Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER –II-(New)-EXAMINATION – SUMMER-2019

Subject Code: 3720817 **Date: 31/05/2019**

Subject Name: Noise and Vibrations Analysis

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain Lagrange's method for deriving the differential equations for two degree of freedom conservative system	**07**
	(b)	Define following terms: Logarithmic decay, Damped natural frequency, Critical Damping, Vibration isolation, Stiffness influence coefficient, Magnification factor, Noise	**07**
Q.2	**(a)**	Derive the Duhamel's integral for under-damped condition.	**07**
	(b)	Explain the dynamic and static coupling with suitable example.	**07**
		OR	
	(b)	Explain the concept of coordinate coupling with a suitable example	**07**
Q.3	**(a)**	In a spring mass-dashpot system k=30kN/m, m=100 kg and the damping provided is only 25% of the critical value. Determine (1) damping ratio (2) critical damping co-efficient (3) natural frequency of damped vibration (4) logarithmic decrement (5) ratio of two successive amplitudes.	**07**
	(b)	Determine the response of a SDOF damped system when its support is harmonically excited.	**07**
		OR	
Q.3	**(a)**	A shaft of negligible weight 6cm diameter and 5 meter long is simply supported at the ends and carries four weights 50 kg each at equal distance over the length of the shaft. Find the frequency of vibration by Dunkerley's method. Take E= $2x\ 10^6$ kg/cm^2	**07**
	(b)	Derive the equation of motion for longitudinal vibration of bars and discuss the solution methodology with suitable example.	**07**
Q.4	**(a)**	Derive the relation between logarithmic decay and damping coefficient of SDOF undamped system.	**07**
	(b)	Derive the equation of transverse vibrations of a beam using Euler-Bernoulli beam theory.	**07**
		OR	
Q.4	**(a)**	Explain semi-definite torsional vibration system and determine the natural frequencies.	**07**
	(b)	Give the mathematical forms of following boundary conditions on the vibrations of beam. Also discuss the effect of the same. (1) Free end (2) Simply supported end (3) Fixed end.	**07**
Q.5	**(a)**	Derive the wave equation for free vibrations of a string.	**07**
	(b)	Discuss the techniques for noise reduction.	**07**
		OR	
Q.5	**(a)**	Explain the working principle of Vibrometer	**07**
	(b)	Enlist various techniques for active and passive control of vibrations and explain any one in detail.	**07**

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