Reg. No.															

Question Paper Code	12813

M.E. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

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.	Differentiate between longitudinal vibration and transverse vibration.	2	K2	CO1
2.	What is critical speed of shaft?	2	K1	CO1
3.	What is Transmissibility ratio?	2	K1	CO2
4.	Name the Vibration isolating materials.	2	K1	CO2
5.	What is stiffness coefficient?	2	K1	CO3
6.	Define Coordinate coupling.	2	K1	CO3
7.	What is 'n^{th} mode of vibration' in continuous system?	2	K1	CO4
8.	State the possible boundary conditions at the end of a spring.	2	K1	CO4
9.	Name the Vibration frequency measuring instruments.	2	K1	CO5
10.	What are Vibration exciters or Vibration shakers?	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

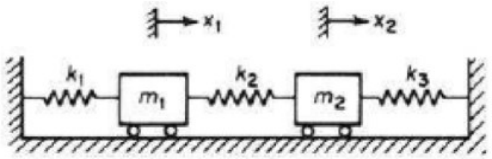
			Marks	K – Level	CO
11.	a)	An instrument vibrates with a frequency of 3 Hz when there is no damping. When the damping is provided, the frequency of damped vibrations was observed to be 2.2 Hz. Find 1. The damping factor and 2. Logarithmic decrement.	13	K3	CO1
		OR			
	b)	A coil of spring stiffness 4 N/mm supports vertically a mass of 20 kg at the free end. The motion is resisted by the oil dashpot. It is found that the amplitude at the beginning of the fourth cycle is 0.8 times the amplitude of the previous vibration. Determine the damping force per unit velocity. Also find the ratio of the frequency of damped and undamped vibrations.	13	K3	CO1
12.	a)	Explain the different types of Vibration isolation methods.	13	K2	CO2
		OR			

b) With a neat sketch, explain the Active vibration isolation system and find the closed-loop equation. *13 K2 CO2*

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

OR

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



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

OR

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

15. a) Explain the construction and working of Electro dynamic exciter with neat sketch. *13 K2 CO5*

OR

b) Explain the working of Piezo electric Transducers with output voltage control, used for Vibration measuring Instruments *13 K2 CO5*

PART - C (1 × 15 = 15 Marks)

16. a) An accelerometer has a suspended mass of 0.01 kg with a damped natural frequency of vibration of 150 Hz. When mounted on an engine undergoing an acceleration of 1*g* at an operating speed of 6000 rpm, the acceleration is recorded as by the instrument. Find the damping constant and the spring stiffness of the accelerometer. *15 K3 CO6*

OR

b) A trailer moving over a road having an approximately sinusoidal profile with a wave length of 5m and amplitude of 50 mm. The trailer weighs 500 kg and is pulled along the road with a velocity of 60kmph. Determine the spring constant to give vibration amplitude of 10 mm and the most unfavorable speed of the vehicle. *15 K3 CO6*