

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2022****Subject Code:3160109****Date:06/06/2022****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, Degree of freedom, Time Period	03
	(b) Explain the Energy method for vibration analysis.	04
	(c) Classify different types of vibration.	07
Q.2	(a) Define: logarithmic decrement, damping ratio and critical damping coefficient.	03
	(b) Explain Logarithmic decrement.	04
	(c) Find the natural frequency of the system shown in Figure 1.	07
	OR	
	(c) Derive the equation to calculate natural frequency of Simple pendulum.	07
Q.3	(a) Define: Critical Speed, Resonance, Magnification factor.	03
	(b) A vibrating system consists of a mass of 50 kg, a spring of stiffness of 30 kN/m and a damper. The damping provided is only 20 % of the critical value. Determine: i) Damping factor ii) Critical damping coefficient iii) Natural frequency of damped vibration iv) Logarithmic decay	04
	(c) Write a note on Vibration isolation and Transmissibility.	07
	OR	
Q.3	(a) What is Resonance? How it can be avoided?	03
	(b) Explain behavior of Overdamped, Underdamped and Critically damped systems with neat sketch.	04
	(c) With neat sketch explain working of Vibration measuring instruments.	07
Q.4	(a) Define: 1. Fundamental mode of vibration 2. Principal mode of vibration 3. Normal mode of vibration	03
	(b) With neat sketch explain response of a rotating unbalanced system.	04
	(c) Derive an expression for frequency & time period of torsional vibration of two rotor systems.	07
	OR	
Q.4	(a) Define: Multi degree of freedom system. Name the various methods used to analyze these systems.	03
	(b) Explain Critical speed or Whirling speed of shaft.	04
	(c) For Two rotor system prove that angular displacements of the rotors are inversely proportional to their moment of inertia with neat sketch.	07

- Q.5** (a) Write a note on Co-ordinate Coupling. **03**
 (b) Explain Continuous systems. **04**
 (c) Explain Rayleigh's method for finding natural frequency of transverse vibration of beams. **07**

OR

- Q.5** (a) Differentiate between Steady state and Transient vibration **03**
 (b) Define Degree of Freedom. Give one example of single degree, two degree and multi degree of freedom systems. **04**
 (c) Derive the expression for the length of torsionally equivalent shaft. **07**

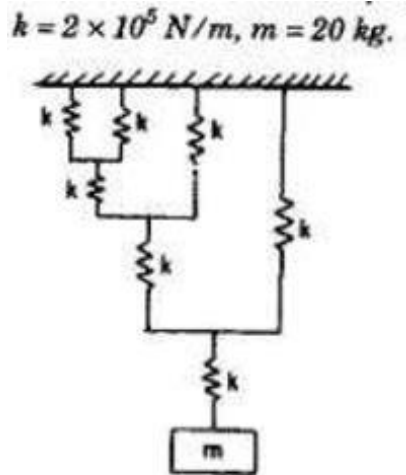


Figure 1
