Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Regular Examination January / February 2011

Subject code: 710902N **Subject Name: Dynamics of Machinery**

Date: 01 /02 /2011 **Time: 02.30 pm – 05.00 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 do you mean by Automatic Control system? Explain liquid level controller of second order with a neat sketch. **07**

(b) The open loop transfer function of unity feedback system is **07**

$$\frac{K}{s(1+0.4s)(1+0.25s)}$$

Find the restriction of K so that the closed loop system is absolutely stable.

Q.2 **(a)** Obtain the Inverse Laplace transforms of the following: **07**

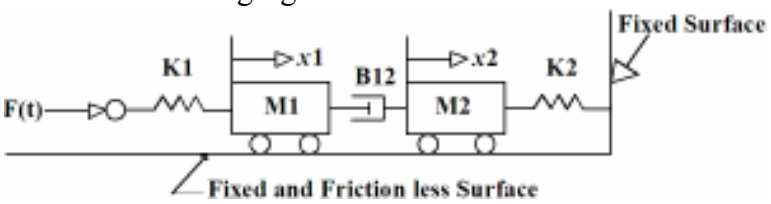
1. $\dfrac{5s+3}{(s-1)(s^2+2s+5)}$
2. $\dfrac{s^2-10s+13}{(s-7)(s^2-5s+16)}$
3. $\dfrac{s^2+6}{(s^2+1)(s^2+4)}$

(b) Check the stability of following system equation **07**

$S^5 + 2S^4 + 24S^3 + 48S^2 - 25S - 50 = 0$

OR

(b) Obtain the overall system function for a mathematical model for the system shown in following figure. **07**



Q.3 **(a)** The forward path transfer function of a unity feedback system is given by **07**

$$G(s) = \frac{K}{s(s+4)(s+5)}$$

Sketch the root locus as K varies from zero to infinity.

(b) A bar of length L is fixed at one end and connected at the other end by a spring of stiffness k. Derive suitable expression of motion for the longitudinal vibrations. **07**

OR

Q.3	**(a)**	Explain Johnson's numerical analysis method used for cam.	**07**
	(b)	The forward path transfer function of a unity feedback system is given by $G(s) = \dfrac{K}{s(s^2 + 4s + 8)}$ Sketch the root locus as K varies from zero to infinity.	**07**
Q.4	**(a)**	Explain Holzer's method with the help of a significant example.	**07**
	(b)	What do you understand by vibration absorbers? Obtain necessary conditions for the vibration absorbers. When a vibration absorber can be called as tuned vibration absorber. Also derive necessary conditions for tuned vibration absorber with its frequency response curve.	**07**
		OR	
Q.4	**(a)**	Derive the expressions for the continuous vibration for the longitudinal bars and transverse beams.	**07**
	(b)	Derive the frequency equation of torsional vibrations for a free-free shaft of length L.	**07**
Q.5	**(a)**	Briefly state the common techniques for noise control and vibration control.	**07**
	(b)	Explain the forces induced in rigid systems in cam.	**07**
		OR	
Q.5	**(a)**	Write a note on: - Noise control.	**07**
	(b)	What is the difference between expression for jumping speed considering rigid cam and elastic cam?	**07**

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