Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI- EXAMINATION – SUMMER 2016

Subject Code:160103 **Date:09/05/2016**

Subject Name:Vibration and Noise Control

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.**

Q.1	**(a)**	With help of neat sketch explain about beat phenomenon.	**07**
	(b)	Using Energy method derive differential equation of motion for undamped free vibrations of single degree of freedom system	**07**
Q.2	**(a)**	Explain about different types of damping.	**07**
	(b)	Derive the equation of motion for Torsional vibrations of circular members.	**07**
		OR	
	(b)	A Torsional pendulum consists of a rotor of mass 2.5 kg and diameter 0.4 m, at its lower end, supported by a rod of diameter 5 mm and length 1m. The modulus of rigidity of the rod material may be assumed to be 0.83×10^{11} N/m^2 . Calculate the natural frequency of Torsional vibration.	**07**
Q.3	**(a)**	Derive expression for frequency of compound pendulum.	**07**
	(b)	What are the various types of vibrations? Distinguish between longitudinal, transverse and torsional vibration.	**07**
		OR	
Q.3	**(a)**	Explain in brief two nodes vibration of three rotor system. How it is differentiated from single node vibration?	**07**
	(b)	Draw a neat diagram of frequency ratio verses transmissibility and explain the three salient regions for the practical application.	**07**
Q.4	**(a)**	What is continuous system? How problems are solved in the system?	**07**
	(b)	A shock absorber is to be designed so that its overshoot is 10% of the initial displacement when released. Determine the damping ratio ξ1. If ξ be made equal to 0.5 ξ1.	**07**
		OR	
Q.4	**(a)**	Explain with schematic diagrams working of Vibrometers, Tachometers and Accelerometers.	**07**
	(b)	In a forced vibratory system a body having 2kg mass vibrates in a viscous fluid. The harmonic exciting force of 20 N acting on the mass results in a resonance amplitude of 15mm with a period of 0.15sec.Determine the damping co-efficient of viscous fluid. If the system is excited by the same harmonic force but at a frequency of 5 cps. What will be the amplitude of forced vibration?	**07**
Q.5	**(a)**	What is transient vibration and steady state vibration in case of force damped vibration? Explain the salient features of frequency response curves.	**07**
	(b)	A vibrating system is defined by the following parameters: M = 5 kg, k = 110 N/m, C = 3 Ns/m. Determine: (a) The damping factor, (b)The natural frequency of vibration, (c) Logarithmic decrement, (d) The ratio of two consecutive amplitude, and (e) The number of cycles after which the original amplitude is reduced to 20 percent.	**07**
		OR	
Q.5	**(a)**	Prepare a schematic diagram of spring mass dashpot system damped free vibration. Find the general solution of the differential equitation of critically damped system.	**07**

(b) A verticle helical spring of length L, and stiffness k has both ends securely fixed. A mass m is attached to the spring at a distance s from one end. Determine the natural frequency of small longitudinal vibrations. Show that at s = 0.5L, frequency is minimum and hence find this frequency. **07**

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