G 1124 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

Seventh Semester

Branch : Mechanical Engineering

DYNAMICS OF MACHINERY (M)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Differentiate between static balancing and dynamic balancing.
2. What do you mean by primary and secondary unbalance in reciprocating mass ?
3. Determine the natural frequency of the spring mass pulley system shown in Fig. 1.

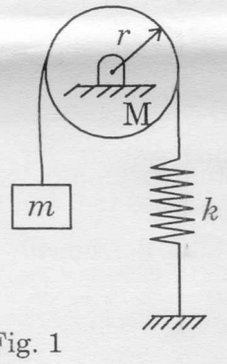

Fig. 1

4. Show that the ratio of two successive amplitudes of oscillations is constant in a damped vibrating system.
5. Discuss the inertia effect of mass of the shaft on natural frequency.
6. Write note on Vibration Absorbers.
7. What is critical speed ? Explain.
8. Construct the trajectories of a simple harmonic oscillator by method of isoclines.

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9. Explain the physiological effects of noise.

10. Differentiate between noise control at the source and along the path.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Four masses A, B, C and D are completely balanced masses C and D make angles of 90° and 210° respective by 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 the :

(i) Mass A and its angular position.

(ii) Positions of planes A and D.

Or

12. A radial engine has 3 cylinders whose axes are spaced at angular intervals of 120°. The three connecting rods are coupled directly to a single crank. The stroke is 120 mm, and the length of each connecting rod is 180 mm. The mass of the reciprocating parts per cylinder is 2 kg. Find the resultant primary and secondary forces acting on the frame of the engine when running at 210 r.p.m.

13. In a single degree damped vibrating system, the suspended mass of 4 kg makes 24 oscillations in 20 seconds. The amplitude decreases to 0.3 of the initial value after 4 oscillations. Find the stiffness of the spring, the logarithmic decrement, the damping factor and damping coefficient.

Or

14. A centrifugal fan of mass 5 kg has a rotating unbalance of 0.25 kg-m. When the dampers having a damping factor of 0.2 are used, specify the spring for mounting such that only 10% of the unbalanced force is transmitted to the floor. Also determine the magnitude of transmitted force. The fan is running at a constant speed of 1000 r.p.m.

15. Determine the natural frequencies, eigen values and mode shapes of the system shown in Fig. 2 by matrix method :

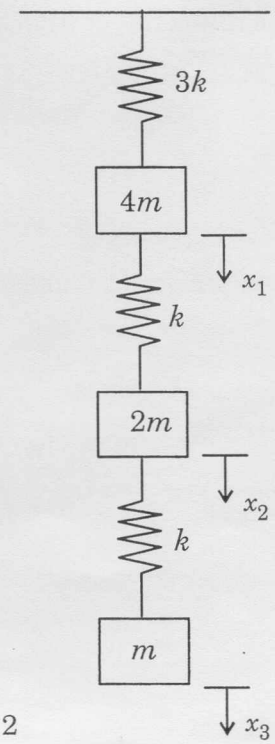

Fig. 2

Or

16. A shaft carries three rotor A, B and C. The moment of inertia of the three rotors A, B and C are 7.5 kgm^2, 22.5 kgm^2 and 12.5 kgm^2 respectively. The distance between A and B is 1.25 m and between B and C is 4 m. The shaft is 40 mm in diameter and modulus of rigidity for the shaft material is 85 GN/m^2. Find :

    (i) The frequency of torsional vibrations ; (ii) Position of nodes.

17. A spring-mass system is shown in Fig. 3. If the system is initially relaxed and a step-function excitation is applied to the mass. Find the response of the system :

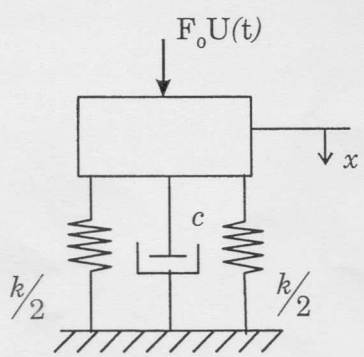

Fig. 3

Or

18. A non-linear spring for a single degree freedom system is given by K $(x) = 10x + 2000\ x^3$. C for viscous damping is 1.5 kg sec/cm. A harmonic force 5 kg amplitude acts on the mass = 1 kg. Find the steady-state response using the direct integration method.

19. Explain the various methods used in controlling industrial noise.

Or

20. Write short notes on :

    (a) Octave band analysis and its importance.

    (b) Subjective and objective assessment of sound.

(5 × 12 = 60 marks)