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Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(EE)PT (Sem.-4)**  
**LINEAR CONTROL SYSTEMS**  
**Subject Code : BTEE-402**  
**M.Code : 72448**

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

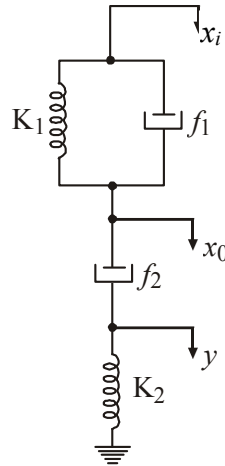
**SECTION-A****1. Answer briefly :**

- a) What do you mean by viscous friction? Explain.
- b) What are servo motors? Discuss their significance in control system.
- c) Explain the terms node and branch with respect to signal flow graph.
- d) What do you mean by regulating systems? Explain.
- e) Differentiate between absolute and relative stability.
- f) What is the effect of adding a pole in the forward path transfer function? Discuss.
- g) List the various applications of root locus.
- h) Explain the need of a compensator.
- i) List the advantages of log magnitude versus phase angle plot.
- j) State the Nyquist stability criterion.

**SECTION-B**

2. What is the basis for the selection of a particular compensator? Write the procedure for the design of a lag compensator.
3. With the help of suitable diagrams and expressions explain the principle and working of synchro transmitter and receiver used in control systems.

4. Write the differential equations for the mechanical system shown in the figure. Also draw the analogous electrical circuit based on force-current analogy.



**Fig.1**

5. Discuss the relation between time and frequency response for second order systems.
6. A unity feedback system is characterized by the open loop transfer function  $G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$ . Determine the steady state errors for unit step, unit ramp and unit acceleration inputs.

### SECTION-C

7. Sketch the root locus of a system having open loop transfer function

$$G(s)H(s) = \frac{1}{s(s+4)(s^2+4s+13)}$$

8. Sketch the Bode plot for the transfer function given below :

$$G(s)H(s) = \frac{2(s+0.25)}{s^2(s+1)(s+0.5)}$$

Determine the gain and phase margin. Is the system stable?

9. Discuss :
- Linear and non-linear systems
  - Open and closed loop systems
  - Time variant and time invariant systems

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**