

G.R. No.

Paper Code - P119-152 (ESE)

**DECEMBER 2019 / END-SEM****F. Y. M. TECH. (MECHANICAL) (SEMESTER - I)****COURSE NAME: ADVANCED VIBRATIONS AND  
ACOUSTICS****COURSE CODE: MEPA11182****(PATTERN 2018)**

Time: [3 Hour]

[Max. Marks: 50]

**(\*) Instructions to candidates:**

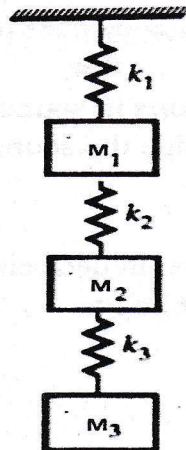
- 1) Answer Q.1, Q.2, Q.3, Q.4 OR Q.5, Q.6 OR Q.7, Q.8 OR Q.9
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) A spring mass system has spring constant of 'K' N/m and the mass W kg. It has natural frequency of cantilever as 12 CPS. An extra 2 Kg mass is coupled to W and natural frequency is reduced by 2 CPS. Determine K and W. [3 marks]

**OR**

b) The successive amplitudes of vibration of vibratory system is obtained under free vibrations are 0.69, 0.32, 0.19, 0.099 units respectively. Determine the damping ratio of the system [3 marks]

Q.2) a) Determine influence coefficient of the spring mass system. Take  $K_1=3K$ ,  $K_2=2K$  and  $K_3=K$ . [3 marks]





**OR**

b) What is application of Matrix Iteration Method? Explain with example. [3 marks]

Q.3) a) What is Continuous System? Explain with example. [2 Marks]

**OR**

b) What is the application of mode summation method? [2 marks]

Q.4) a) Enlist different vibration measurement methods. Vibrometer and Velometer with neat sketch. [6 marks]

b) Enlist different vibration exciters with its application. Explain importance of frequency domain analysis of signals. [8 marks]

**OR**

Q.5) a) What is vibration isolation? Explain different methods of vibration isolation. What are the Input and output parameters of vibration isolation [6 marks]

b) What is experimental modal analysis? Explain shaker testing with neat sketch [8 marks]

Q.6) a) Calculate the sound pressure level if 1) rms pressure value is 30  $\mu\text{Pa}$ . 2) find pressure level if sound pressure level is 40 dB and the reference pressure is 20 micro pascal [6 marks]

b) What is acoustics? Describe mathematical correlations in planer wave acoustics and its propogation. [8 marks]

**OR**

Q.7) a) Explain the behavior of sound in an enclosure with suitable example [6 marks]

b) What is the significance of dB scale? Describe the parameters used for measurement of sound? Determine sound pressure level if the rms sound pressure is 1 Pa. [8 marks]

Q.8) a) Prove that for one dimensional flow through pipe of uniform cross section, the wave equation is given as [6 marks]

$$\left(\frac{\partial}{\partial t} + u_0 \frac{\partial}{\partial x}\right)^2 p' - c_0^2 \frac{\partial^2 p'}{\partial x^2} = c_0^2 \left(\rho_0 \frac{\partial^2 \beta}{\partial t^2} - \frac{\partial f_x}{\partial x}\right).$$

b) What is masking? Explain masking by pure tones and masking by noise. [8 marks]

**OR**

Q.9) a) Write the mathematical correlations in sound power showing total sound power and nth sound power level. Determine the sound power level of the source that generate 1.5 W and 2.2 W. [6 marks]

b) Calculate the sound intensity level in decibels for a sound wave traveling in air having a pressure amplitude of 0.656 Pa [8 marks]