Roll No												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JAN 2023

Course Code: MEC 212

Course Name: MECHANICAL VIBRATIONS

Program & SEM: B.Tech – VI SEM

Date: 27-JAN-2022

Time: 9.30 AM to 12.30 PM

Max Marks: 100

Weightage:50%

Instructions:

(i) Read the all questions carefully and answer accordingly.

(ii) Scientific calculator is permitted

(iii) *Assume any missing data*

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 5 marks. (5Qx 5M= 25M)

1. Define Vibrations. Explain Beats Phenomenon with a neat sketch. (C.O.No.1) [Knowledge level]
2. Define i) Resonance ii) Phase Difference (C.O.No.3) [Knowledge level]
3. Determine the effect of the mass of the spring on the natural frequency of the syst (C.O.No.2) [Application level]
4. What are different types of vibrations? Explain any one in detail. (C.O.No.1) [Knowledge level]
5. Explain Vibro meter with a neat sketch. (C.O.No.4) [Knowledge level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 10 marks. (3Qx10M=30M)

6. The Spring of an automobile trailer are compressed 0.1m under its own weight. Find the critical speed when the trailer over a road with a profile approximated by a sine wave of amplitude 0.08m and wave length 14m. What will be the amplitude of vibration at 60Km/hr? [C.O.No.3) [Application level]
7. Define Logarithmic Decrement and show that it can be expressed as $\delta=1/n \ln (xo/xn)$ (C.O.No.4) [Application]
8. Vibrometer gives a reading of relative displacement of 0.5 mm. The natural Frequency of vibration is 600rpm and the machine runs at 200 rpm, Determine the magnitude of displacement, velocity and acceleration of vibrating machine part. [C.O.No.3)[Application level]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 15 marks. (3Qx15M=45M)

9. Use the Stodola method to determine the lowest natural frequency of four degrees of freedom spring mass system as shown in Fig.2

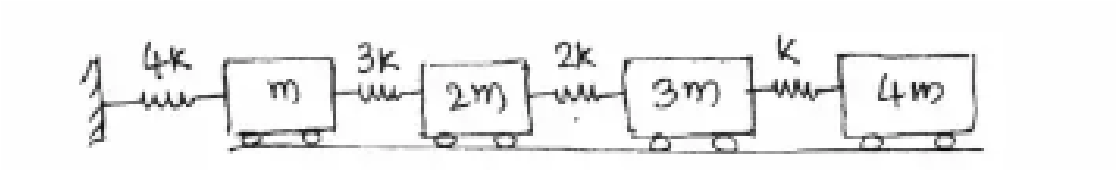

Fig.2 (C.O.No.4) [Application level]

10. Add the following harmonic motions and check the solution graphically.

$X1=2\cos(\omega t +0.5)$; $X2=5\sin(\omega t +1.0)$

(C.O.No. 1) [Application level]

11. The weight of an electric motor is 125N and it runs at 1500 rpm.The armature weighs 35N and its centre of gravity lies 0.05 cm from the axis of rotation.The motor is mounted on 5 springs of negligible damping so that force transmitted is $1/11^{th}$ of the impressed force.Assume that the weight of the motor is equally distributed among the 5 springs.Determine:

a) Stiffness of each spring

b) Dynamic force transmitted to the base at the operating speed

c) Natural frequency of the system

(C.O.No. 4) [Application level]