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T 3259

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Fourth Semester

Computer Science and Engineering

EE 1291 — ELECTRICAL ENGINEERING AND CONTROL SYSTEMS

(Regulation 2004)

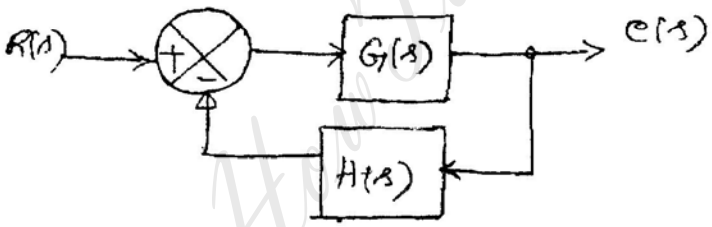
Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchoff's voltage law.

2. Draw the signal flow graph for the system shown.



3. Define form factor.

4. What is a phase variable?

5. What are the essential parts of a D.C generator?

6. State Routh's Stability criteria.

7. What is the e.m.f. equation of a transformer?

8. Define gain margin.

9. What are the three most popular type of stepper motor rotor arrangements?

10. How do you classify single phase motors?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find out the equivalent resistance of four equal resistances connected in parallel. (6)

(ii) Derive the transfer function of a RLC series circuit. (10)

Or

(b) (i) State Kirchoff's current law and give an example. (6)

(ii) Explain Mason's gain formula. (10)

12. (a) (i) What is the relation between line and phase values in three phase circuits? Derive. (8)

(ii) Explain velocity error constant. (8)

Or

(b) (i) Explain the characteristics of D.C. shunt motor.

(ii) Describe the various types of inputs used in analyzing time response of a system.

13. (a) (i) Derive the emf equation of a d.c. generator. (10)

(ii) Explain stable, unstable and marginally stable system. (6)

Or

(b) (i) Explain the measurement of three phase power. (6)

(ii) Determine the stability of the system given by $f(s) = s^3 + 2s^2 + 2s + 13$. (10)

14. (a) (i) Discuss the losses in a transformer. (8)

(ii) Sketch the frequency response of the system given by $G(s) = s + 1$ at a frequency of 1 rad/s. (8)

Or

(b) (i) Discuss the losses in a three phase induction motor. (8)

(ii) What is a corner frequency? How will you determine it? What are the corner frequencies of the following systems

$$G(s)=\frac{s}{s+0.5}$$

$$G(s)=\frac{(s+0.2)}{(s+0.3)(s+5)}$$ (8)

15. (a) (i) Draw the characteristics of a two phase a.c. servo motor. (8)

(ii) Explain an error detector used in control system. (8)

Or

(b) (i) Explain the working principle of stepper motor. (8)

(ii) Write notes on hydraulic actuator. (8)

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