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

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 160103 **Date: 25/11/2011**

Subject Name: Vibration and Noise Control

Time: 10.30 am -1.00 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)**	What is a harmonic motion? Explain in brief how it is represented by vectors and complex method.	**07**
	(b)	Define the following terms. (1) Time period (2) Free Vibrations (3) Forced Vibrations (4) Resonance (5) Damped Vibrations (6) Frequency.	**07**
Q.2	**(a)**	Establish an expression for the natural frequency of vibration using energy method and Rayleigh's method.	**07**
	(b)	Describe with the help of sketches longitudinal vibrations tortional vibrations and transverse vibrations.	**07**
		OR	
	(b)	A fly wheel is mounted on a 1.5 meter vertical shaft 50mm diameter fixed at both the ends. The flywheel mass of 500kg located at 0.9 meter from the top. Find the natural frequencies of longitudinal vibrations and transverse vibration take E=200GN/ m^2.	**07**
Q.3	**(a)**	Explain in brief free tortional vibrations three rotor system. How do we get the fundamental frequency ?	**07**
	(b)	A steel shaft 1.5 meter long is 95mm in diameter for the first 0.6 meter of its length, 60mm in diameter for the next 0.5meter of the length and 50mm in diameter for the remaining 0.4meter of its length. The shaft carries two fly wheels at two ends. The first having a mass of 900Kg and 0.85 meter radius of gyration located at the 95mm diameter end and second having a mass of 700Kg and 0.55meter radius of gyration located at the other end. Determine the location the node and the natural frequency of tortional vibrations Take G=80 GN/m^2.	**07**
		OR	
Q.3	**(a)**	Derive an equation for free damped vibrations spring mass system and explain in brief when roots are real, equal and imaginary.	**07**
	(b)	The measurements a mechanical vibrations systems so that it has a mass of 8Kg and the springs can be combined to give an equivalent spring of stiffness 5.4N/mm. If the vibrating system a dashpot attached which exerts a force of 40N when the mass has a velocity of 1m/second. Find (1) Critical damping co-efficient (2) Damping factor (3) Logarithmic decrement, and (4) Ratio of consecutive amplitudes.	**07**

Q.4	**(a)**	What is vibration isolation? Explain with the help of vector representation the equation of transmissibility. Also show the graph of transmissibility verses frequency ratio for different damping factor.	**07**
	(b)	A machine has a mass of 100Kg and unbalanced reciprocating parts of mass 2kg which move through a vertical stroke 80mm with SHM. The machine mounted on four springs symmetrically arranged. Neglecting damping, Calculate the combine stiffness of the spring in order that force transmitted to the foundation is 1/25th of the applied force, when speed of rotation of crankshaft is 1000rpm. When machine is actually supported on the springs it is found the damping reduces the amplitude of successive free vibrations by 25%.Find the force transmitted to the foundation at 1000rpm.	**07**
		OR	
Q.4	**(a)**	Write a short note on (1) Vibration absorbers (2) Accelerometer	**07**
	(b)	Derive the equation frequency for combined rectilinear and angular modes.	**07**
Q.5	**(a)**	Write the equation of motion for two degree of freedom system and find their roots. Explain the principles modes of vibration giving mode shape and displacement time diagram.	**07**
	(b)	What is influence co-efficient? Also explain and state the Maxwell's theorem.	**07**
		OR	
Q.5	**(a)**	Define and explain each terms used in logarithmic decrement.	**07**
	(b)	The following data are given for viscous damping system. Mass = 2.5kg Spring Constant = 3 N/mm and the amplitude to decreases to 0.25 of initial value after five consecutive cycles. Determine the damping co-efficient of the system.	**07**