GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

BD17002010

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AR-17

M.TECH 1ST SEMESTER EXAMINATIONS(BACK), NOV/DEC 2019

MD,MMDPC1030

MACHINE VIBRATION

Time: 3 Hours Max Marks : 70

The figures in the right hand margin indicate marks.

PART-A (10 X 2=20 MARKS)

1. Answer the following questions.
   a) What is Rayleigh's method, write its applications.
   b) Define Force vibration.
   c) What is meant by viscous damping.
   d) What is logarithmic decrement?
   e) How can we make a system to vibrate in one of its natural made?
   f) What happens to the response of an undamped system at resonance?
   g) What are the causes of vibration?
   h) Define the terms: phase angle, frequency, period and natural frequency
   i) Explain Damped system.
   j) What is meant by first and second mode of vibration?

PART-B (5 X 10=50 MARKS)

Answer any five questions from the following.

2. In a forced vibration with degree of freedom=1; the exciting Force is given by F=100Sin (2 t) Newton where t is time in second stiffness constant K=500 N/m; m=100 kg, damping coefficient c=0.2N. sec/m, Determine:
   a) natural frequency and Damping Ratio (6)
   b) equation of position (4)

3.Spring-mass system consists of a spring of stiffness 350 N/m. The mass is 0.35 kg. The mass is displaced 20 mm beyond the equilibrium position and released. The damping coefficient is 14 N.s/m. Determine

(a) Critical damping coefficient and damped natural frequency. (6)

(b) Logarithmic decrement. (4)

4.

a) Why is it important to find the natural frequency of a vibrating system? (2)

b) Two rotors having equal masses of 60 kg each and radius of gyration 0.3m are keyed to both ends of a shaft 0.8 m long. The diameter of the shaft is 0.08 m for 0.30 m length, 0.10 m for the next 0.2 m length and 0.09 m for rest of the length. Find the frequency of tensional vibrations. Take $G = 9 \times 10^{11}$ N/m^2.

(8)

5.

a)Explain about the vibration isolation and transmissibility and justify your answer with mechanical vibrations. (5)

b).A machine of 100kg mass is supported on a spring of total stiffness 720Kn/m and has unbalanced rotating element, which results in the disturbing mass of 350N rotating at 3000rpm.Assuming a damping

factor 0.2 determine

(1) amplitude due to unbalanced mass (2) Transmissibility (3) Transmitted force (5)

6.

a) What is the difference between a vibration absorber and a vibration isolator? (2)

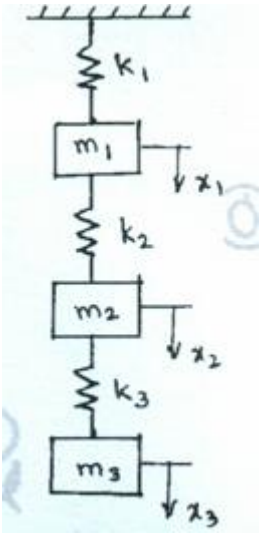
b). Find the total response of a single degree freedom system with m=10kg, c= 50 N.s/m. and k=2000 N/m under the action of harmonic force *F=F0 sin wt* with *F0=200 N and w*= 31.416 rad /s. The initial condition are initial displacement is 0.01 and initial displacement=5 m/s at t=0. (8)

7.

a) Find the first natural frequency for the system shown in Fig. by matrix iteration method. (5)

b) draw the mode shape for the system shown in Fig. by matrix iteration method. (5)

Take k1= k2 = k3 = k and m1 = m2 = m3= m.



8.

a) Derive the fundamental equation for the lateral vibration of Beams and determine the natural frequency of a simply supported beam. (5)

b) Determine the normal functions for free longitudinal vibration of a bar of length L and uniform cross-section. One end of the bar is fixed and the other free. (5)

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