

B. Tech Degree VI Semester Examination, April 2010

ME 601 INSTRUMENTATION AND CONTROL SYSTEMS (2006 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A

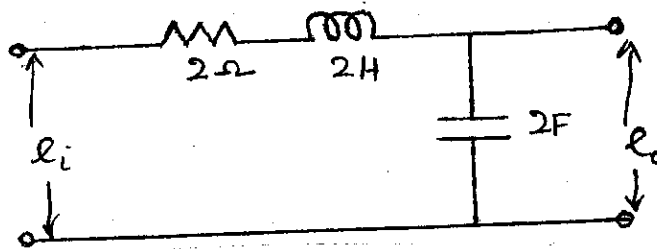
(Answer all questions)

(8 x 5 = 40)

- I.
 - a. What is static calibration? Explain.
 - b. What are zero order, first order and second order instruments? Give one example for each type.
 - c. Differentiate between unbonded strain gauge and bonded strain gauge.
 - d. What are RTDS? Explain its working with a neat sketch.
 - e. Explain a PI controller with its transfer function.
 - f. Derive the transfer function of an AC Servo motor.
 - g. Determine the range of K for stability of a unity gain feedback system whose open loop transfer function is

$$G(s) = \frac{K(1-S)}{S(S^2 + 5S + 9)}$$

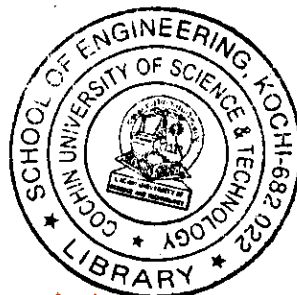
- h. Find the transfer function of an electrical system as shown in the figure:



PART B

(4 x 15 = 60)

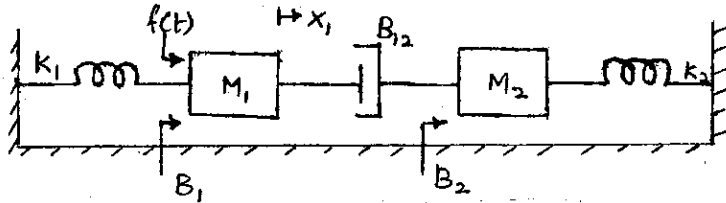
- II.
 - a. What are the steps involved in the analysis of a measurement system? (5)
 - b. Generate the generalized mathematical model of a spring-mass-damper system. (10)
- OR
- III.
 - a. Discuss briefly the generalized input-output configuration of a measurement system. (10)
 - b. Explain any two methods for correction of spurious inputs. (5)
- IV.
 - a. List the basic methods of measurement of force. (5)
 - b. With a neat sketch explain weight measurement using multiple lever system. (10)
- OR
- V. Write short notes on the following: (15)
 - (i) Gieger Muller counter
 - (ii) Ionization chamber
 - (iii) Scintillation counter



(Turn over)

VI. a. Define steady state error. Find the steady state error when the input is a unit ramp signal. (5)

b. Determine the transfer function $\frac{X_1(s)}{F(s)}$ for the given mechanical system. (10)



OR

VII. a. Explain the transient response of a second order system for a unit step input. (10)

b. Find the transfer function of a liquid level system. (5)

VIII. Sketch the Bode plot for the following transfer function: (15)

$$G(s) = \frac{5(1+2s)}{(1+4s)(1+0.25s)}$$

OR

IX. A unity feedback control system has an open loop transfer function (15)

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

Sketch the root locus.