Reg. No.												

Question Paper Code	21345

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

First Semester

M.E. - CAD / CAM

20PCDPC104 - MECHANICAL VIBRATIONS

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level,CO
1.	What are the causes and effects of vibrations?	2,K1,CO1
2.	What is critical speed of shaft?	2,K1,CO1
3.	What is Transmissibility ratio?	2,K1,CO2
4.	Compare the Vibration Absorber and Vibration Isolator.	2,K2,CO2
5.	What are Eigen values and Eigen vectors?	2,K2,CO3
6.	What is influence coefficient?	2,K1,CO3
7.	Define the basic principle of Rayleigh's method.	2,K1,CO4
8.	How many natural frequencies Continuous systems have?	2,K1,CO4
9.	List out the vibration measuring instruments.	2,K1,CO5
10.	What are the types of Transducers used in Vibration measurement?	2,K1,CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

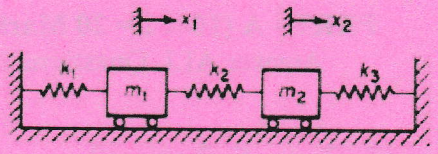
11.	a)	The following data are given for a vibratory system with viscous damping: Mass = 2.5 kg; spring constant = 3 N/mm and the amplitude decreases to 0.25 of the initial value after five consecutive cycles. Determine the damping coefficient of the damper in the system.	13,K3,CO1
		OR	
	b)	An instrument vibrates with a frequency of 1 Hz when there is no damping. When the damping is provided, the frequency of damped vibrations was observed to be 0.9 Hz. Find 1. The damping factor and 2. Logarithmic decrement.	13,K3,CO1
12.	a)	The electric motor is supported on a spring and a dashpot. The spring has the stiffness 6400 N/m and the dashpot offers resistance of 500 N at 4 m/sec. The unbalanced mass 0.5 kg rotates at 50 mm radius and	13,K3,CO2

the total mass of vibratory system is 20 kg. The motor runs at 400 rpm. Determine (a) Damping factor (b) Amplitude of vibration and phase angle (c) Resonant speed and amplitude.

OR

b) Explain the different types of Vibration isolation methods. *13,K3,CO2*

13. a) The following system shows the Three degree of freedom undamped system.Determine the first natural frequency of vibration,using Dunkerley's principle.Stiffness: $k_1=k_2=k_3=100$ N/m and mass: $m_1=2m, m_2=m_3=10$ kg. *13,K3,CO3*



OR

b) Derive the equations for Transmissibility Ratio, using the vibration absorbers, for the system subjected to Excited force. *13,K3,CO3*

14. a) Determine the natural frequencies of Lateral vibration of a uniform beam clamped at one end and free at the other. *13,K3,CO4*

OR

b) Derive the Equation of motion for Free Vibration of a String (Both Ends Fixed) with types of Mode shapes. *13,K3,CO4*

15. a) Explain the principle of Seismic Instrument and derive the equation of motion with steady state solution. *13,K3,CO5*

OR

b) Explain the construction and working of Electro dynamic exciter with neat sketch. *13,K3,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) A trailer has 1000 kg mass when fully loaded and 250 kg when empty. The spring of the suspension is 350 KN/m. The damping factor is 0.5when the trailer is fully loaded. The speed is 100 km/hr. The road varies sinusoidally with a wave length of 5m. Determine the amplitude ratio of the trailer when fully loaded and empty. *15,K3,CO6*

OR

b) A Vibrometer having a natural frequency of 4 rad/s and is attached to a structure that performs a harmonic motion. If the difference between the maximum and the minimum recorded values is 8 mm, find the amplitude of motion of the vibrating structure when its frequency is 40 rad/s. *15,K3,CO6*