GIET UNIVERSITY, GUNUPUR – 765022

M. Tech (First Semester) Examinations, January– 2024

MPCMD1020 - Mechanical Vibration

(Machine Design)

Time: 3Hrs   Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A   **(2 x 10 = 20 Marks)**

Q.1. Answer all questions

		CO#	Blooms Level
a.	Discuss the importance of studying mechanical vibrations in the design and analysis of engineering systems.	CO1	K1
b.	Differentiate between free vibrations and forced vibrations in mechanical systems.	CO2	K2
c.	How do mechanical systems exhibit harmonic motion in free vibrations?	CO2	K2
d.	Describe the relationship between frequency and amplitude in mechanical vibrations.	CO3	K3
e.	How are damping models introduced, and what role do they play in the study of mechanical vibrations?	CO3	K2
f.	How do equations of motion differ for single-degree freedom systems and systems with multiple degrees of freedom?	CO4	K3
g.	Discuss the advantages and limitations of using mathematical models to represent mechanical vibrations.	CO4	K3
h.	How does the amplitude of forced vibrations relate to the frequency of the external force applied to a mechanical system?	CO5	K2
i.	How do engineers choose appropriate sensors for vibration measurements based on the characteristics of the system under study?	CO5	K2
j.	Discuss the role of boundary conditions in the analysis of vibrations in continuous systems.	CO6	K2

PART – B   **(10 x 5=50 Marks)**

Answer *ANY FIVE* questions

		Marks	CO#	Blooms Level
2. a.	What are the key challenges associated with controlling and minimizing mechanical vibrations in engineering designs?	5	CO1	K1
b.	How do mechanical vibrations impact the performance and lifespan of mechanical systems?	5	CO1	K2
3. a.	Describe the behavior of a single-degree freedom system in the absence of external forces.	5	CO2	K2
b.	How does the amplitude of forced vibrations vary with the frequency of the external force? Explain	5	CO3	K3

4. a.	How is phase difference important in understanding harmonic motion? Explain with example.	5	CO3	K3
b.	How can engineers utilize the principles of harmonic motion in design and analysis? Explain.	5	CO2	K4
5. a.	How does redundancy in a mechanical system relate to degrees of freedom?	5	CO3	K3
b.	Define mechanical vibrations and provide examples of systems exhibiting vibratory behavior.	5	CO4	K2
6. a.	How is damping represented in the equations governing vibrations, and what role does it play?	5	CO4	K3
b.	Discuss the importance of understanding vibrations in the design of structures and machinery.	5	CO5	K3
7. a.	Define resonance and explain its causes in vibrating mechanical systems.	5	CO5	K2
b.	Discuss the challenges associated with predicting and preventing resonance in complex structures.	5	CO5	K3
8. a.	Differentiate between active and passive vibration control methods.	5	CO6	K4
b.	Discuss the significance of mode shapes in understanding the behavior of vibrating structures.	5	CO6	K4

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