C 26750
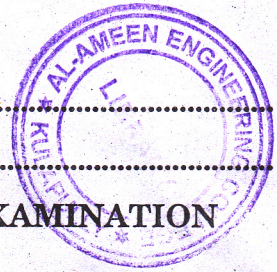
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Name..............................

Reg. No..............................

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION MAY 2012

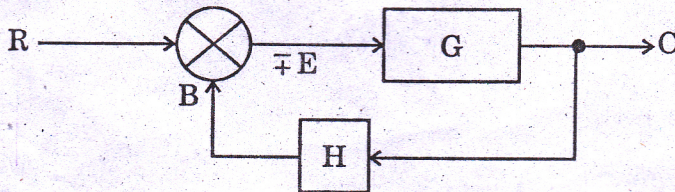## EC/PTCE 09 604—CONTROL SYSTEMS

(2009 Admissions)

Time : Three Hours

Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. State Mason's Gain formula.

2. Draw the signal flow graph of the given system block diagram.

3. Define overshoot.

4. What is transportation lag ?

5. What is a state space variable ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Write the merits and demerits of open loop and closed loop systems.

7. Briefly explain the rules for Block diagram rules.

8. Determine the step response of a second order system.

9. Write a note on root locus.

10. With an example, explain the sampled data systems.

11. Write the state space model for a series RLC circuit in terms of charges and fluxes.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) (i) Write a note on computers in Automatic control.

(4 marks)

Turn over

(ii) Determine the Laplace transform of
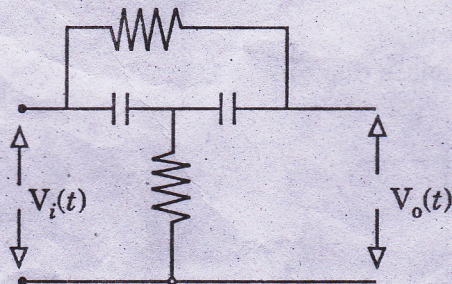
(1) $\dfrac{1}{s+1}$.

(2) $\dfrac{1}{s(s+1)}$.

(6 marks)

Or

(b) (i) State and explain any *two* properties of Laplace transforms.   (4 marks)

(ii) Derive the transfer function of the network given below using signal flow graph technique.

(6 marks)

13. (a) Discuss in detail about the time response of a

(i) First order system.

(ii) Second order system.

Or

(b) (i) A system is described by the following characteristic equation Find the Routh's stability criterion

$$s^4 + 2s^3 + 3s^2 + 2s + 15 = 0.$$

(6 marks)

(ii) Write a note on gain cross over frequency and resonant peak frequency.   (4 marks)

14. (a) Discuss in detail about the analysis of discrete time systems.   (10 marks)

Or

(b) (i) Write a note on Jury's test.   (5 marks)

(ii) With an example explain Bilinear transformation.   (5 marks)

15. (a) Discuss in detail about the state-space representation of a Linear-Time-Invariant system.

(10 marks)

Or

(b) Discuss in detail about Linear transformation and diagonalisation.   (10 marks)

[4 × 10 = 40 marks]