Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(OLD) – EXAMINATION – SUMMER 2019

Subject Code:161901 **Date:27/05/2019**

Subject Name: Dynamics Of Machinery

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)** Define the following terms: **07**
(i) Periodic motion (ii) Simple Harmonic Motion (iii) Degree of Freedom(iv) Natural Frequency (v) Damping Factor (vi) Logarithmic Decrement (vii) Resonance

(b) The measurements on a mechanical vibrating system show that it has a mass of 8 kg and that the springs can be combined to give an equivalent spring of stiffness 5.4 N/mm. If the vibrating system have a dashpot attached which exerts a force of 40 N when the mass has a velocity of 1 m/s, find : 1. critical damping coefficient, 2. damping factor, 3. Logarithmic decrement, and 4. ratio of two consecutive amplitudes. **07**

Q.2 **(a)** Why Reciprocating masses are partially balanced. What are its effects. **07**

(b) Derive an expression for logarithmic decrement. What is the significance of Logarithmic decrement? **07**

OR

(b) Derive the governing equation characterizing the motion of free-damped system.Also explain the terms ‘under-damping’, ‘over-damping’ and ‘critical damping’. **07**

Q.3 **(a)** Draw and explain the single and two node vibrations of three rotor system. **07**

(b) Derive an expression for critical speed of a shaft carrying rotor and without damping. **07**

OR

Q.3 **(a)** Derive the expression to determine the natural frequency of free torsional vibrations of a ‘geared system’ in standard notations. **07**

(b) The mass of an electric motor is 120 kg and it runs at 1500 r.p.m. The armature mass is 35 kg and its C.G. lies 0.5 mm from the axis of rotation. The motor is mounted on five springs of negligible damping so that the force transmitted is one-eleventh of the impressed force. Assume that the mass of the motor is equally distributed among the five springs.Determine : 1. stiffness of each spring; 2. dynamic force transmitted to the base at the operating speed; and 3. natural frequency of the system. **07**

Q.4 **(a)** A, B, C and D are four masses carried by a rotating shaft at radii 100,125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that theshaft shall be in complete balance. **07**

(b) Discuss the balancing of V-engines. **07**

OR

Q.4 **(a)** Derive the following expressions, for an uncoupled two cylinder locomotivengine: **07**

1) Variation in tractive force;
2) Swaying couple; and
3) Hammer blow.

(b) Explain the 'direct and reverse crank' method for determining unbalanced forces in radial engines. **07**

Q.5 **(a)** Explain Vibration isolation and transmissibility **07**

(b) Write step by step procedure of Stodola's method to find out fundamental natural frequency of system having three degree of freedom. **07**

OR

Q.5 **(a)** Write a short note on vibration isolations. **07**

(b) Describe Dunkerley's method to find the natural frequency of a shaft carryinseveral loads. **07**

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