B.E. Eighth Semester (Mechanical Engineering) (C.B.S.)

Elective - III : Mechanical Vibrations

P. Pages : 3 **KNT/KW/16/7591**

Time : Three Hours * 0 2 2 9 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Use of non programmable calculator is permitted.

1. a) Define Free & Fixed vibrations with examples. **5**

b) Determine the natural frequency of vibration for spring mass pulley system as shown in figure (1). **8**

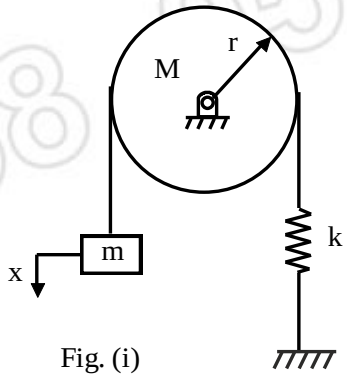


Fig. (i)

OR

2. a) What do you mean by Vibration Isolation? Explain the different methods used. **6**

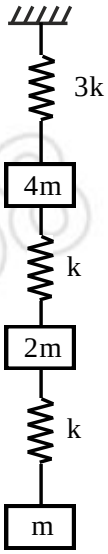
b) A vibratory system in a vehicle is to be designed with following parameters : **7**
$k = 100 N/m, C = 2N - sec/m, m = 1kg$
Calculate the degrees of amplitude from its starting value after 3 complete oscillators & frequency of oscillation.

3. a) Explain Dynamic Vibration Absorber with differential Equation. **7**

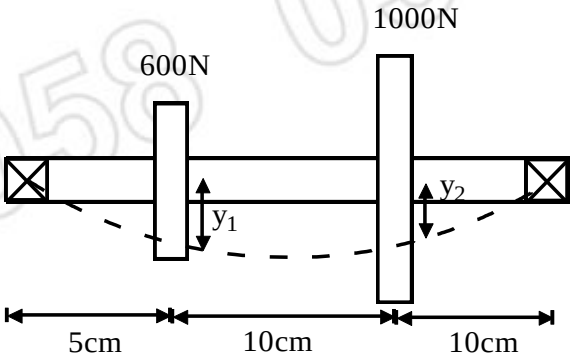
b) A machine runs at 5500 rpm. Its forcing frequency is very near to the natural frequency. If the nearest frequency of the machine is to be atleast 20 percent from the forced frequency, design a suitable vibration absorber for the system. Assume the mass of the machine as 30kg. **7**

OR

4. Determine the influence coefficients of the three degree of freedom spring mass system as shown in figure & hence find out the three natural frequencies of the system. **14**

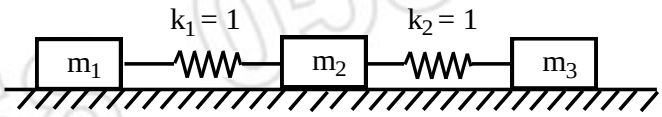


5. A solid steel shaft of uniform diameter, carrying two disc as shown in fig. Determine the fundamental natural frequency assuming $E = 19.6 \times 10^6 \, N/cm^2$ & $I = 40 \, cm^4$. **13**

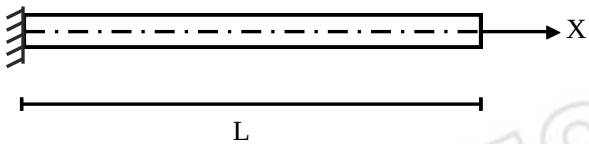


OR

6. Using Holzer method, determine the natural frequencies of the spring mass system as shown in fig. Take $m_1 = m_3 = 1kg$ & $m_2 = 2kg$. **13**

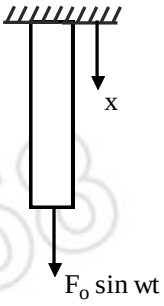


7. A rectangular bar of length 'L' and uniform Cross Section having longitudinal Vibrations. Derive the frequency equation if one end of the bar is fixed and other end is free. **13**

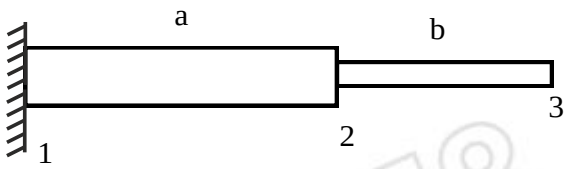


OR

8. Determine the longitudinal vibrations of uniform bar of length 'L' subjected to a sinusoidal force $F_o \sin \omega t$ at the free end, as shown in fig. **13**



9. Determine the equation of motion for the longitudinal vibration of the two section bar as shown in figure using FEM. **13**



OR

10. Derive the transformation co-ordinates matrix for the planar structure. **13**

11. a) Explain vibration measuring Instruments. **7**

b) How will you analyse condition monitoring results on FFT. **7**

OR

12. Write short note on : **13**

a) Accelerometer.

b) Seismometer.

c) Discrete F.T.

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