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AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.Tech. (First Semester) Regular Examinations, February – 2025

24MMDPC11002 –Mechanical Vibration

(Machine Design)

Time: 3 hrs

Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. What is the definition of mechanical vibrations, and why are they important in the field of engineering?	CO1	K1
b. How do mechanical systems exhibit harmonic motion in free vibrations?	CO2	K2
c. How are damping models introduced, and what role do they play in the study of mechanical vibrations?	CO3	K2
d. Discuss the advantages and limitations of using mathematical models to represent mechanical vibrations.	CO4	K3
e. Discuss the role of boundary conditions in the analysis of vibrations in continuous systems.	CO6	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. Explain the significance of studying mechanical vibrations in the design process.	5	CO1	K2
b. How do mechanical systems exhibit harmonic motion in free vibrations?	5	CO2	K2
(OR)			
c. Illustrate the importance of studying mechanical vibrations in the design and analysis of engineering systems.	5	CO1	K1
d. How is damping represented in the context of harmonic motion? Explain with suitable example.	5	CO2	K4
3.a. Briefly describe about the free vibrations and it's importance.	5	CO3	K3
b. Write the significance of one degree of freedom in mechanical system	5	CO3	K3
(OR)			
c. What do you mean by damping? Briefly explain that how is damping represented in the context of harmonic motion?	5	CO2	K4
d. In what ways do degrees of freedom influence the vibrational behavior of a system? Explain with example.	5	CO3	K3
4.a. How can engineers utilize the principles of harmonic motion in design and analysis? Explain.	5	CO2	K4
b. How does redundancy in a mechanical system relate to degrees of freedom?	5	CO3	K3
(OR)			
c. Write the fundamental equation governing the motion of mechanical systems.	5	CO4	K2
d. How is damping represented in the equations governing vibrations, and what role does it play?	5	CO4	K3

5.a.	Define mechanical vibrations and provide examples of systems exhibiting vibratory behavior.	5	CO5	K3
b.	What are forced vibrations, and how do they differ from free vibrations in mechanical systems?	5	CO5	K2
	(OR)			
c.	Discuss the importance of understanding vibrations in the design of structures and machinery.	5	CO5	K3
d.	Explain how external forces influence the response of a vibrating mechanical system.	5	CO5	K2
6.a.	Explain the concept of strain gauges and their application in measuring structural vibrations.	5	CO6	K4
b.	How mass and stiffness matrices are used in the analysis of multi-degree freedom systems? Explain with suitable example	5	CO6	K4
	(OR)			
c.	Define vibration absorbers and their role in reducing vibrations in mechanical systems.	5	CO6	K4
d.	Discuss the challenges associated with analyzing and predicting the behavior of nonlinear systems.	5	CO6	K4

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