P111-252-DyE-ESE

Total No. of Questions – [06] Total No. of Printed Pages: 02

G.R. No.	

May 2022 / INSEM+ENDSEM

F. Y. M. TECH. (DESIGN ENGINEERING) (SEMESTER – I)

COURSE NAME: ADVANCED VIBRATIONS AND ACOUSTICS

COURSE CODE: MEPA11202

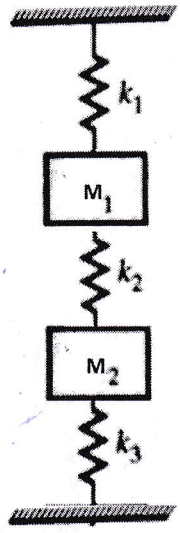
(PATTERN 2020)

Time: [3 Hours] [Max. Marks: 60]

(*) Instructions to candidates:

1) **All Questions are compulsory**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) What is significance of damping coefficient? Determine resultant motion of m1 and m2 (Fig-C) for the following cases 1) m1 up by 5mm and m2 hold fixed 2) m1 down by 5mm and m2 up by 7.5 mm. Take m1=m2=9.8, K1=K3=8820N/m and K2=3430 N/m [10 Marks]



Q.2) Categories and explain the different types of damping. Derive the expression for Logarithmic decrement. 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 [10 Marks]

Q.3) What is continuous system? Derive the one dimensional wave equation and its generalized solution for lateral vibration of string as a continuous system. Assume that the string is fixed at both ends. Apply this boundary condition

and determine the frequency equation of the system. [10 Marks]

Q.4)a) Explain the block diagram of FFT spectrum analyzer . What is the significance of frequency domain analysis over time domain analysis.? Describe the Experimental model analysis. Explain electrodynamic and hydraulic [10 Marks]

Q.5) a) Explain sound, noise and speech measuring devices. [4 Marks]

b) What is acoustics Impedance? Correlate it with acoustic energy and Reflection coefficient [6 Marks]

Q.6) 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) Write short Notes on 1) Beats 2) Masking by pure tones [4 marks]

****