

3315

B. Tech. (ME) 6th Semester (G Scheme)
Examination, July-2022

DYNAMICS OF MACHINES
Paper-PCC-ME-308-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt five questions in all, selecting at least one question from each unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Explain the following : 6×2.5=15
- (a) What do you mean by constraint forces and applied forces ?
 - (b) Why is balancing of rotating parts necessary for high speed engines ?
 - (c) Explain the term height of the governor.
 - (d) Distinguish between brakes and dynamometers.
 - (e) Explain what is meant by applied torque and reaction torque.
 - (f) What do you mean by spin, precession and gyroscopic planes ?

Unit-I

2. (a) What are free-body diagrams of a mechanism ? 8

3315-P-3-Q-9 (22)

[P. T. O.]

(2)

3315

(b) What do you mean by equivalent offset inertia force ? 7

3. State and explain D'Alembert's principle. 15

Unit-II

4. Four masses m_1 , m_2 , m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radiuses of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angle 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. 15

5. Explain the 'Direct and reverse crank' method for determining unbalanced forces in radial engines. 15

Unit-III

6. A porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and is 200 mm when the governor is at maximum speed. Find the minimum and maximum speed and range of speed of the governor. 15

(3)

3315

7. Describe with sketches of torsion dynamometer and explain with detail the calculation involved in finding the power transmitted. 15

Unit-IV

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 stem. 15

(i) When the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.

(ii) 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 gyroscopic couple and centrifugal couple for stability of a two wheel vehicle while taking a turn. 15