

SUBJECT: CIRCUIT THEORY

Day : Monday
Date: 03/12/2018

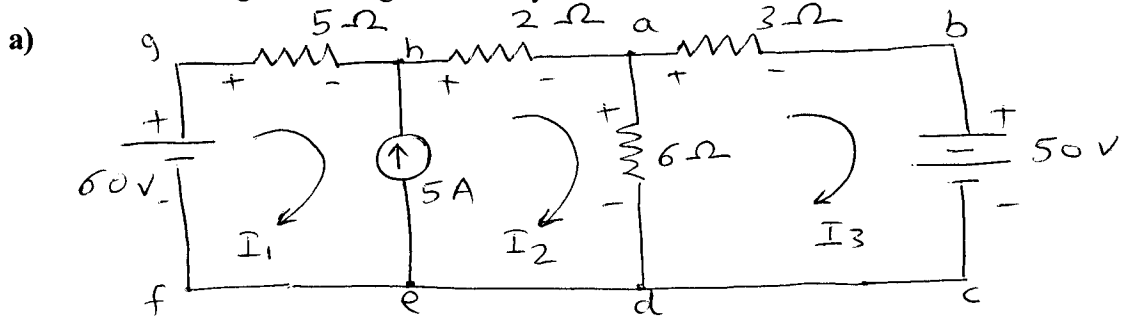
Time: 10.00 AM TO 01.00 PM
Max. Marks: 60

W-2018-2304

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw the diagrams wherever necessary.
- 4) Assume suitable data, if necessary.

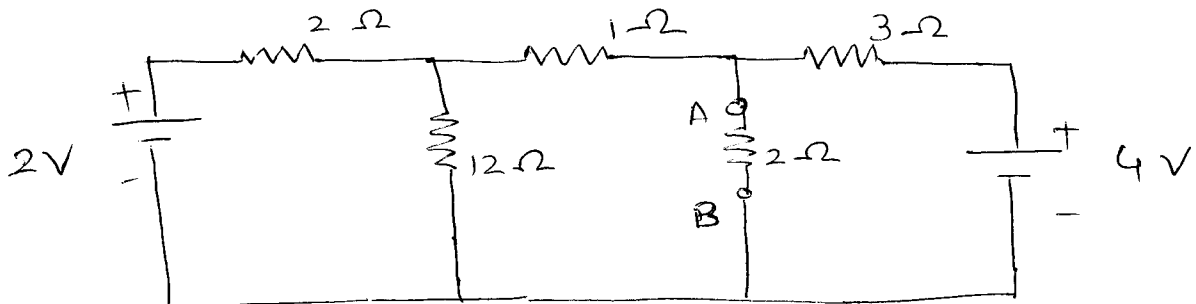
Q.1 Find current through a-b using mesh analysis. (06)



b) What are the steps used for node analysis. (04)

OR

Q.1 a) Find the current through 2Ω resistance connected between terminals A & B in the figure using Thevenin's theorem. (06)



b) State & explain superposition theorem with example. (04)

Q.2 Discuss the following w.r.t. graph theory. (10)

- i) Incident matrix
- ii) Tieset matrix

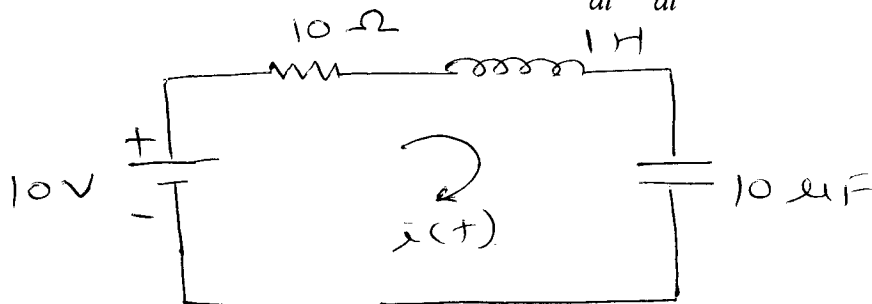
OR

Q.2 Define following terms: (10)

- i) Planner graph
- ii) Tree
- iii) Co-tree
- iv) Twigs
- v) Links

Q.3 a) In the network shown in the figure, the switch is closed. Assuming all initial (07)

conditions as zero, find i , $\frac{di}{dt}$ & $\frac{d^2i}{dt^2}$ at $t=0^+$.



b) Define initial conditions for passive elements. (03)

OR

Q.3 Derive an expression for undriven series RC circuit. Draw its voltage response versus time. (10)

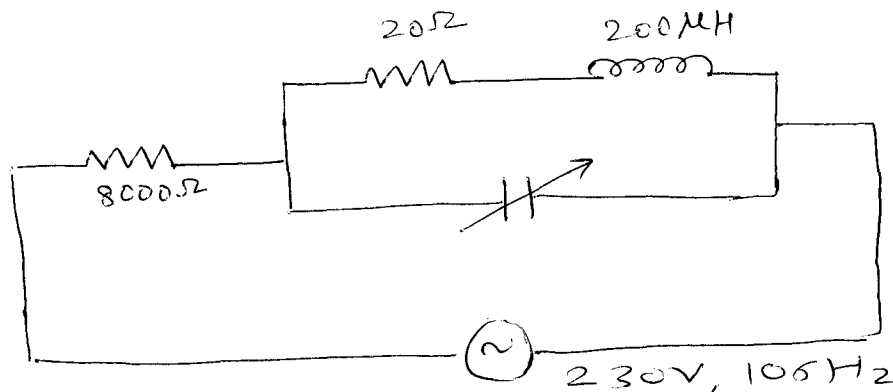
Q.4 Define the following parameters w.r.t. series resonance: (10)

- i) Behavior of R, L & C with change in frequency ii) Bandwidth
 iii) Sensitivity iv) Quality factor

OR

Q.4 A coil having a resistance of 20Ω and an inductance of $200\mu\text{H}$ is connected in parallel with a variable capacitor. The parallel combination is connected in series with a resistance of 8000Ω . A voltage of 230V at a frequency of 106Hz is applied across the circuit as shown in figure. Calculate: (10)

- i) Capacitance at resonance ii) Q-factor of the circuit
 iii) Dynamic impedance of the circuit iv) Total circuit current



Q.5 a) Derive an expression for characteristics impedance of T – Network. (05)

b) Design a constant k LPF T and π section, having cut-off frequency of 4KHz & nominal characteristics impedance of 500Ω . (05)

OR

Q.5 a) What is band stop filter? Draw its T-network and π -network. Write the formulae of $L_1, C_1,$ & L_2, C_2 . (05)

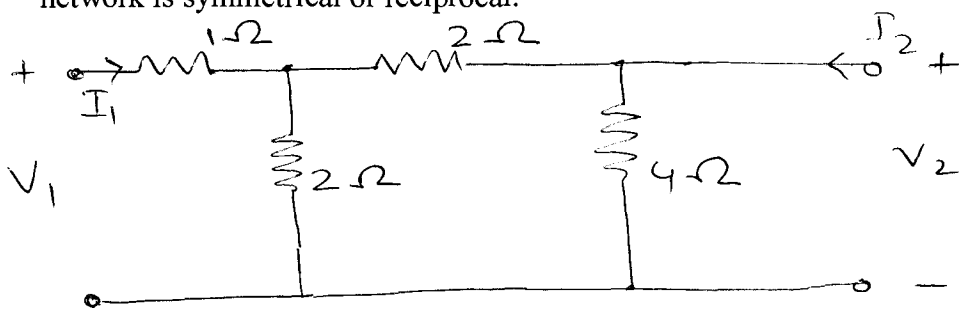
b) Draw and explain the m-derived HPF T-network. (05)

Q.6 Derive an expression for condition for reciprocity : (10)

- i) Z - Parameters
 ii) ABCD-parameters

OR

Q.6 a) Determine Y-parameter for the network shown in figure. Determine whether the network is symmetrical or reciprocal. (07)



b) Write down expressions for hybrid parameters in form of Z parameters. (03)

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