N 1043

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Second Semester

Electronics and Communication Engineering

EC 142 — CIRCUIT THEORY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the rms value of $V(t)$.

$$V(t) = 50\sin(100\Pi t + 300).$$

2. State Kirchoff's laws.

3. A generator is having internal impedance $(4 + j5)$ ohm. Determine the required load impedance, for maximum power transfer.

4. Prove Tellegen's theorem for the circuit of Fig. 1.

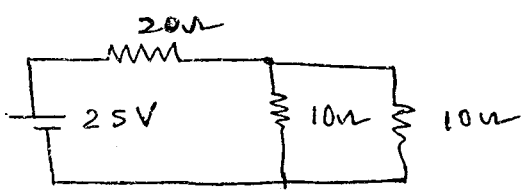

Fig. 1

5. Define quality factor Q of a coil.

6. A series circuit has R = 10 ohm L = 1 mH C = 0.01 μF. Calculate the resonance Frequency in rad/sec.

7. Plot the impedance of (a) Capacitor (b) Resistor as function of frequency.

8. A circuit has 10 V supply with R = 100 ohm L = 1 mH. What is the time constant of the circuit.

9. Find the dual of the circuit shown in Fig. 2.

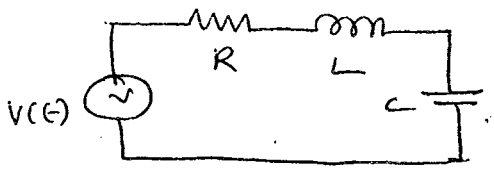

Fig. 2

10. Define (a) Tree (b) Branch of Network.

PART B — (5 × 16 = 80 marks)

11. (i) Determine the mesh currents I_1, I_2 and I_3 for the circuit shown in Fig. 3. (10)

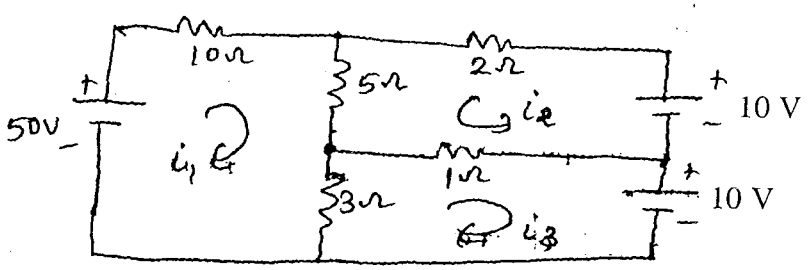

Fig. 3

(ii) In the circuit shown in Fig. 4, find the value of current through 100 Ω. (6)

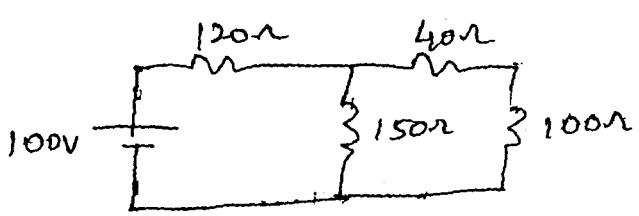

Fig. 4

12. (a) Find the thevenin's voltage and thevenins resistance for the circuit of Fig. 5 at (a, b).

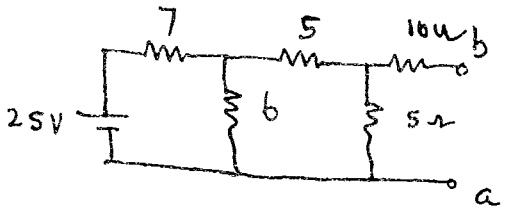

Fig. 5

Or

(b) Using superposition theorem find the current in 10 Ω resistor (Fig. 6)

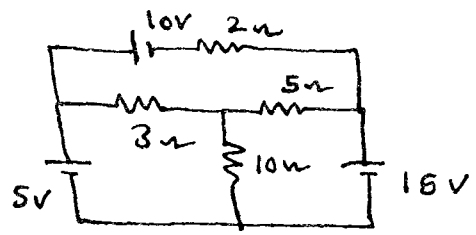

Fig. 6

13. (a) A coil of inductance 0.75 H and resistance 40 Ω is a part of a series resonant circuit having a resonant frequency of 160 Hz if the supply voltage is 230 V, 50 Hz. Find (i) current (ii) power factor (iii) voltage across the coil.

Or

(b) For the circuit of Fig. 7 find an expression for frequency of parallel resonance.

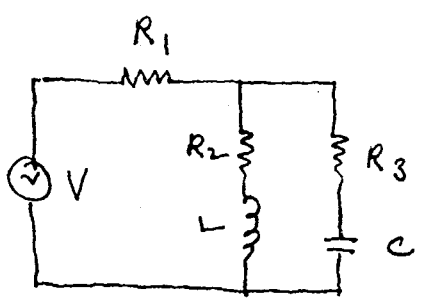

Fig. 7

14. (a) A 10 V supply is in series with $R = 10\ \Omega$ and $C = 10\ \mu F$ and a switcher. The switch is closed at $t = 0$. Calculate the voltage across the capacity after one time constant where (i) $V_c(0) = 0\ V$ (ii) $V_c(0) = 5\ V$.

Or

(b) Explain

(i) undamped

(ii) over damped

(iii) critically damped conditions of R–L–C series circuit.

Also draw approximate responses in each case.

15. (a) (i) For the graph theorem in Fig. 8

Find all possible Tree's of the network.

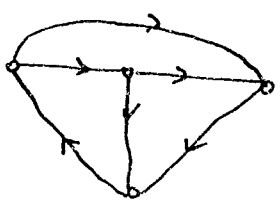

Fig. 8

(ii) Find the dual of the network shown in Fig. 9.

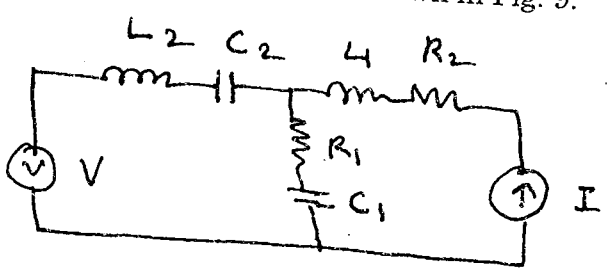

Fig. 9

Or

(b) For the circuit shown in Fig. 10. Solve for branch currents using Tieset analysis.

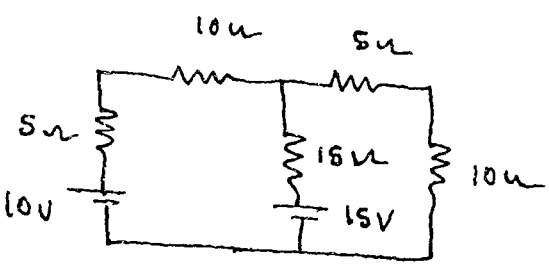

Fig. 10