L 1095

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

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. Write the equivalent resistance when two resistors are connected in parallel.

2. Write the relationship between line and phase voltages.

3. What is meant by back emf?

4. What are the different parts of the induction machine?

5. Why is the single phase induction motor not self-starting?

6. What are the advantages of block diagram representation?

7. What are the different types of error constants?

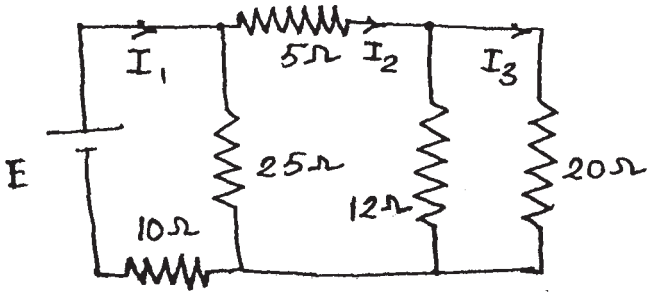
8. How do you identify the stability of the control system using Routh-Hurwitz criterion?

9. Define gain and phase margins.

10. What are the applications of stepper motor?

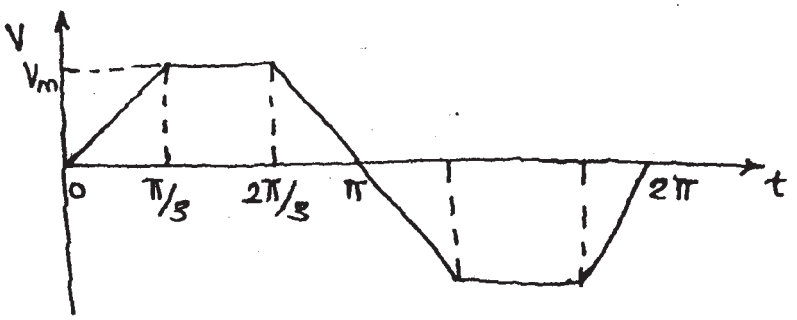
PART B — (5 × 16 = 80 marks)

11. (i) Find the supply voltage E such that the power in the 20 ohm resistor is 180 W. (8)



(ii) State Mason's gain formula and describe about the rules for drawing signal flow graphs. (8)

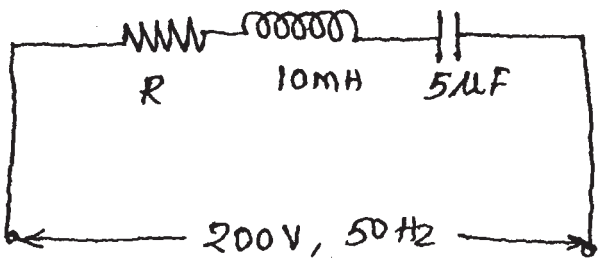
12. (a) (i) Find the average, RMS, form factor and peak factor of the following wave form. (8)



(ii) Describe about different types of input test signals used in time response analysis of control systems. (8)

Or

(b) (i) In the following circuit, the current lags the voltage by 50°. Find the value of R and voltage across each circuit element (8)



(ii) Define the rise time, maximum over shoot, peak time and settling time of the second order control system. (8)

13. (a) (i) With a neat sketch, explain the construction and operating principle of a D.C. machine. (8)

(ii) Explain about the stability of the system by observing the location of the roots of the characteristic equation in the time domain response. (8)

Or

(b) (i) A 250 V d.c. shunt motor takes 41 A at full load. Resistances of motor armature and shunt field windings are 0.1 ohm and 250 ohm respectively. Find the back e.m.f. on full load. (8)

(ii) A closed loop control system has the characteristic equation given by $s^3 + 4.5s^2 + 3.5s + 1.5 = 0$. Investigate the stability using Routh-Hurwitz criterion. (8)

14. (a) (i) What is a transformer? How does it transfer electrical energy from one circuit to another? (8)

(ii) Explain the procedure to draw the Bode plot and discuss how the stability of the system can be found from it. (8)

Or

(b) (i) Explain the principle of operation of the three phase induction motor. (8)

(ii) How is the closed loop frequency response of the control systems obtained from M and N circles? (8)

15. (a) (i) Describe the construction and principle of operation of capacitor start induction run induction motor. (8)

(ii) Explain the switching sequence of the stepper motor. (8)

Or

(b) (i) Briefly describe the operating principle of reluctance motor. (8)

(ii) Explain the significance of hydraulic and pneumatic systems. (8)
