Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME SEMESTER – I EXAMINATION – SUMMER 2017

Subject Code:2710908 **Date:11/05/2017**

Subject Name: Vibration and Noise

Time:02:30 p.m. to 05:00 p.m. **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)**	Derive the Duhamel's integral for under-damped condition.	**07**
	(b)	A spring mass system has a natural frequency f1. Calculate the value of k2 another spring which when connected to k1 in parallel increases the frequency by 30%.	**07**
Q.2	**(a)**	Explain semi-definite torsional vibration system and determine the natural frequencies.	**07**
	(b)	A press of mass *m* is mounted on an elastic foundation of stiffness *K*. During operation, the force applied to the press builds up to its final value F_0 in a time t_0 as shown in Fig.1. Determine the responses of the press for (i) $t < t_0$ and (ii) $t > t_0$	**07**

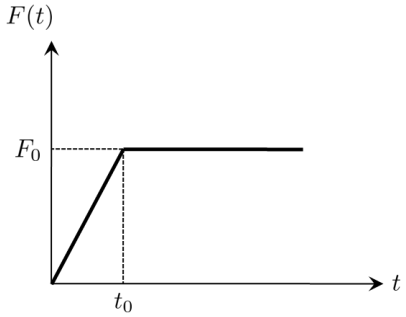

Fig. 1

OR

	(b)	Explain Lagrange's method for deriving the differential equations for two degree of freedom conservative system	**07**
Q.3	**(a)**	Find the natural frequency for the following system. (Fig. 2)	**07**

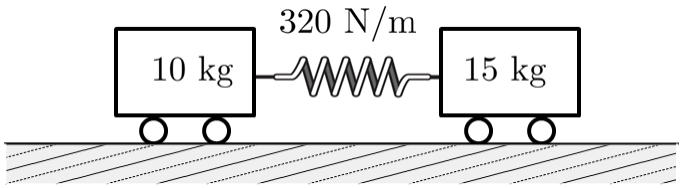

Fig. 2

	(b)	Prove that the normal modes are orthogonal using orthogonality conditions.	**07**

OR

Q.3	**(a)**	Explain the working principle of Vibrometer.	**07**
	(b)	Discuss torsional vibrations of two rotor system.	**07**
Q.4	**(a)**	Explain Dunkerley's method with suitable example	**07**
	(b)	Discuss active and passive vibration control.	**07**

OR

Q.4	**(a)**	Explain: Random variables and random processes.	**07**
	(b)	Explain the working principle of seismic instrument	**07**
Q.5	**(a)**	Derive an equation of motion for an Euler-Bernoulli beam in the presence of the axial load.	**07**
	(b)	Discuss: force and displacement transmissibility.	**07**

OR

Q.5	**(a)**	Discuss the design principles for reducing the noise.	**07**
	(b)	Explain the dynamic and static coupling with suitable example.	**07**

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