F 3337 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Mechanical Engineering

ME 010 702—DYNAMICS OF MACHINES (ME)

(New Scheme—2010 admission onwards)

[Regular / Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Explain Hammer blow and swaying couple.
2. What are the different types of vibrations ? Explain.
3. Write down the differential equation of motion for a two degree of vibrating system.
4. Explain shock spectrum.
5. Define acoustic impedance.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

1. Derive the expression for variation of tractive effort.
2. Explain the behaviour of a system subjected to under, over and critically damped conditions.
3. Explain the function of a vibration absorber.
4. Derive the expression for critical speed of a shaft.
5. Briefly explain the process of recording and reproduction of sound.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

1. For Masses A, B, C and D are completely balanced. Masses C and D makes angle of 90° and 210° respectively with B in the same sense. The planes containing B and C are 300 mm apart. Masses A, B, C, and D can be assumed to be concentrated at radii of 360, 480, 240 and 300 mm respectively. The masses B, C and D are 15 kg, 25 kg and 20 kg respectively. Determine (a) mass A and its angular position (b) positions of planes A and D.

(12 marks)

Or

2. A single cylinder reciprocating engine has a reciprocating mass of 60 kg. The crank rotates at 60 r.p.m. and the stroke is 320 mm. The mass of the revolving parts at 160 mm radius is 40 kg. If two-thirds of the reciprocating part and whole of the revolving parts are to be balanced, determine the (a) balance mass required at a radius of 350 mm ; (b) unbalanced force when the crank has turned 50° from TDC.

(12 marks)

3. A vibrating system consists of a mass of 50 kg, a spring with a stiffness of 30 kN/m and a damper. The damping provided is only 20% of the critical value. Determine (a) damping factor ; (b) critical damping coefficient ; (c) natural frequency of damped vibrations ; (d) logarithmic document.

(12 marks)

Or

4. A machine part having a mass of 2.5 kg vibrates in a viscous medium. A harmonic exciting force of 30 N acts on the part and causes a resonant amplitude of 14 mm with a period of 0.22 second. Find the damping coefficient.

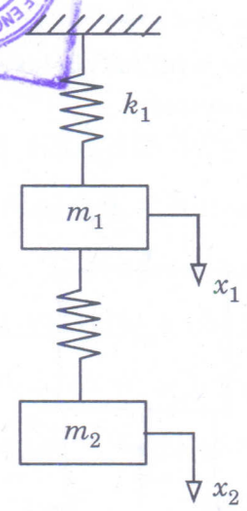
(12 marks)

5. A two DOF is shown in figure. Determine :

   (a) The two natural frequencies of vibrations.

   (b) Ratio of amplitudes of motion of m_1 and m_2 for the two modes of vibration.

   (c) Mode shapes.



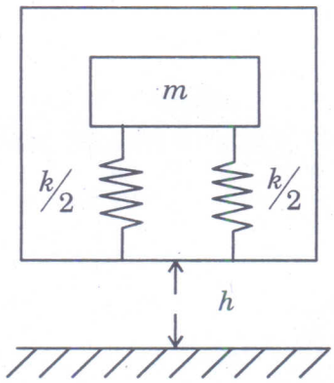
(12 marks)

Or

6. A 1.2 m log shaft has a dia of 45 mm for half the length and 60 mm for the remaining length. One end of the sahft is fixed and the other carries a rotor of 200 kg mass with a radius of gyration of 45 mm. Find the frequency of the torsional vibration neglecting the inertia of the shaft. Take G = 84 GN/m^2.

(12 marks)

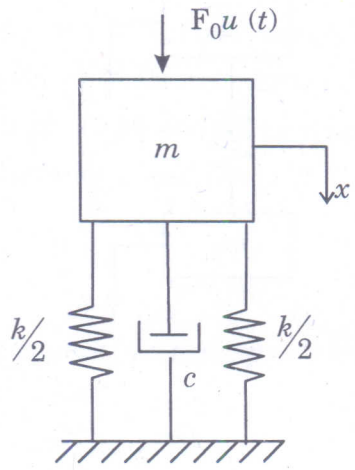
7. An apparatus of mass 'm' is shipped in a container as shown in figure. In the process of unloading, the container is dropped from a height 'h' to a hard floor. Find the response of the system.



(12 marks)

Or

8. A spring mass system shown in figure is initially relaxed and a step function excitation is applied to the mass. Find the response of the system.



(12 marks)

9. With a neat sketch explain the working of a sound level meter. (12 marks)

Or

10. In a warehouse there are 4 machines. M/C 1 produces a sound power of 1 W. M/Cs 2, 3 and 4 produce an acoustical power of 0.5, 0.75 and 1.25 W respectively. What is the total power level generated in the area by the fan M/Cs.

(12 marks)

[5 × 12 = 60 marks]