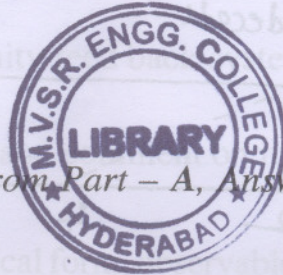


**FACULTY OF ENGINEERING**  
**B.E. 3/4 (EE/Inst.) I Semester (Main) Examination, December 2010**  
**LINEAR CONTROL SYSTEMS**

Time : 3 Hours]

[Max. Marks : 75

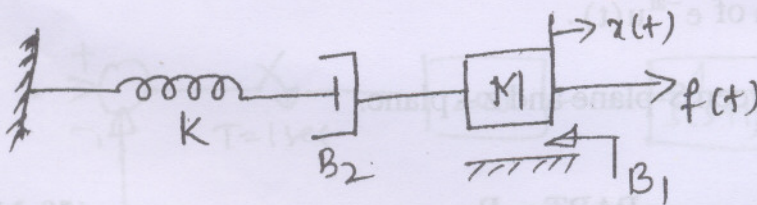
*Note : Answer all questions from Part – A, Answer any five questions from Part – B.*



## PART – A

(25 Marks)

1. Draw the force voltage analogous circuit for the system given.



2. How does synchro pair act as error detector. 3
3. Calculate the angle of departure for the transfer function 2

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

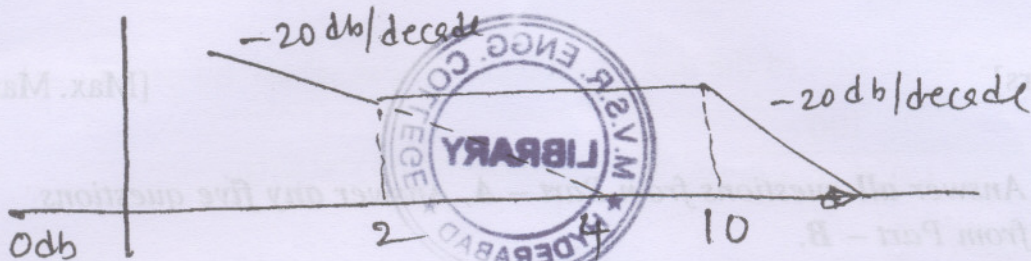
4. Maximum overshoot (\$M\_p\$) of a second order system is 40%, then find the damping ratio of the system. 3

5. Define frequency domain specifications 2

2

2

6. Find the transfer function of the system whose experimental frequency response data is given below ? 3



7.  $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$  determine state transition matrix. 3

8. Define controllability. 2

9. Determine z - transform of  $e^{-at}u(t)$ . 3

10. Explain the relation between S-plane and z - plane. 2

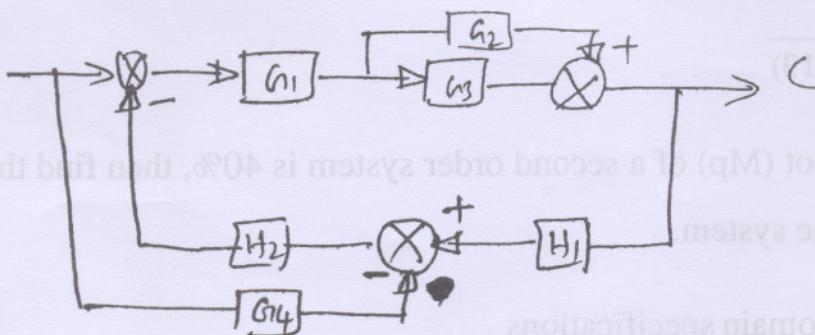
## PART - B

(50 Marks)

11. a) Explain about DC servo motor. 3

- b) Derive the transfer function of Armature controlled DC servo motor. 7

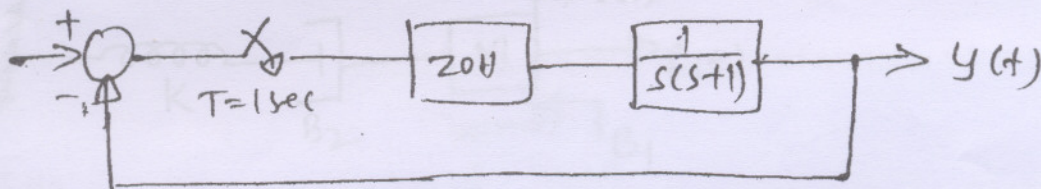
12. a) Obtain the transfer function C/R of the following system. 5



- b) Explain the principle and working of a synchro. 5



13. a) Determine time response specifications for second order system for unit step input. 7  
b) Explain Routh Hurwitz criterion. 3
14. Draw the Bode Plot of the unity feed back system whose transfer function is  $G(S) = \frac{100}{S(1+0.1S)(1+0.2S)}$  and comment on its stability. 10
15. Determine controllable canonical form, observable canonical form and diagonal form for the following transfer function.  $G(S) = \frac{4(S+1)}{(S+2)(S+4)(S+6)}$  10
16. Determine  $Y(z)/R(z)$  for the following system 10



17. Write short notes on
- a) Nyquist stability criterion 5  
b) Properties of z - transform 5