



Mechanical Vibration (1030 / 1040)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
 2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
 3. Students should note, no supplement will be provided.
 4. Solve **any five** questions.
 5. Figures with right indicates full marks.
 6. Use of non programmable calculator is allowed.
 7. Assume suitable data if necessary.
1. a) For the three degree system shown in figure obtain the three natural frequencies and corresponding mode shapes. **10**

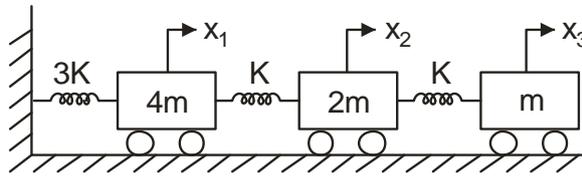


Fig. 1 (a)

- b) Explain influence coefficients and find stiffness influence coefficient and flexibility influence coefficients of the system shown in figure. **10**

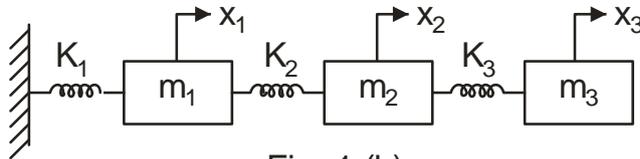


Fig. 1 (b)

2. a) Develop a wave equation for string element in lateral vibration. **10**
Also Determine C_n and D_n for a uniform string of length ℓ which is fixed at the ends and stretched under tension T . If the string is displaced into an arbitrary shape $(x, 0)$ and released.

- b) Determine the response of a single DOF system to the step excitation shown in figure. 10



3. a) A line shaft carries five pulleys P, Q, R, S & T equally spaced along the shaft. The masses of the pulleys P, R and S are 10, 8 & 16 kg respectively. The eccentricity of all pulley masses can be assumed equal. The angular distance between P and R is 90° and R and S is 135° measured in the same direction. 10
Find the masses of pulleys Q and T and their angular position so that the shaft is Completely Balanced.
- b) Explain Vibration Absorber. 10
4. a) Explain Experimental Modal Analysis. Considering an example of structural or mechanical system. 10
- b) Explain Machine condition Monitoring and Diagnosis. 10
5. a) Explain correlation function of a Random Process. 10
- b) Explain the following terms : 10
- i) Jump phenomenon.
- ii) Phase plane Representation.
6. a) Explain the following terms : 10
- i) Decibel Scale.
- ii) Sound pressure level and Intensity level.
- b) i) Add the noise of six machines which individually make a noise level of 78, 81, 81, 79, 72, 65 dB respectively. 5
- ii) Explain methods for Reduction of Vibration for Noise. 5
7. Write short notes on **any four**. 20
- i) Noise Measurement.
- ii) Duffings Equation.
- iii) Self excited Vibration.
- iv) Untuned Viscous damper
- v) Dynamic Balancing.
