Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (OLD course)• EXAMINATION – SUMMER 2015

Subject Code: 710902 **Date:12/05/2015**

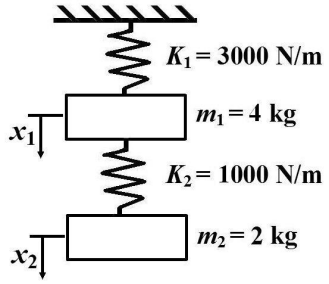
Subject Name: DYNAMICS OF MACHINERY

Time: 10:30 am to 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)**	Derive the wave equation taking an example of the transverse vibration of the string with usual notations, mentioning the assumptions made.	**07**
	(b)	What do you mean by vibration isolation and force transmissibility? Also draw their frequency response curves.	**07**
Q.2	**(a)**	State the various methods used for noise measurement. Explain any two of them.	**07**
	(b)	Discuss about the auto correlation functions and their properties.	**07**
		OR	
	(b)	Explain the random aspects of noise and spectral density.	**07**
Q.3	**(a)**	What do you mean by Automatic Control System? Explain with example: proportional control, integral control and derivative control action.	**07**
	(b)	What is stability of a control system? State the different criteria used to investigate the stability of the control system explaining any one of them.	**07**
		OR	
Q.3	**(a)**	Write a short note on óRoot Locus methodô. List out the procedural steps for plotting Root Locus with suitable example.	**07**
	(b)	Define óTransfer functionô. What are the properties of transfer function? Also discuss about the advantages of transfer function.	**07**
Q.4	**(a)**	Why it is necessary to carry out the dynamic analysis in case of high speed cam-follower mechanism? Also define the following terms: Follower jump, Jump speed, Spring surge and Spring wind up	**07**
	(b)	Explain Johnsonôs numerical analysis method used for cam dynamics.	**07**
		OR	
Q.4	**(a)**	Discuss about the mathematical model of the cam and follower system considering their elasticity.	**07**
	(b)	With neat sketch, explain the óPhase Plane methodô for analysis of the jump phenomenon in case of cam-follower system.	**07**
Q.5	**(a)**	Determine the natural frequencies of two DoF system shown in the figure:	**07**



	(b)	Find the inverse Laplace transform of the following transfer functions: (i) $\dfrac{s+6}{s(s^2+4s+3)}$ (ii) $\dfrac{5}{s(s^2+4s+5)}$ (iii) $\dfrac{2s+5}{s(s+4)}$	**07**

OR

Q.5 **(a)** Comment about the stability of the control system whose characteristic equation is $s^6 + s^5 + 5s^4 + 3s^3 + 2s^2 - 4s - 8 = 0$. **07**

If the system is found to be unstable, how many roots it has with positive real part?

(b) The open loop transfer function of unity feed back system is $G(s) = \dfrac{K}{s(s^2 + s + 1)(s + 2)}$. **07**

Estimate the value of K so that the closed loop system is fully stable.

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