

6E6055

Roll No. \_\_\_\_\_

Total No of Pages: 4

6E6055

**B. Tech. VI-Sem. (Main/Back) Exam., April/May-2016**  
**Electronics & Communication Engineering**  
**6EC5A Control Systems**

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks (Main & Back): 26

**Instructions to Candidates:-**

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

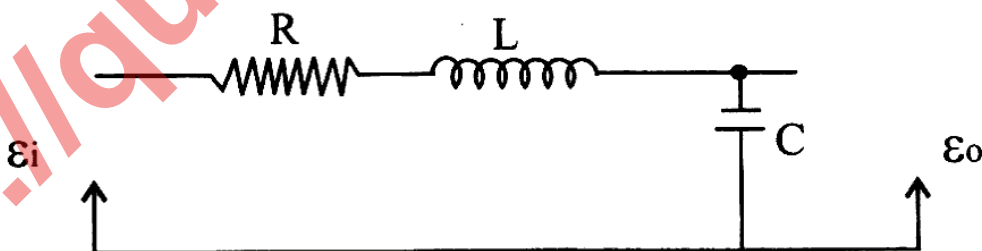
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL \_\_\_\_\_

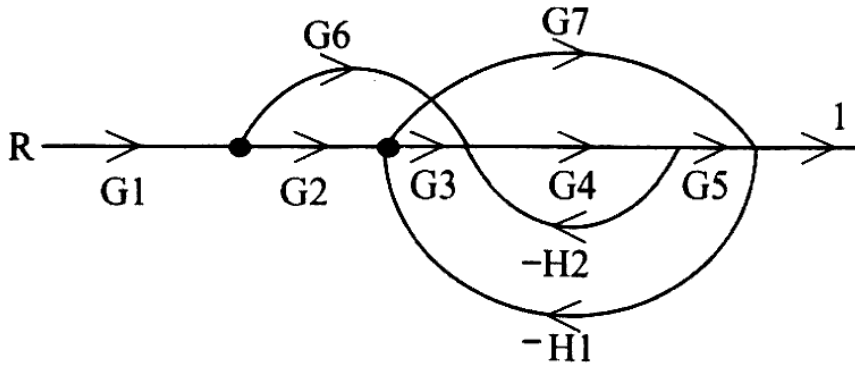
2. NIL \_\_\_\_\_

**UNIT-I**

Q.1 (a) Determine the transfer function of the following electrical network. [8]

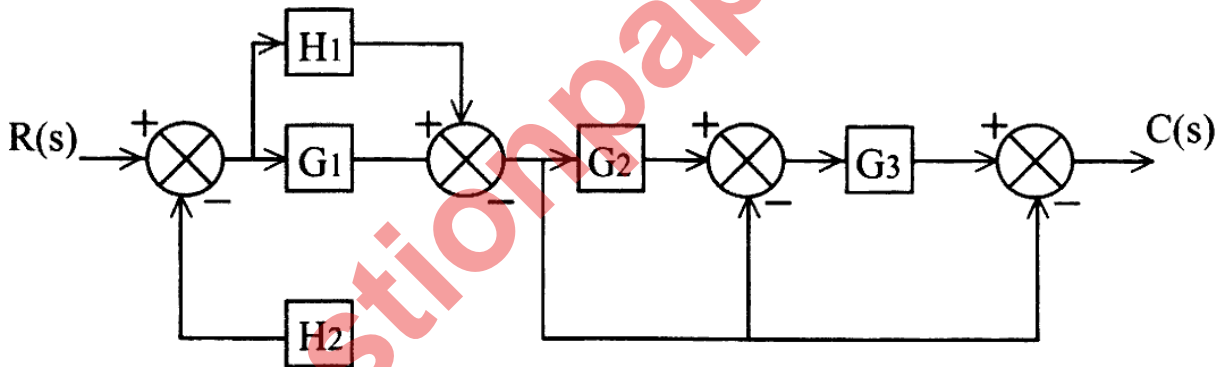


- (b) Find the transfer function of the system whose single flow graph is below. [8]



**OR**

- Q.1 (a) What is closed loop transfer function of a system with positive feedback? Explain, what is the effect on stability? [8]
- (b) Simplify the block diagram shown in fig. [8]



## UNIT-II

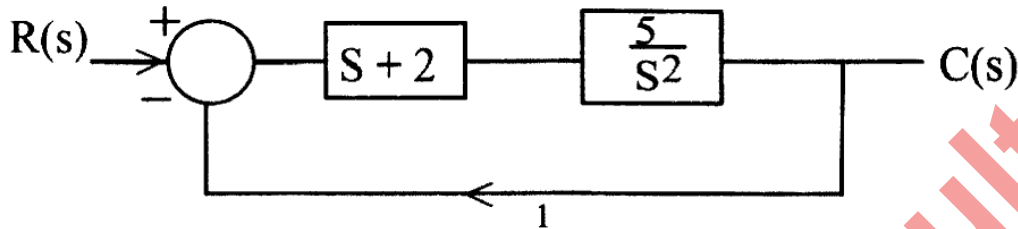
- Q.2 (a) A unity feedback control system has  $G(S) = \frac{1}{S(S+2)}$ . The input to the system is given by  $Y(t) = 2t + 3t + 3t^3$ . Determine the general error coefficient and steady state error. Explain force – voltage & force – current analogy with complete details. [8]
- (b) Determine the stability of system  $S^6 + S^5 + 5S^4 + 3S^3 + 2S^2 - 4S - 8 = 0$  [8]

**OR**

Q.2 (a) Consider the system having open loop transfer function  $G(S) = \frac{1}{S(S+1)}$ .

Calculate rise time, peak time, peak overshoot and settling time. [8]

(b) What is time response of the system when it is excited by unit step I/P? [8]



**UNIT-III**

Q.3 (a) The open loop transfer function of a unity feedback control system is given below.

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

Determine closed loop stability and nyquist criteria. [8]

(b) Find out time response of second order system for step input and also all parameters. [8]

**OR**

Q.3 (a) Discuss stability of a system by root locus techniques.

$$G(S) = \frac{K}{S^2 (S+2) (S+5)}, H(S)=1 \quad [8]$$

(b) Explain the salient features of root locus plot. [8]

**UNIT-IV**

Q.4 (a) The open loop transfer function of a feed back control system is

$$G(S) H(S) = \frac{K}{S (1+5S) (1+.25S)}$$

Draw Bode – plot & find K for gain margin 20dB [8]

(b) Determine following terms:

- (i) Phase crossover frequency [2]
- (ii) Phase margin [2]
- (iii) Gain cross over frequency [2]
- (iv) Gain margin [2]

**OR**

Q.4 (a) Sketch Bode – plot for -

$$G(S) = \frac{1000}{(1+2S)(1+0.002S)} \quad [8]$$

(b) Consider -

$$G(S) = \frac{K}{S(S+1)}$$

Determine values of K & T with  $M_p = 25\%$  and  $W_r = 8$  rad / second. [8]

**UNIT-V**

Q.5 Compare lag, lead and lead – leg compensating network in detail. [16]

**OR**

Q.5 (a) What is controller? Explain PID controller with effect of P, I, D individually. [8]

(b) Obtain state model for the transfer function

$$\frac{Y(S)}{U(S)} = \frac{6(S+3)(S+2.5)}{(S+2)(S^2+4S+5)} \quad [8]$$

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