S 114

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2005.

Second Semester

Electronics and Communication Engineering

EC 142 — CIRCUIT THEORY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

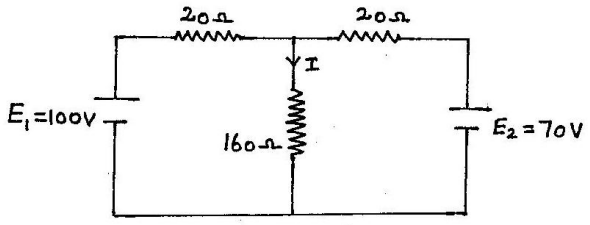
PART A — (10 × 2 = 20 marks)

1. State Kirchoff's law.

2. What do you understand by Nodal analysis?

3. State the compensation theorem.

4. For the circuit shown in Fig., find I using Millmann's theorem.



5. Define series resonance.

6. State the usefulness of tuned circuits.

7. Distinguish between the forced response and free response of a circuit.

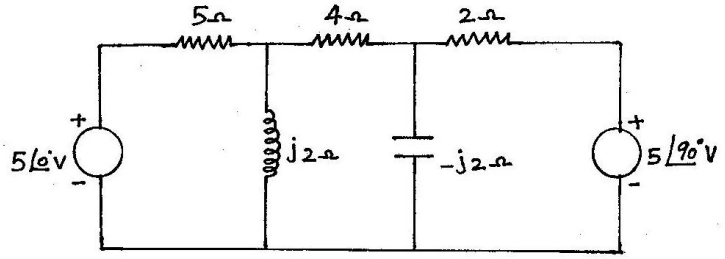
8. How is a transient state attained in a circuit?

9. Define tieset of a graph.

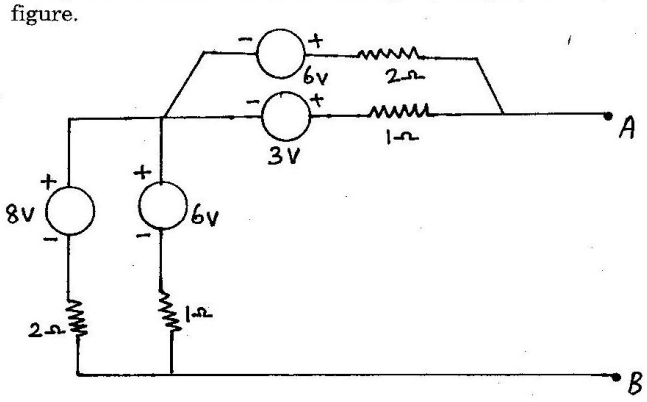
10. Define linear graph and subgraph.

PART B — (5 × 16 = 80 marks)

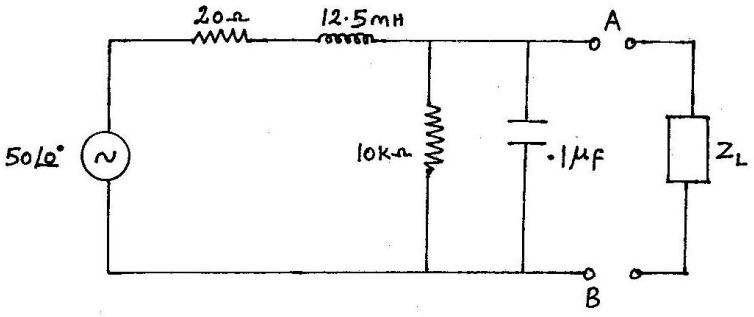
11. (i) Determine the node voltage for the circuit shown in figure by Nodal analysis. (8)



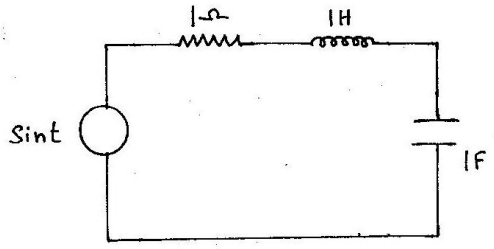
(ii) Using source transformation techniques, simplify the network shown in figure. (8)



12. (a) (i) For the circuit shown in Fig, find the load impedance Z_L that maximizes the power transfer and also find the power transferred with the conjugate matched load impedance (w = 500 r/s). (8)



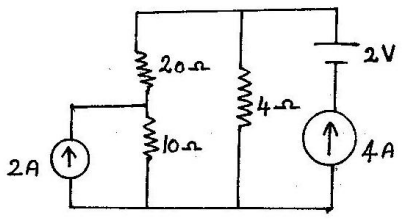
(ii) Verify Tellegen's theorem for the network shown in Fig. (8)



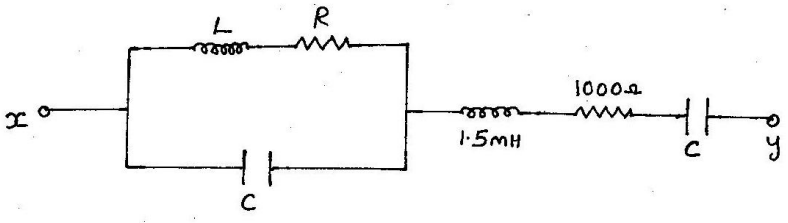
Or

(b) (i) A d.c. generator supplies current to a series combination of 1 kΩ and 3 kΩ resistors. A voltmeter is used to measure the voltage across 1 kΩ resistor. Using Thevenin's theorem, determine the lowest resistance which the voltmeter must have that the measurement error shall not exceed 1%. (8)

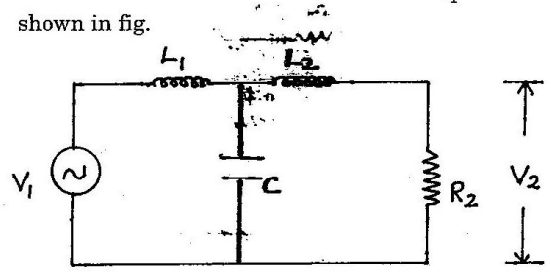
(ii) Determine V_{AB} using superposition theorem in the circuit shown in fig. (8)



13. (a) (i) Determine the values of R, L and C for the network shown in Fig. to have a resistance of 11 kΩ across the terminals *xy* (f_0 = 10 kHz). (8)

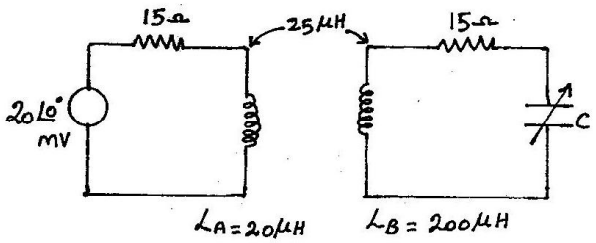


(ii) Obtain the voltage transfer function $\frac{V_2}{V_1}$ for the coupled circuit shown in fig. (8)



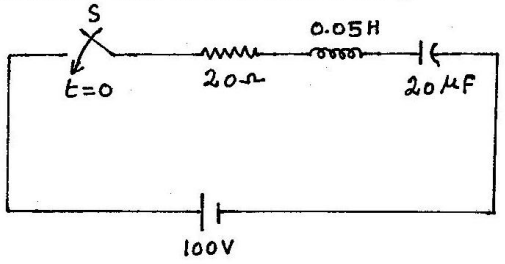
Or

(b) (i) In the coupled circuit shown in fig., the input to the primary is 20 mV at f = 1 MHz and secondary is tuned to this frequency. Determine (1) the value of C (2) input impedance (3) secondary current and (4) the voltage across the capacitor. (8)

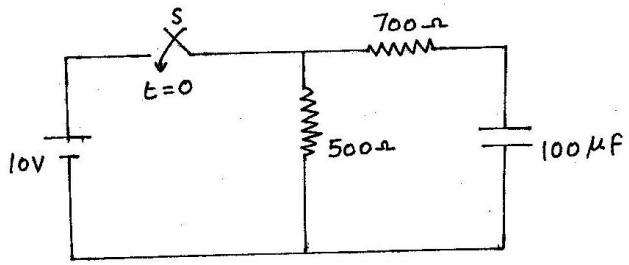


(ii) Obtain the resonant frequency, Q factor bandwidth and the voltage across the capacitor at resonance for the circuit series RLC having R = 7.5 Ω, L = 6 μH and C = 40 pF with a supply voltage of 0.5 V. (8)

14. (a) (i) Obtain an expression for the transient current when the switch S is closed at t = 0 for the circuit shown in Fig. (8)

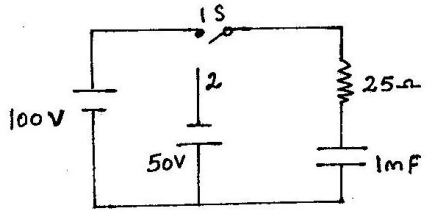


(ii) In the circuit shown in Fig, how long does it take after the switch S is closed before the total current from the supply reaches 30 mA. (8)



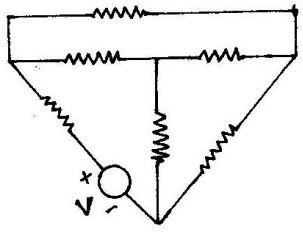
Or

(b) (i) In the circuit shown in Fig., the switch is put in position 1 for 1 mS and then thrown to position 2. Find the transient current in both intervals. (8)



(ii) Obtain the transient voltage across the elements R and C in a series RC circuit excited by a d.c. voltage when the switch is closed at $t = 0$. (8)

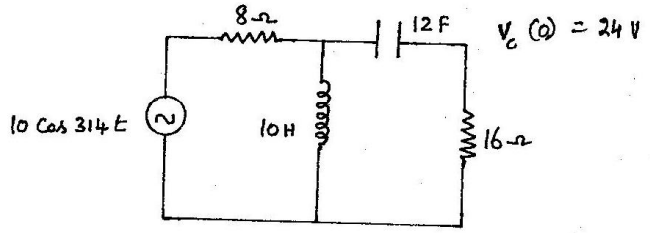
15. (a) (i) For the network shown in Fig., obtain the tie–set matrix and hence write down the equilibrium equations. Also give the expression for branch current interms of link currents. (8)



(ii) Explain the procedure to form a cut–set matrix. (8)

Or

(b) (i) For the circuit shown in Fig., write the mesh equations. Obtain the duals of the mesh equations and hence derive the dual network from the dual equations derived. (8)



(ii) State the properties of

(1) Tree of a graph

(2) Path of a graph. (8)

upload your college symposium/conference details,photo(s),video(s) in www.technicalsymposium.com