

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2160109

Date: 03/05/2017

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.

		MARKS
Q.1	Short Questions	14
	1 How would you define Critical damping?	
	2 Define fundamental mode of vibration.	
	3 A cantilever beam has _____ degrees of freedom.	
	4 Differentiate Free and Forced vibration.	
	5 Define term Node.	
	6 Write an equation of motion for spring-mass system and explain each term.	
	7 The amount of damping necessary for a system to be critically damped is known as _____.	
	8 Frequency measuring instruments work on the principle of _____.	
	9 Accelerometer is designed with _____ frequency.	
	10 Find the natural frequency of the system shown in fig. 1.	
	11 If the string length of simple pendulum is increased four times, the frequency of the system will be _____.	
	12 Define critical speed of shaft.	
	13 Define Magnification Factor.	
	14 Vibrometer is known as low frequency transducer. True or False?	
Q.2	(a) Explain overdamped, underdamped and critically damped system with an example of a door.	03
	(b) Use Lagrange's equation to find equations of motion for a system shown in Fig.2.	04
	(c) Write a note on Beats Phenomenon.	07
	OR	
	(c) Derive the solution of equation of motion for a spring mass damper system with Harmonic force.	07
Q.3	(a) Describe all the terms of equation of motion and define the use of equation of motion.	03
	(b) Describe types of vibration	04
	(c) Write a note on vibration isolation and transmissibility.	07

OR

- Q.3** (a) Write a short note on torsional vibrations produced by single rotor. **03**
(b) Determine the natural frequency of the mass m placed at the tip of a cantilever beam of negligible mass **04**
(c) Write a note on Compound Pendulum. **07**
- Q.4** (a) What is the difference between periodic and harmonic motion. Also prove what would happen on addition of two harmonic motions. Take any example. **03**
(b) What are the ways to eliminate or avoid undesirable vibration? **04**
(c) A vibratory body of mass 150kg supported on springs of total stiffness 1050 kN/m has a rotating unbalance force of 525 N at a speed of 6000 rpm. If the damping factor is 0.3, Determine: (i) the amplitude caused by the unbalance and its phase angle (ii) the transmissibility (iii) the actual force transmitted and its phase angle. **07**

OR

- Q.4** (a) The successive amplitudes of vibrations of vibratory system as obtained under free vibration are 0.69, 0.32, 0.19, 0.099 units respectively. Determine the damping ratio of the system. **03**
(b) What do you mean by steady state and transient vibration? **04**
(c) Write a note on response of a rotating unbalanced system. **07**
- Q.5** (a) What do you mean by multi degree of freedom system? State the importance of eigen values and eigen vectors in vibration analysis. **03**
(b) Write a note on Fullarton's Tachometer. **04**
(c) Write a note on torsional vibration of a two rotor system. **07**

OR

- Q.5** (a) Write a note on Energy method **03**
(b) Write a note on Vibration absorber. **04**
(c) Explain working of Vibrometer with neat sketch. **07**

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