.

f. Name two phases of kinematic synthesis.

g. Compare involute and cycloidal tooth profiles.

h. What do you understand by dimensional synthesis of pre-conceived type of mechanism?

i. Define transmission angle.

j. Write the right hand screw rule for determining the gyroscopic motion parameters.

SECTION-B

2. How is the friction effect taken into account at the turning and sliding pairs of a mechanism? Explain in detail.

3. Four masses m_1, m_2, m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45°, 75°, and 135°. Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.

4. Explain how are the gear train classified. Give atleast one distinguished feature of each type.

5. A pinion of 20 involute teeth and 125 mm pitch circle diameter drives a rack. The addendum of both pinion and rack is 6.25 mm. What is the least pressure angle which can be used to avoid interference? With this pressure angle, find the length of the arc of contact and the minimum number of teeth in contact at a time.

6. Prove that the resultant unbalanced force is minimum when half of the reciprocating masses are balanced by rotating masses.

SECTION-C

7. In a epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m in the clockwise direction, what will be the speed of gear B?

8. The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship : (a) when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h. (b) when the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees.

9. Explain the following :

   (a) Two and Three point synthesis.

   (b) Simple and compound gear trains.

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.