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(3 pages)

Name.....

Reg. No.....

THIRD SEMESTER B.TECH. DEGREE EXAMINATION, DECEMBER 2004

CS-2K-306/IT-2K-306/PTCS-2K-305 – ELECTRIC CIRCUITS AND SYSTEMS

(New Scheme)

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions.*

Assume suitable data that are not given.

Part A

I. (a) Derive an expression for equivalent inductance of coupled circuits in parallel.

(b) Explain with an example the method of writing cut-set schedule and obtaining the relation between tree branch voltages and branch voltages of graph.

(c) Obtain the star connected equivalent for the delta connected circuit shown in Fig. (1). Derive the formula used.

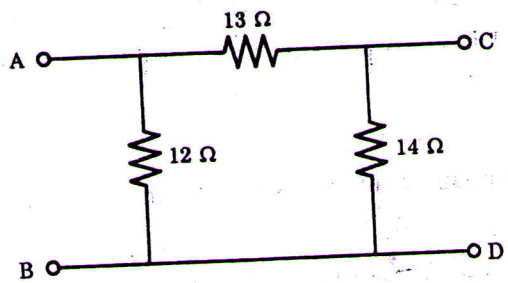

Fig. 1

(d) A balanced star connected load of $(6 + j4)\ \Omega$ pu phase is connected to a balanced 3-ϕ, 400 V supply. The phase current is 10 A. Find (i) the total active power, (ii) reactive power and total apparent power.

(e) Find the transmission or general circuit parameters for the circuit shown in Fig. (2).

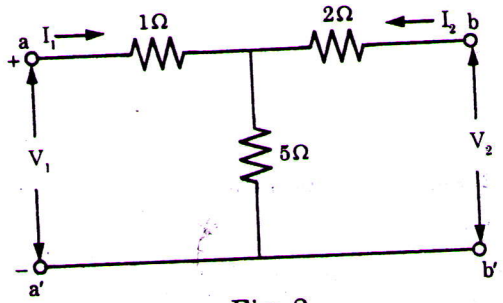

Fig. 2

Turn over

(f) Write the advantages and disadvantages of Maxwell's Inductance-capacitance bridge.

(g) Explain with block diagram the closed loop temperature control system.

(h) Reduce the block diagram shown in Fig. (3) and find C/R.

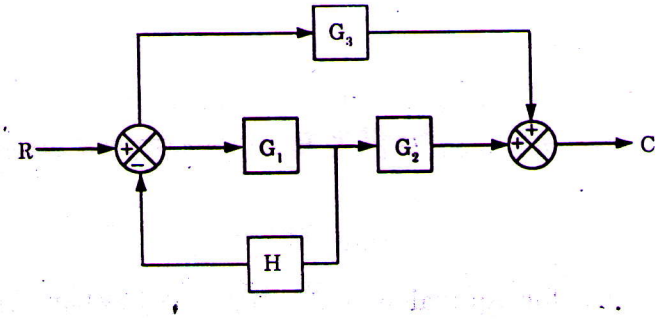

Fig. 3

(8 × 5 = 40 marks)

Part B

Unit I

II. (a) (i) State and prove initial value theorem. (5 marks)

(ii) Verify the initial value theorem for the following functions (1) $5e^{-4t}$ and (2) $2-e^{5t}$. (10 marks)

Or

(b) Find the currents through various resistors in the circuit shown in Fig. (4).

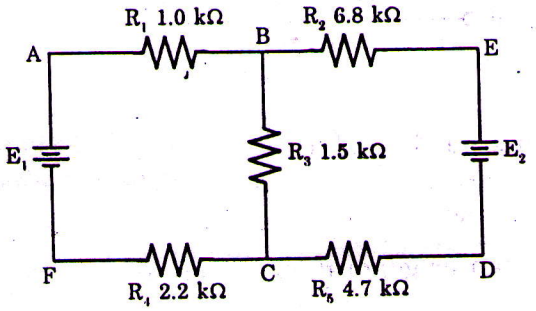

Figure 4

(15 marks)

Unit II

III. (a) (i) Derive the expression for power in series RL series circuit. (6 marks)

(ii) A bulb is rated at 100 W and 110 V. Calculate the impedance of a choke which should be connected in series with the bulb so that it may be used on 230 V ac supply. Find the total active power and the overall power factor. The reactance to resitance ratio of the choke is 10. (9 marks)

Or

(b) (i) With the help of suitable diagram write the expressions for phase currents and line currents for a balanced delta connected load. (5 marks)

(ii) A 3-phase star connected motor takes 10 kVA at power factor 0.6 lagging from a 220 volt three phase source. It is in parallel with a delta connected load having 16 Ω resistance and 12 Ω capacitive reactance in series in each phase. Find line current, total power and power factor of the combination. (10 marks)

Unit III

IV. (a) For the circuit shown in Fig. 5 determine the current $i(t)$ when the switch is closed at $t = 0$. Assume that the initial charge on the capacitor is zero.

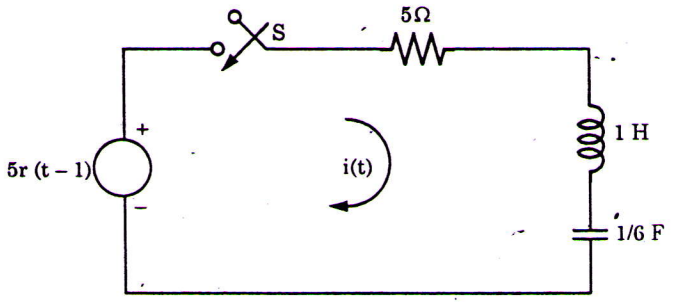

Fig. 5 (15 marks)

Or

(b) Find the Y parameters for the network shown in Fig. 6.

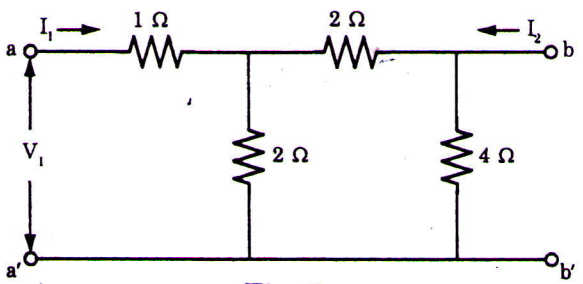

Fig. 6 (15 marks)

Unit IV

V. (a) A unity feedback control system has an open loop transfer function, $G(s) = \frac{10}{s(s+2)}$.

Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units. (15 marks)

Or

(b) Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies. (15 marks)

(4 × 15 = 60 marks)