

Total No. of Questions : 7]

SEAT No. :

P4062

[5255]-560

[Total No. of Pages : 3

M.E. (Mechanical) (Design Engineering)
ADVANCED MECHANICAL VIBRATIONS
(2013 Credit Pattern) (Semester-II) (502208)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Answer any five questions.*
- 2) *Draw Neat diagrams wherever necessary.*
- 3) *Use of non-programmable scientific calculator is allowed.*
- 4) *Assume suitable data wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Find the natural Frequency and mode shapes of three degree of freedom system as shown in Fig. Q. 1 using matrix method (Eigen values and eigen vector). **[10]**

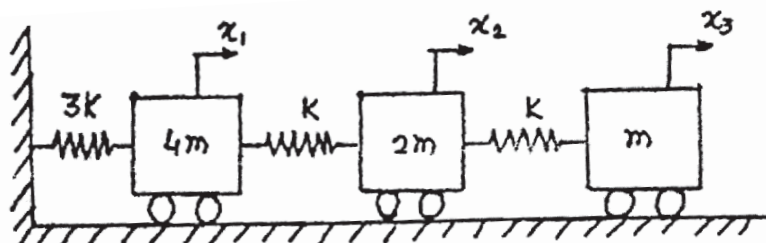


Fig. Q. 1

Q2) A bar fixed at one end is pulled at the other end with a force 'F' as shown in Fig. No. 2. The force is suddenly released. Investigate the vibration of the bar. **[10]**

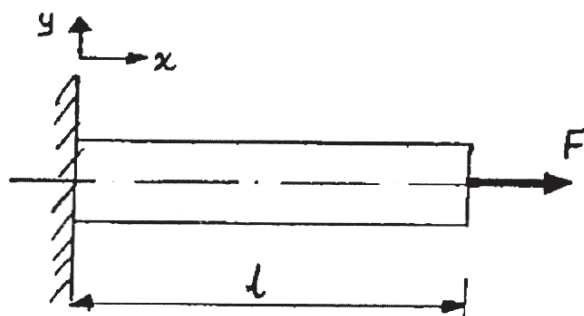


Fig. No. 2

P.T.O.

- Q3) a)** Derive the wave Equation for the transverse vibration of a string. [5]
- b)** Determine flexibility influence coefficient of the triple pendulum of lengths L_1 , L_2 , L_3 and masses m_1 , m_2 , m_3 attached by the string as shown in Figure No. 3. [5]

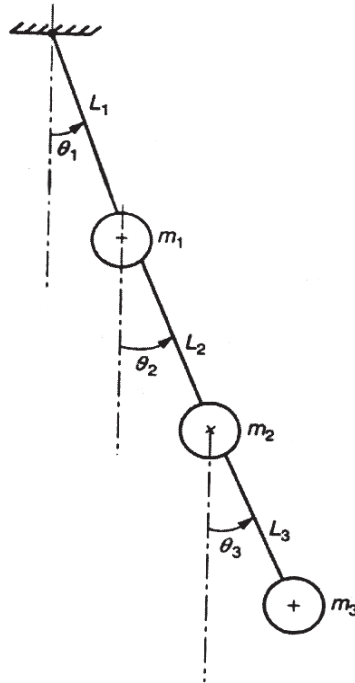


Figure No. 3

- Q4)** Derive expression for dimensionless displacements in un-damped dynamic vibration absorber in terms of the parameters of the system. For the tuned Absorber, show: [10]
- a) The relationship between response speed and mass ratio
- b) Frequency response curves for main system and absorber
- Q5) a)** State and explain different machine condition monitoring and machine vibration monitoring techniques. [5]
- b)** Explain significance of using FFT analyzer in vibration with its merits and demerits. [5]

- Q6)** a) Give three examples of random input. How will you proceed to find their Spectral Density? [5]

Calculate the Autocorrelation function corresponding to the ideal white noise and to the unit step function.

- b) Explain with neat sketch wide-band and narrow band processes. Define white noise, ideal noise and band limited noise. [5]

Q7) Write notes on (Any Four): [10]

- a) Free vibration of string with various boundary conditions
- b) In-situ Balancing Method
- c) Noise absorber
- d) Influence coefficients
- e) Auto correlation function

