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[5352]-548

S.E. (Electrical Engineering) (II Sem.) EXAMINATION, 2018

NETWORK ANALYSIS

(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

- N.B. :—**
- (i) Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.
 - (ii) Neat diagrams must be drawn wherever necessary.
 - (iii) Figures to the right indicate full marks.
 - (iv) Assume suitable data, if necessary.

1. (a) Find I_x and I_y shown in Fig. 1 using Mesh analysis. [6]

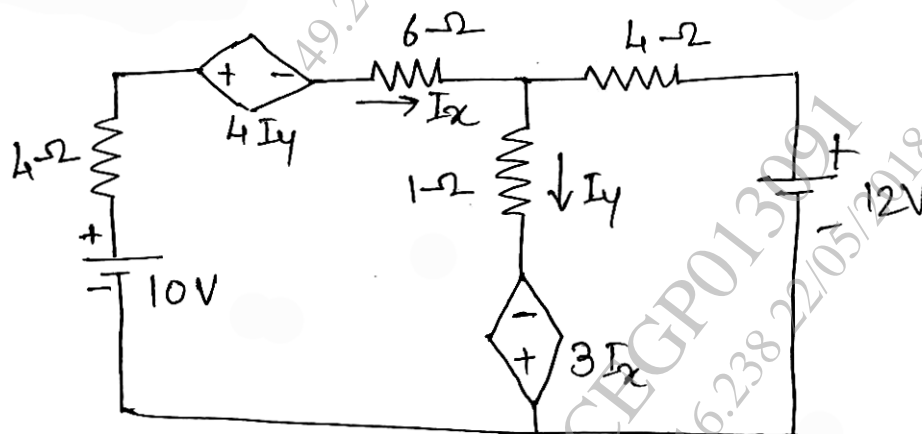


Fig. 1

P.T.O.

- (b) Find the Thevenin's equivalent of the circuit shown in Fig. 2. [7]

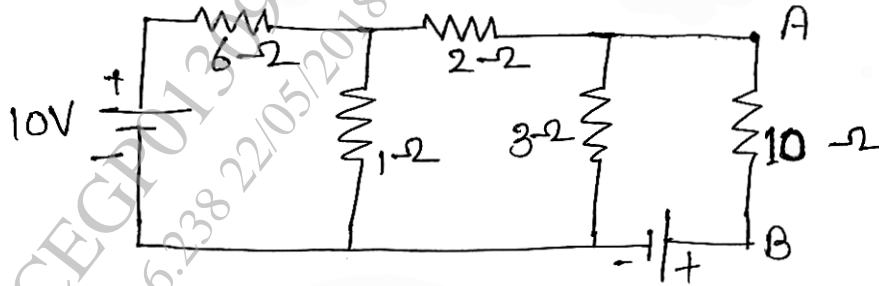


Fig. 2

Or

2. (a) Find the Mesh transformation matrix for the circuit shown in Fig. 3. [7]

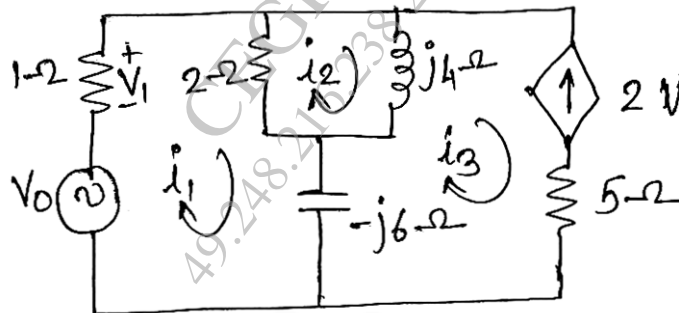


Fig. 3

- (b) State and explain maximum power transfer theorem applied to a.c. circuit. [6]
3. (a) In Fig. 4 steady state condition is reached with 100 V d.c. source. At $t = 0$, switch k is suddenly opened. Find the expression

of current through the inductor after $t = \frac{1}{2}$ sec. [6]

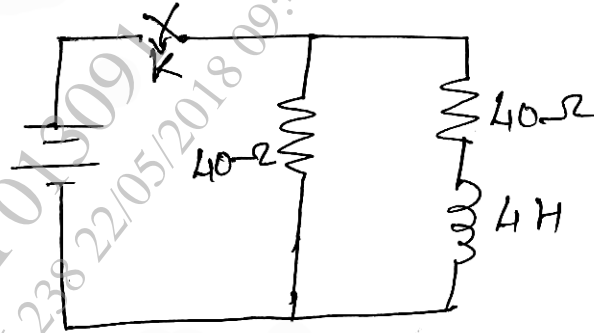


Fig. 4

- (b) For the circuit shown in Fig. 5, obtain the current through the capacitor 'C' at $t = 0^+$ following switching at $t = 0$. Assume the capacitor to be initially discharged. [6]

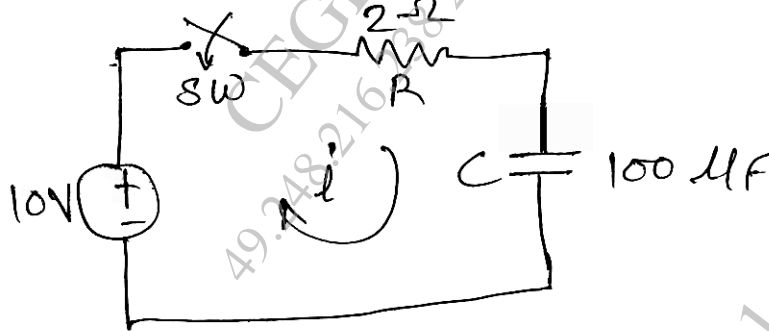


Fig. 5

Or

4. (a) The $10 \mu\text{F}$ capacitors in RC circuit of Fig. 6 has initial charge of $100 \mu\text{C}$ with polarities as shown in figure. At $t = 0$, the

switch being closed, a d.c. voltage of 100 V is applied. Find the expression for the current. [6]

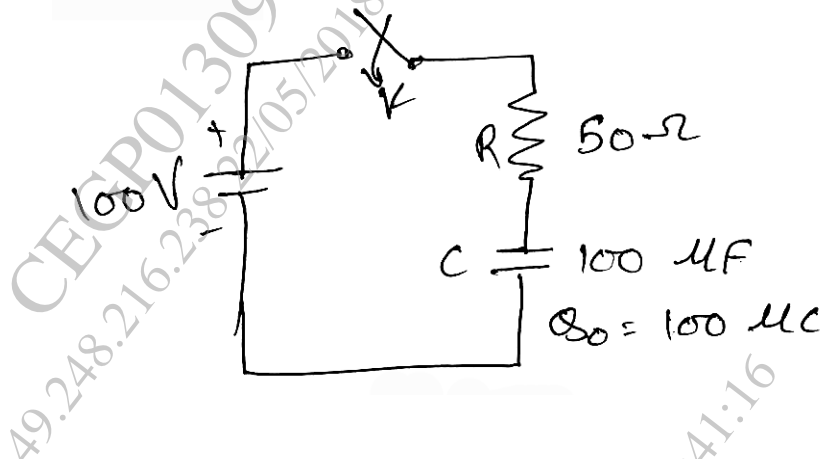


Fig. 6

- (b) In the circuit shown in Fig. 7, the switch 's' is kept in position '1' for long period to establish the steady state conditions. The switch is then moved to position '2' at $t = 0$. Find out the expression for the current after switching the switch to position '2'. [6]

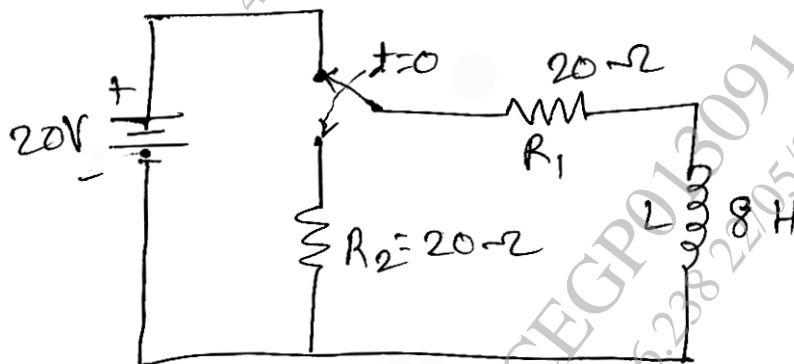


Fig. 7

5. (a) Find 'Y' parameter for the circuit shown in Fig. 8. [7]

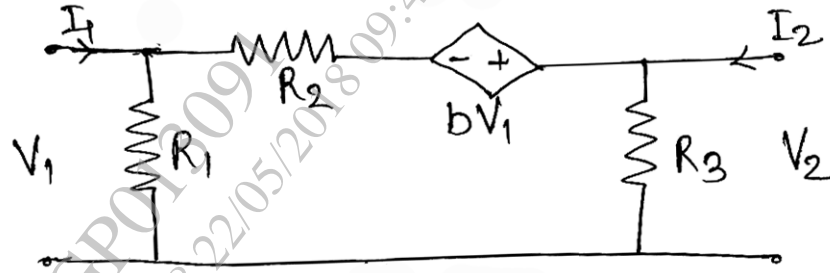


Fig. 8

- (b) Write a short note on restriction on pole and zero location in transfer function. [6]

Or

6. (a) Develop relation between 'Z' parameter and transmission parameter. [6]
- (b) Find the driving point admittance ' Y_{11} '(s) for the network shown in Fig. 9 and plot pole-zero diagram. [7]

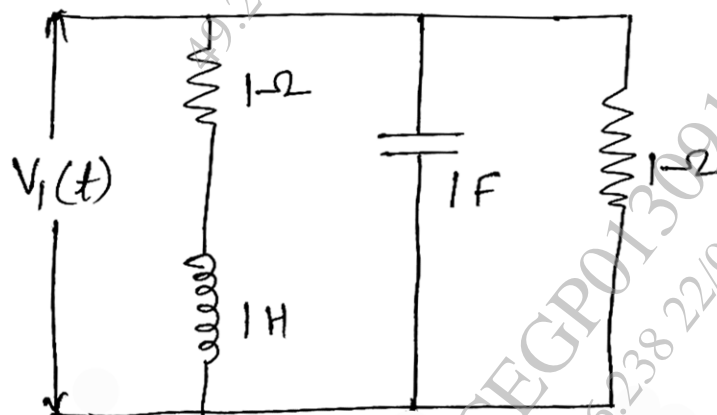


Fig. 9

7. (a) Derive the expression for characteristic impedance (Z_0) attenuation constant (α) and phase constant (β) of prototype constant-K type low pass filter from symmetrical network. [6]
- (b) Design a 'T' and ' π ' section constant-K high pass filter having cut-off frequency of 12 KHz and nominal impedance $R_0 = 500 \Omega$. Also find : [6]
- (i) Its characteristic impedance and phase constant at 24 kHz and
- (ii) attenuation at 4 kHz.

Or

8. (a) Explain the following terms in relation with filters : [6]
- (i) Cut-off frequency
- (ii) Pass band
- (iii) Stop band.
- (b) Design constant-K low pass filter to have a cut-off frequency of 796 Hz when terminated in a 600Ω resistance in both the T and π configurations. [6]