

M.Tech. Mechanical Engineering Design (CBCS) Semester - I
MED13 - Mechanical Vibrations

P. Pages : 2

Time : Three Hours



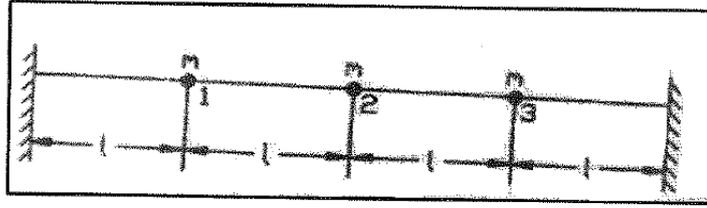
GUG/S/23/14188

Max. Marks : 70

- Notes :
1. Answer **any five**.
 2. All questions carry equal marks.
 3. Due credit will be given to neatness and adequate dimensions.
 4. Assume suitable data wherever necessary.
 5. Illustrate your answers wherever necessary with the help of neat sketches.
 6. I.S. Hand book for structural steel section, I.S. Code 8000/1962 or 1964, I.S. 456 (Revised), I.S. 875 May be consulted.
 7. Discuss the reaction, Mechanism wherever necessary.

1. a) Define vibration and Elaborate main causes of vibration. **7**
b) Explain terms related to vibration **7**
 - a) Force vibration
 - b) Free or natural vibration
 - c) Damped vibration
 - d) Longitudinal vibration
2. a) Write short note on the effects of vibration. **7**
b) Explain damped single degree freedom system and different types of damping **7**
3. a) A gun barrel of mass 600 Kg has a recoil spring of stiffness 294,000 N/m. If the barrel recoils 1.3 meters on firing, Determine **14**
 - (a) The initial recoil velocity of the barrel
 - (b) The critical damping coefficient of the dashpot which is engaged at the end of the recoil stroke.
 - (c) The time required for the barrel to return to a position of 5cm from the initial position.
4. a) Explain the Fourier series transform method by harmonic analysis. **7**
b) Explain multi degree freedom system by matrix formulation. **7**
5. A string is stretched with a large tension T between two points and has three point masses fixed along its length as shown in figure. The masses can vibrate freely in the lateral direction, **14**
 - A) Determine the flexibility matrix and write the differential equation of motion in matrix form in term of flexibility matrix.

- B) determine the stiffness matrix and write the differential equations of motion in Matrix form in terms of stiffness matrix.



6. a) Explain lateral vibration of beams. 7
- b) Explain in brief the continuous system of longitudinal vibration of Bars. 7
7. a) Describe Displacement Measuring Instruments or Vibrometers. 7
- b) A vibrometer has a period of free vibration of 2 sec. It is attached to a machine with a vertical harmonic frequency of 1hz. If the Vibrometer mass has an amplitude of unit 2.5 mm relative to the Vibrometer frame, what is the amplitude of vibration of machine. 7
8. a) Derive transient analysis Using Laplace Transform. 7
- b) Explain Acceleration measuring instruments or accelerometers. 7
