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Question Paper Code : 70464

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Second Semester

Electronics and Communication Engineering

EE 6201 — CIRCUIT THEORY

(Common to Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Biomedical Engineering and Medical Electronics Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. The resistance of two wires is 25 Ω when connected in series and 6 Ω when connected in parallel. Calculate the resistance of each wire.

2. Distinguish between mesh and loop of a circuit.

3. A star connected load of 5 Ω each is to be converted in to an equivalent delta connected load. Find the resistance be used.

4. A load is connected to a network of the terminals to which load is connected, $R_{\text{th}} = 10$ ohms and $V_{\text{th}} = 40V$. Calculate the maximum power supplied to the load.

5. Define selectivity.

6. What is co-efficient of coupling?

7. Determine the Laplace transform of unit step function $u(t)$ and sinusoidal function $\sin(\omega t)$.

8. A RLC series circuit has R = 10 ohms and L = 2H. What value of capacitance will make the circuit critically damped?

9. Write the distortion power factor equation of the three phase circuits.

10. Distinguish between unbalanced source and unbalanced load.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the current I_L in the circuit shown in Fig. 11(a)(i). (8)

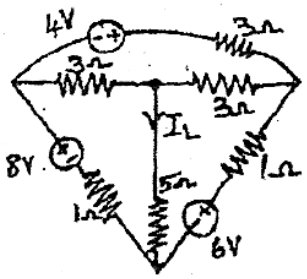

Fig. 11(a)(i)

(ii) Calculate the voltage across A and B in the circuit shown in Fig. 11(a)(ii). (8)

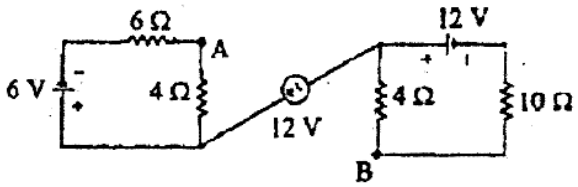

Fig. 11(a)(ii)

Or

(b) (i) Determine v_x and i_x in the given Fig. 11(b)(i). (10)

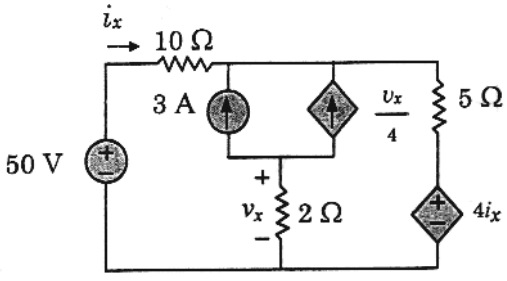

Fig. 11(b)(i)

(ii) Write the mesh equation and nodal equation for the network in fig. 11(b)(ii) by inspection method. (6)

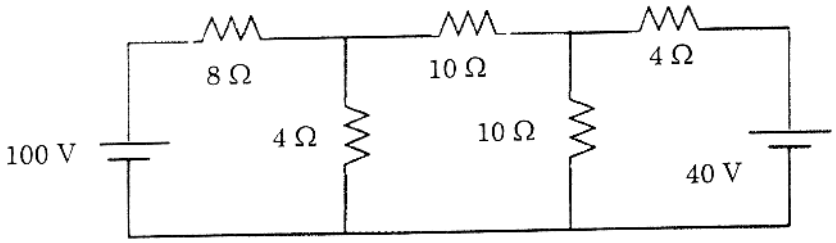

Fig. 11(b)(ii)

12. (a) (i) Obtain the equivalent resistance R_{ab} of the circuit given in Fig. 12(a)(i) and calculate the total current *i*. (8)

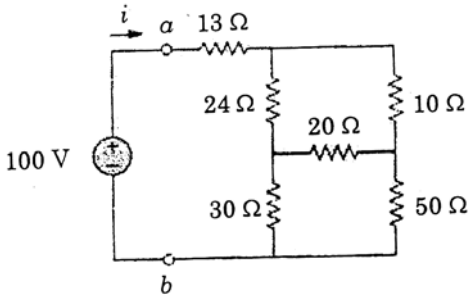

Fig. 12(a)(i)

(ii) Find the value of R_L in fig. 12(a)(ii) for maximum power to R_L and calculate the maximum power. (8)

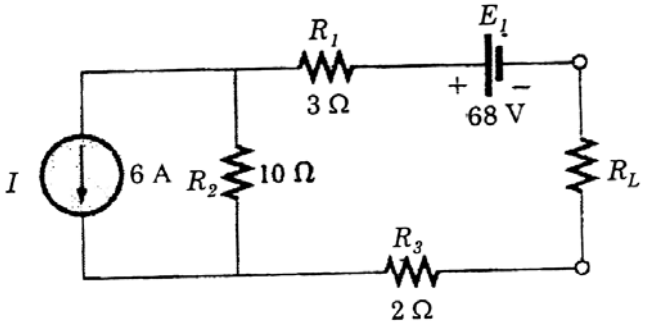

Fig. 12(a)(ii)

Or

(b) Apply Norton theorem to determine current I_o for the given circuit in Fig. 12(b) (16)

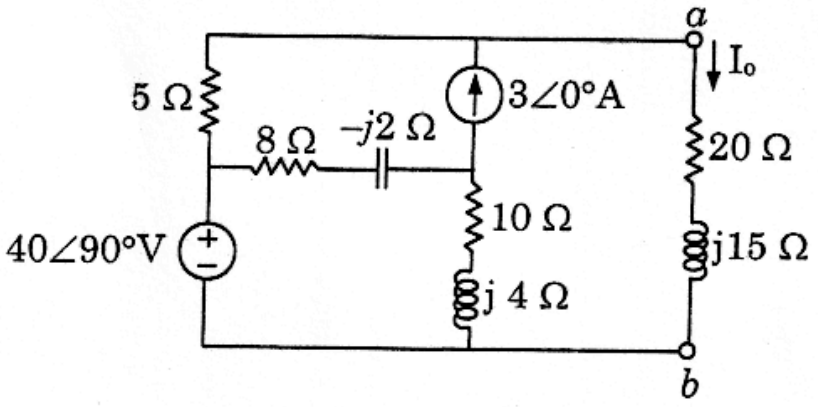

Fig. 12(b)

13. (a) With neat illustration and necessary derivations, explain the linear transformer. (16)

Or

(b) Derive the Mutual inductance and the coupling coefficient of the transformer with necessary illustrations. (16)

14. (a) In the RL circuit shown in Fig. 14(a), the switch is closed to position-1 at $t = 0$. After $t = 100$ ms, the switch is changed to position-2. Find $i(t)$ and sketch the transient. (16)

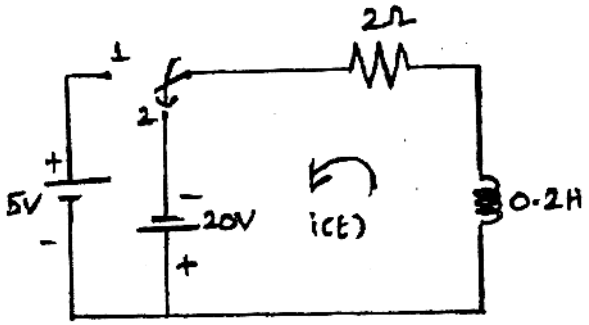

Fig. 14(a)

Or

(b) (i) Determine the driving point impedance of the network shown in Fig. 14(b)(i) (8)

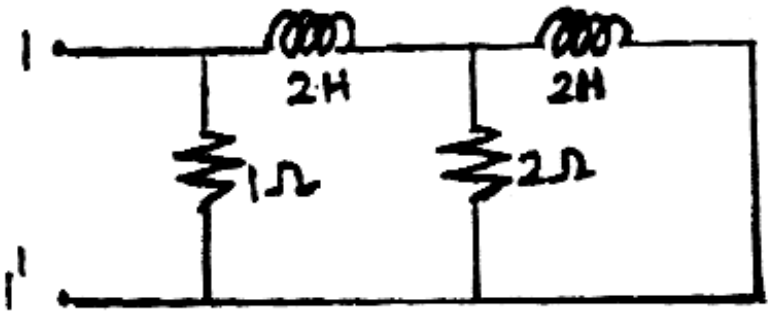

Fig. 14(b)(i)

(ii) Determine the h-parameters of the two part network shown in Fig. 14(b)(ii) (8)

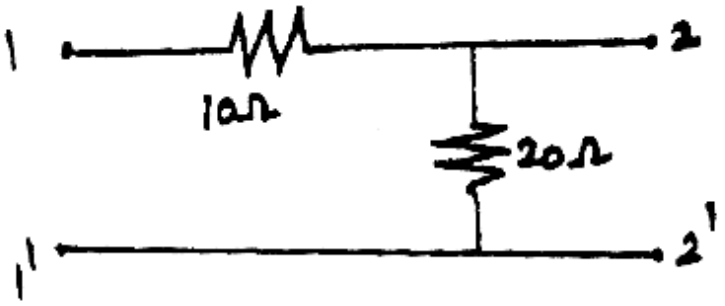

Fig. 14(b)(ii)

15. (a) (i) A balanced $\Delta-$connected load having an impedance $20-j15\Omega$ is connected to a $\Delta-$ connected, positive sequence supply $V_{ab}=330\angle 0°\text{V}$. Calculate the phase currents of the load and the line currents. (8)

(ii) The input power to a 3ϕ load is 10 kw at 0.8 pf. Two wattmeters are connected to measure power, find the individual readings of the wattmeters. (8)

Or

(b) For the unbalanced circuit in Fig. 15(b), determine the line currents and voltage across each load impedances draw the phasor diagram. (16)

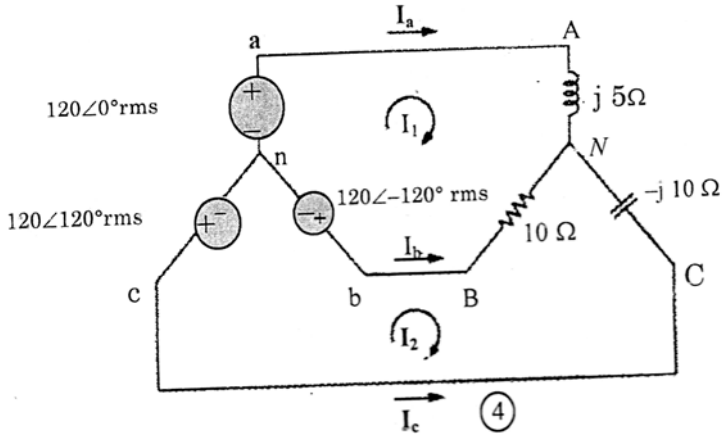

Fig. 15 (b)