

[5060]-587

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

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) Using matrix iteration technique, calculate all the natural frequencies of the system shown in figure Q.1. **[10]**

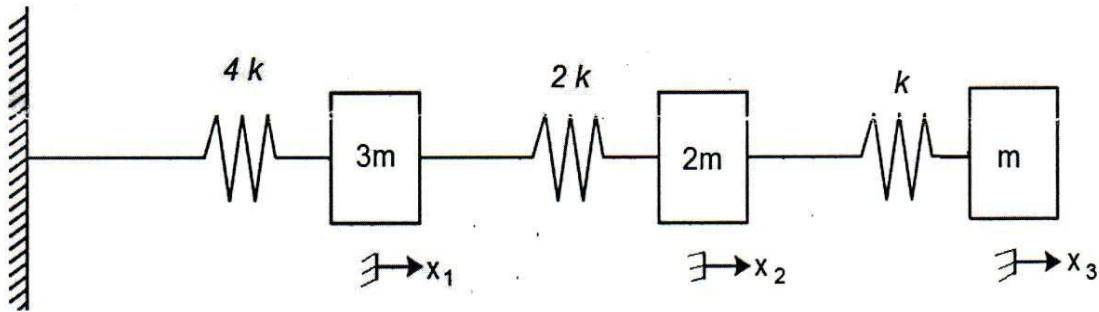


Figure: Q.1

- Q2)** a) Derive the wave equation for the string. **[3]**
- b) How does a continuous system differs from discrete system in the nature of equation of motion? **[2]**
- c) Determine the natural frequencies of vibration of a uniform beam fixed at $x = 0$ and simply supported at $x = l$. **[5]**

Q3) What is transient vibration? How to find response of single degree of freedom system against unit impulse? How to find the response of a single degree of freedom system to an arbitrary excitation and against arbitrary ground excitation? [10]

Q4) Analyze undamped dynamic vibration absorber and show frequency response for main system and absorber system. [10]

Q5) a) State the three types of maintenance schemes used for machinery. Explain how time domain and frequency domain techniques are used for condition monitoring. [5]

b) Explain FFT analyzer with block diagram. [5]

Q6) a) Derive an expression for spectral density of the derived process. [5]

b) Calculate the Autocorrelation function corresponding to the ideal white noise and to the unit step function. [5]

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

a) Frequency Measuring Instruments

b) In-situ Balancing of rotors

c) Holzer Method

d) Fault Diagnosis

e) Analysis of Narrow and Wide band systems.

