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Total number of pages:[2]

**B.Tech. || ME || 7<sup>th</sup>Sem**  
**Mechanical Vibrations**

**Subject Code: BTME-803**

**Paper ID:**

**Time allowed: 3 Hrs**

**Max Marks: 60**

**Important Instructions:**

- All questions are compulsory
- Assume any missing data

**PART A (10x 2marks)**

Q. 1. Short-Answer Questions:

- (a) What are different types of vibration?
- (b) What do you mean by compound pendulum?
- (c) Define the terms, Degree of freedom, Amplitude.
- (d) What are the different materials used for vibration isolation?
- (e) What are uses of dampers?
- (f) What do you mean by the term resonance in vibrations?
- (g) What is condition for which a vibration absorber is termed as dynamic vibration absorbers?
- (h) What are the different types of damping?
- (i) Write down the formula for calculating the Degree of freedoms for a vibrating system.
- (j) Write down the equation of motion for the single degree of freedom system in which harmonic force is acting on the system.

**PART B (5x8marks)**

Q. 2. A body of 5kg is supported on a spring of stiffness 200N/m and has dashpot CO1 connected to it which produces a resistance of 0.002N at a velocity of 1cm/sec. In what ratio will the amplitude of vibration be reduced after 5 cycles.

OR

Derive an expression for the longitudinal vibrations of bars.

Q. 3. A body describes simultaneously two motions  $x_1 = 3\sin 40t$ ,  $x_2 = 4\sin 41t$ . What CO2 is the maximum and minimum amplitude of combined motion and beat frequency?

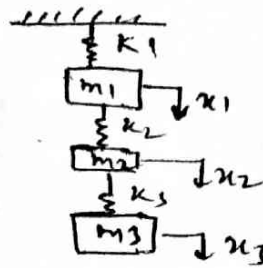
OR

Define logarithmic decrement? Derive its formula and also the relation between logarithmic decrement and vibration energy.

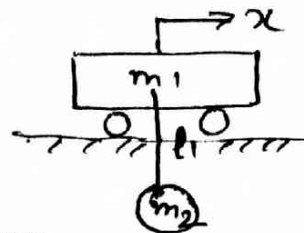
- Q. 4. What are different vibration measuring instruments? Explain with neat sketch any one of them. CO3

OR

Determine the natural frequency of the system of the spring mass system shown in Fig. Take  $m_1=m_2=m_3=m$  and  $k_1=k_2=k_3=k$ . Using Stodola's method.

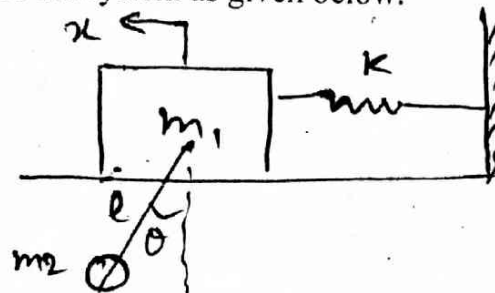


- Q. 5. Explain the natural frequency of the system as given below. CO4

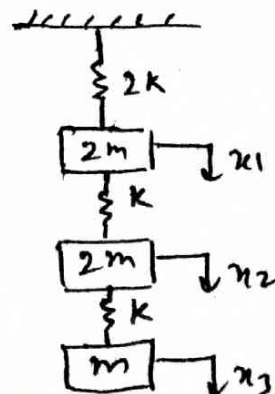


OR

Find the natural frequency of the system as given below.



- Q. 6. Using matrix method, determine the natural frequencies of the system as shown in the figure below. CO5



OR

A shaft of negligible weight 6 cm diameter and 5 m long is simply supported at the ends and carries four weights 50 kg each at equal distance over the length of the shaft. Find the frequency of the vibration. Take  $E=2 \times 10^6 \text{ kg/cm}^2$ . CO5