GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021

Subject Code:3160109   **Date:30/11/2021**
Subject Name:Theory of Vibration
Time:10:30 AM TO 01:00 PM   **Total Marks: 70**
Instructions:
   1. **Attempt all questions.**
   2. **Make suitable assumptions wherever necessary.**
   3. **Figures to the right indicate full marks.**
   4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define: Natural Frequency, Damping Ratio, Time Period	**03**
	(b)	Explain series and parallel connections of Spring.	**04**
	(c)	Classify different types of vibration.	**07**
Q.2	**(a)**	What do you mean by vibration? Which are the probable causes of vibration?	**03**
	(b)	Explain different types of Damping.	**04**
	(c)	Derive the equation to calculate natural frequency & time period of Simple pendulum.	**07**
		OR	
	(c)	Derive the equation to calculate natural frequency & time period of torsional vibration of single rotor system.	**07**
Q.3	**(a)**	What is Resonance? How it can be avoided?	**03**
	(b)	Prove that reduction in amplitude in one complete cycle in Coulomb damping is 4F/k.	**04**
	(c)	A vibratory system in a vehicle is to be designed with the following parameters: k= 100 N/m, C=2 N-s/m m=1 kg Calculate the decrease of amplitude from its starting value after 3 complete oscillations and frequency of oscillation.	**07**

OR

Q.3	**(a)**	Write a short note on Vibration Isolation.	**03**
	(b)	Explain Transmissibility.	**04**
	(c)	With neat sketch explain working of Vibration measuring instruments.	**07**
Q.4	**(a)**	Explain Continuous systems.	**03**
	(b)	Derive an expression for natural frequency for undamped single degree of freedom spring mass system.	**04**
	(c)	Explain Rayleigh Method.	**07**

OR

Q.4	**(a)**	Define Degree of Freedom. Give one example of single degree, two degree and multi degree of freedom systems.	**03**
	(b)	With neat sketch explain the working of Vibration absorber.	**04**
	(c)	Derive an expression for frequency & time period of torsional vibration of two rotor systems.	**07**

Q.5 **(a)** Define: Node, Principal mode of vibration, Normal mode of vibration **03**

(b) How will you define Steady state and Transient vibration? Plot both responses. **04**

(c) Derive solution for Spring mass damper system with harmonic force. **07**

OR

Q.5 **(a)** Define multi degree of freedom with at least two examples. **03**

(b) Write a note on Co-ordinate Coupling. **04**

(c) Explain Orthogonalality of modes. **07**

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