Reg. No. : .....

Name : .....

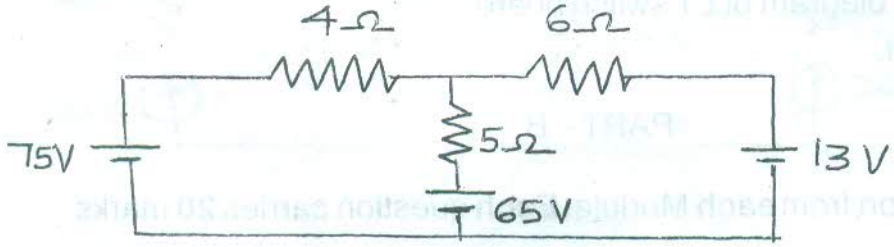
Combined First and Second Semester B.Tech. Degree Examination, May 2015
(2013 Scheme)
13.108 : FUNDAMENTALS OF ELECTRICAL ENGINEERING (E)

Time : 3 Hours Max. Marks : 100

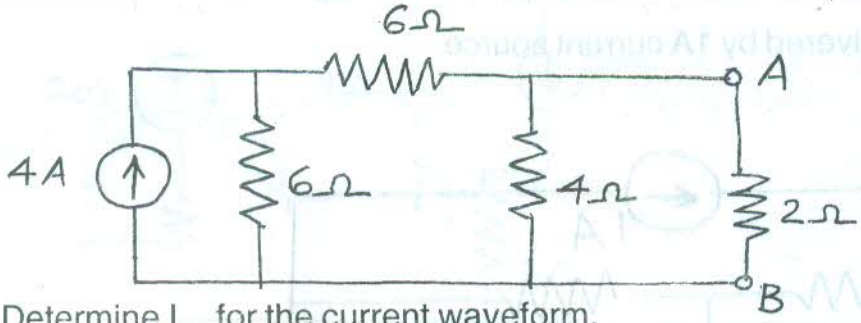
PART – A

Answer **all** questions. **Each** question carries **2** marks.

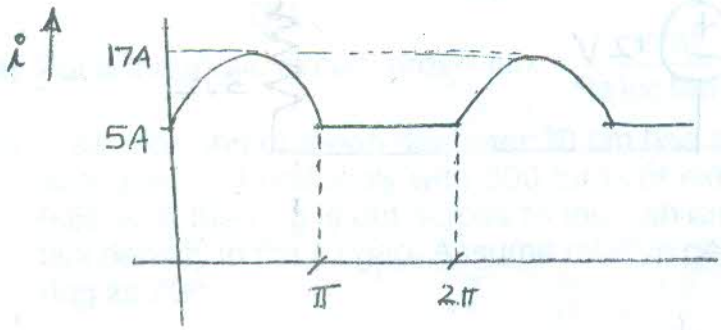
1. Distinguish between active and passive elements with examples.
2. Compare Mesh and Nodal analysis.
3. Find the current through 5 Ω resistor using Nodal analysis.



4. State Maximum Power transfer theorem.
5. Find the current through 2Ω resistor connected across AB using Thevenin's theorem.

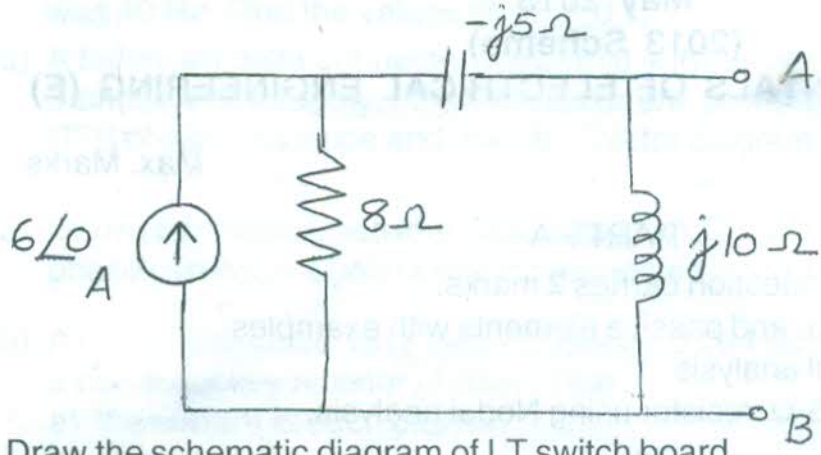


6. Determine I_{av} for the current waveform.



7. A pure inductance of 0.01H passes a current i = 5 cos 2000 t A. What is the voltage across the element ?

8. Find the Norton equivalent across terminals AB.



9. Draw the schematic diagram of LT switch board.

10. Define time constant.

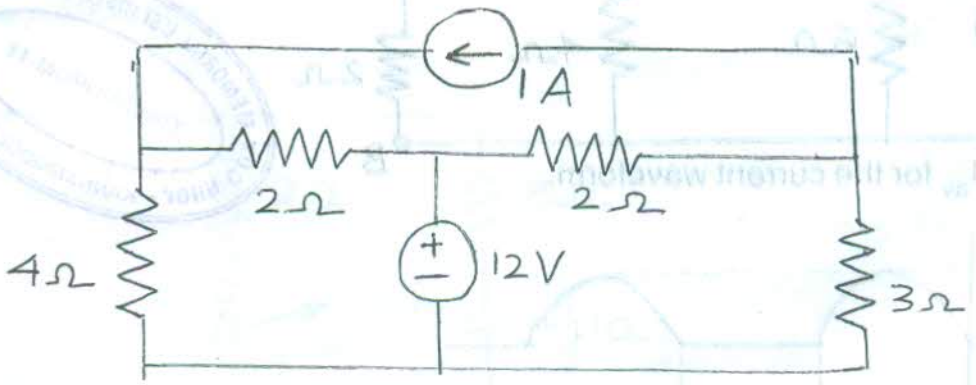
PART – B

Answer **any full** question from **each** Module. **Each** question carries **20** marks.

Module – I

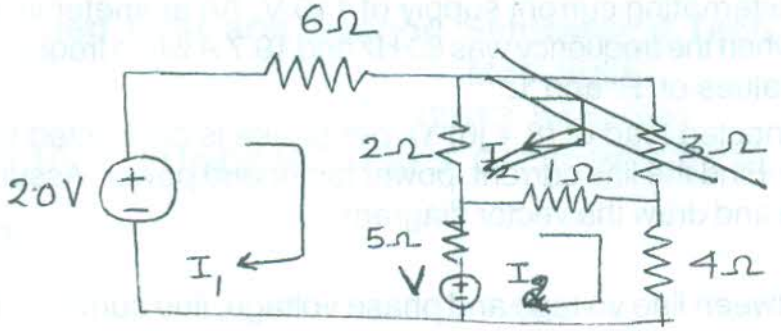
11. a) Distinguish between dependent and independent voltage sources. 6

b) Find the power delivered by 1A current source. 14

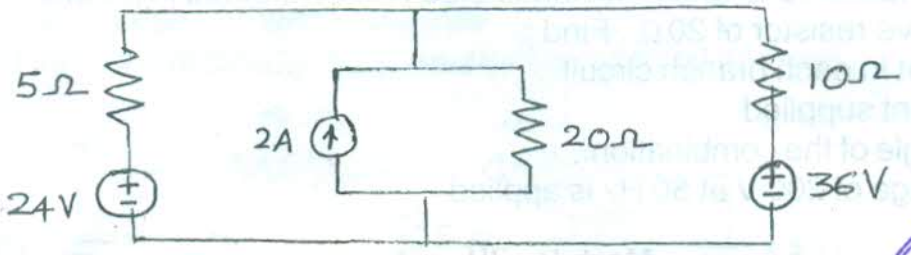


OR

12. a) Determine the voltage 'V' which causes I_1 to be zero for the circuit given using Mesh current analysis. 10



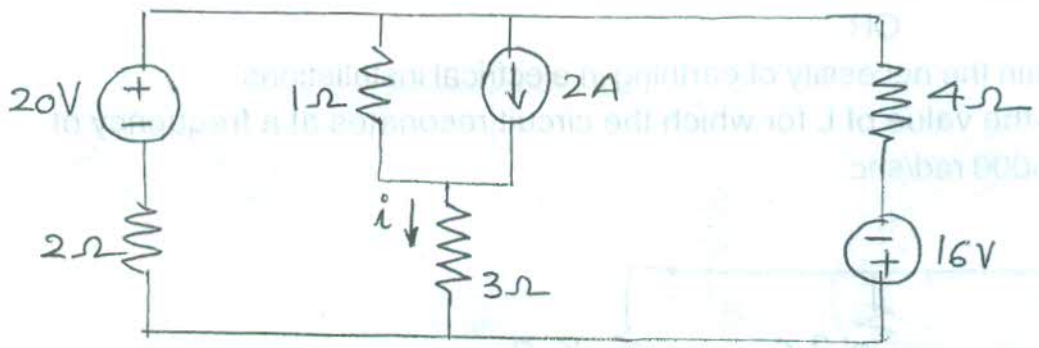
b) Use Node analysis to find current delivered by 24 V source. 10



Module – II

13. a) State Super position theorem. 6

b) Find current 'i' using super position theorem. 14



OR

14. a) For a magnetic circuit, prove $\text{flux} = \dfrac{\text{mmf}}{\text{Reluctance}}$. 6

b) A circular ring of mean diameter 30 cm has a cross sectional area of 6 cm^2 and is wound uniformly with 800 turns of exciting coil carrying a current of 0.65 A. If the ring is cut across to form an air gap of 0.2 cm, determine the flux density in the air gap. Assume relative permeability of the material of the ring as 700. 14

Module – III

15. a) A coil having resistance 'R' Ω and inductance 'L' henries is connected across a variable frequency alternating current supply of 110 V. An ammeter in the circuit showed 15.6 A when the frequency was 80 Hz and 19.7 A when frequency was 40 Hz. Find the values of 'R' and 'L'. 8

    b) A balanced delta connected load of (8 + j6) Ω per phase is connected to a 3-phase 415 V supply. Find the line current, power factor and power. Assume RYB phase sequence and draw the vector diagram. 12

OR

16. a) Derive the relation between line voltage and phase voltage, line current and phase current in a balanced star connected system. 8

    b) A coil of resistance 15 Ω and inductance 0.05 H is connected in parallel with a non-inductive resistor of 20 Ω . Find :
    a) the current in each branch circuit
    b) total current supplied
    c) phase angle of the combination.
    When a voltage of 200 V at 50 Hz is applied. 12

Module – IV

17. a) Explain DC response of an RL network. Sketch relevant waveforms also. 8

    b) Find the frequency at which a series circuit comprising of R = 10 Ω , L = 0.1 H and C = 50 μ F resonates. Find the voltage across inductor at resonance and Q-factor of the circuit. 12

OR

18. a) Explain the necessity of earthing in electrical installations. 6

    b) Find the value of L for which the circuit resonates at a frequency of w = 5000 rad/sec. 14