

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Question Paper Code : R 3686**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Third Semester

Computer Science and Engineering

EE 255 — ELECTRICAL ENGINEERING AND CONTROL SYSTEMS

(Regulation 2001)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the equivalent resistance of two resistors  $5\ \Omega$  and  $10\ \Omega$  are connected in series and parallel.
2. Define power factor.
3. Draw the external load characteristics of shunt generator and cumulative compound generator.
4. A 220 V shunt motor has an armature resistance of 0.2 ohm and field resistance of 110 ohm. The motor draws 5 A at 1500 rpm at no load. Calculate the speed if the motor draws 32 A at rated voltage.
5. State why series motor can not be started without any load.
6. Why is single-phase induction motor not self-starting?
7. Distinguish between open loop and closed loop control system.
8. Name any two effects of feedback in a control system.
9. Give two advantages of state space approach.
10. Define rise time and settling time in the time domain specification of second order system.

PART B — (5 × 16 = 80 marks)

11. (a) (i) By current divider rule find the current thro each resistor shown in Fig. 1. (8)



Fig. 1

- (ii) Find the value of current I in Fig. 2. (8)

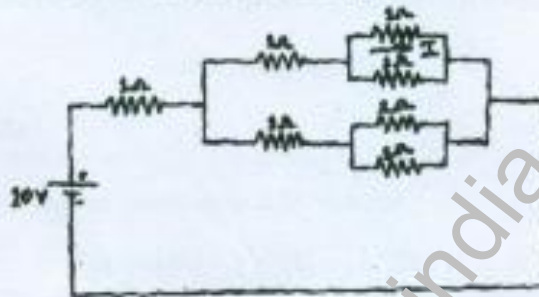


Fig. 2

Or

- (b) (i) Find the equivalent resistance across A and B in the following circuit shown in Fig. 3. (8)

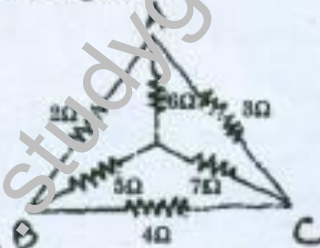


Fig. 3

- (ii) In the given circuit shown in Fig. 4., calculate the load current  $I_L$ , load voltage  $V_L$  and load Power  $P_L$ . (8)

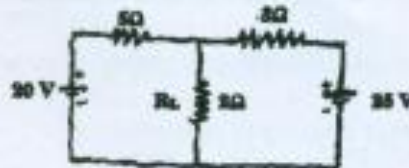


Fig. 4

12. (a) In the network Fig. 5, find the value of  $V_2$ , so that the current through  $(2 + j3)$  ohm impedance is zero.

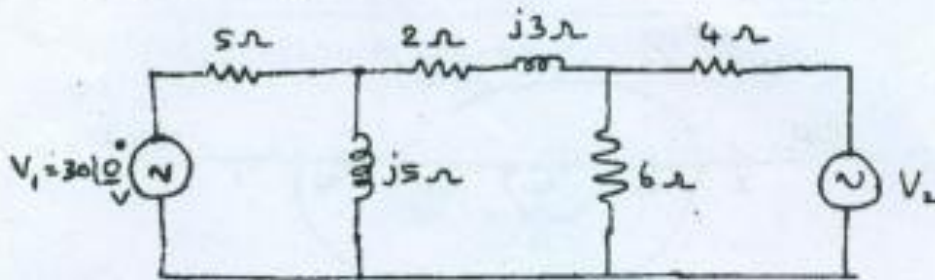


Fig. 5

Or

- (b) Use Node voltage analysis to find currents in  $R_2, R_3, R_4, R_5$  and  $R_6$  of the network in the Fig. 6.



Fig. 6

13. (a) Explain in detail the principle, construction and working of longitudinal cross-sectional view of variable reluctance motor.

Or

- (b) With a neat sketch, explain the working of hybrid stepper motor.

14. (a) Obtain the closed loop transfer function of the system shown in Fig. 7 using the block diagram technique.

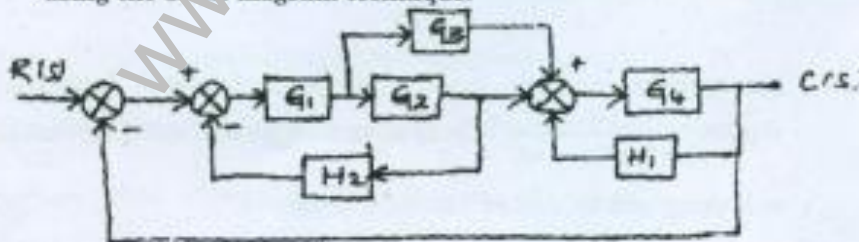


Fig. 7

Or



- (b) Find  $C(s)R(s)$  for the system shown in Fig. 8 by using Mason's gain formula.

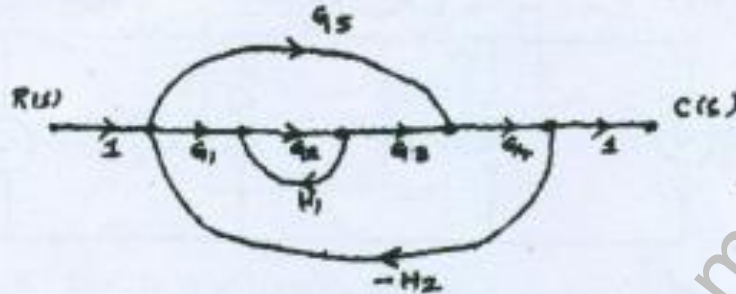


Fig. 8

15. (a) Find the state model of the mechanical system shown using the physical variables shown. (16)

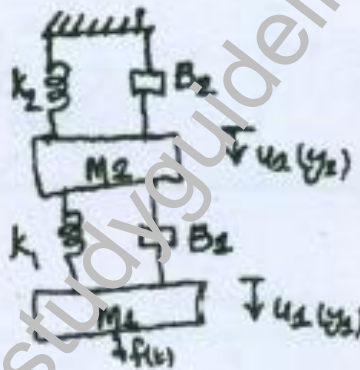


Fig. 9

Or

- (b) The open loop transfer function of a unity feedback system is given by  $G(s) = \frac{50}{(1+0.18s)(1+2s)}$ . Determine steady state error for unit step input, unit ramp and an unit acceleration inputs. (5 + 5 + 6)