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APR-MAY

B. E. (Third Semester) Examination, 2020

(Old Scheme)

(AEI, CSE, EI, ET&T & IT Engg. Branch)

NETWORK ANALYSIS and SYNTHESIS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) of each question is compulsory and carry 2 marks. Part (b), (c) and (d) carry 7 marks. Attempt any two from (b), (c) and (d).*

1. (a) Define the Laplace transform of unit ramp function. 2

(b) A two mesh network is shown in fig. 1. Obtain the expression for $I_1(s)$ and $I_2(s)$. When the switch is closed. 7

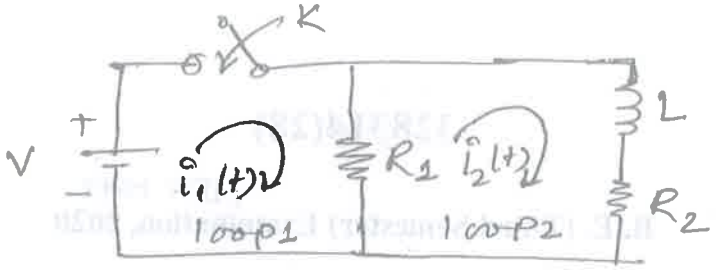

fig. (1)

(c) Obtain inverse Laplace transform of $I(s)$. When

$$I(s) = \frac{250}{(s^2+625)(s+2)}$$ 7

(d) In the network of fig. 2 C_1 is initially charged at V_1 potential polarities being marked in the the figure 2. With switching of k at $t = 0$, find the distribution of voltage in C_1 and C_2 at $t = \infty$ assuming zero initial charge across C_2. 7

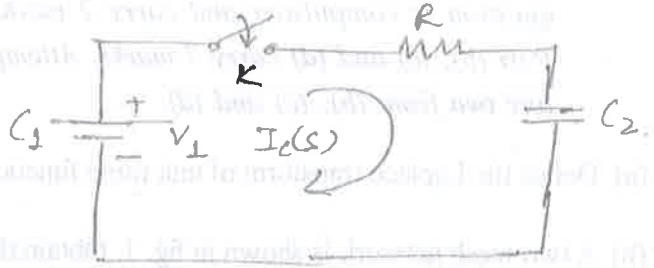

fig. (2)

2. (a) What is characteristic impedance? 2

(b) Find transmission parameter for the circuits of (i) fig. 3 and (ii) fig. 4 and varyify that $AD - BC = 1$. (iii) If both the circuits are connected in cascade find overall transmission parameters. 7

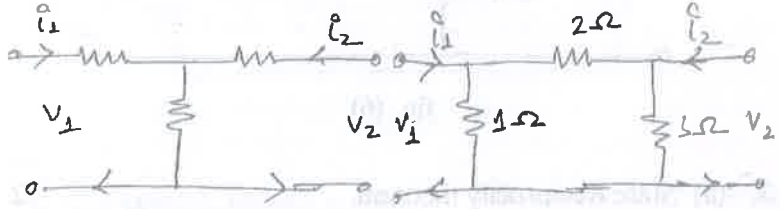

fig. (3) fig. (4)

(c) Fig. (5) show a resistive T network and a resistive π network connected in parallel. Find the overall y parameter of the combination. 7

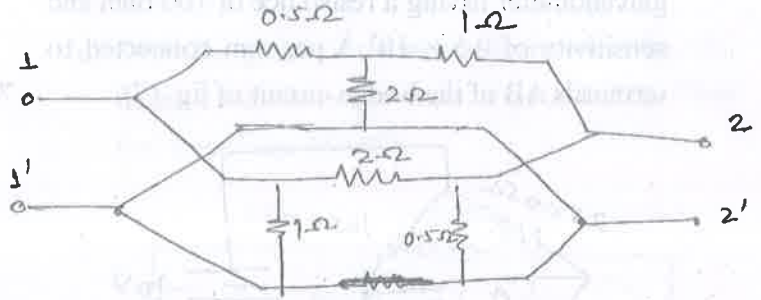

fig. (5)

(d) Fig. (6) shows the equivalent circuit of a transistor for a certain frequency range find h parametrs. 7

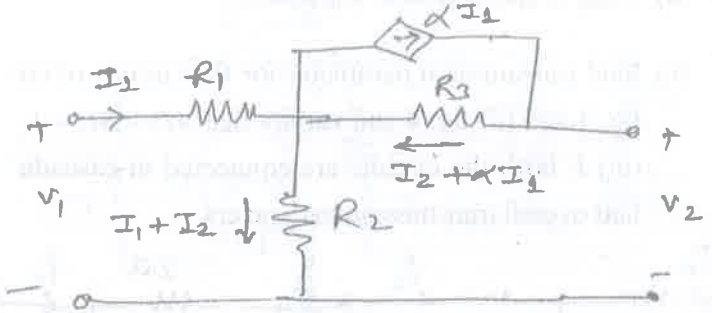

fig. (6)

3. (a) State Reciprocity theorem. 2

(b) Derive maximum power transfer theorem (i) for dc network (ii) for ac networks. 7

(c) Use Thevenin's theorem to find the deflection of galvanometer having a resistance of 100 ohm and sensitivity of $0{\cdot}5 \times 10^5$ A per mm connected to terminals AB of the bridge circuit of fig. (7). 7

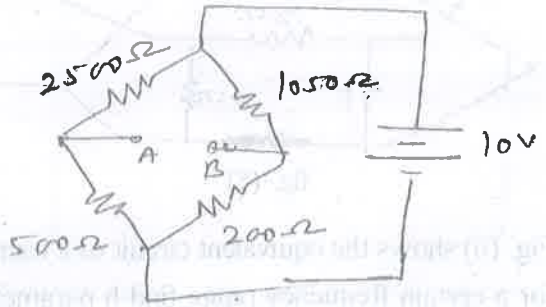

fig. (7)

(d) Use Norton's theorem to find the current in 10 ohm resistance of fig. (8). 7

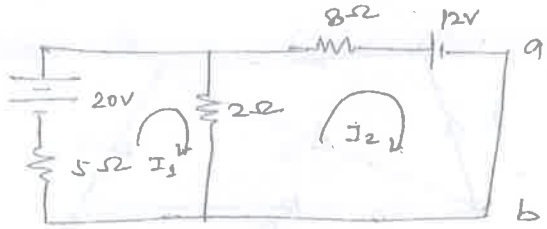

fig. (8)

4. (a) What is Cramer's rules. 2

(b) Define the terms : 7

Graph, oriented graph, mesh, node, Supermesh, Supernode, Tree

(c) Draw the graph of the network shown in fig. (9). Select a suitable tree to write tie-set schedule. Then find three loop currents. 7

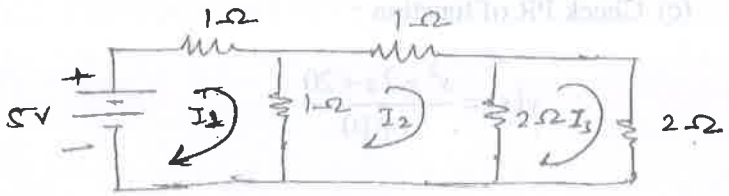

fig. (9)

(d) Find the fundamental cut-set matrix for the following network graph (fig. 10) .

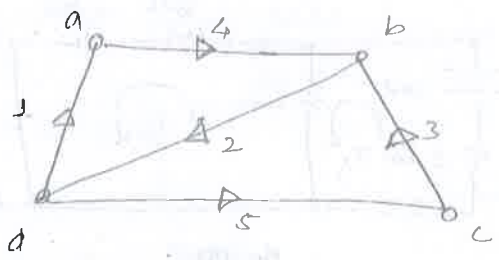

fig. (10)

5. (a) What is reactance function. 2

(b) A LC impedance function for a one port network is given by : 7

$$z(s)=\frac{s\left(s^2+4\right)}{\left(s^2+1\right)\left(s^2+9\right)}$$

Synthesis the network in foster-I forms.

(c) Check PR of function : 7

$$y(s)=\frac{s^2+2s+20}{s+10}.$$

(d) An admittance function is given by 7

$$y(s)=\frac{4s^2+6s}{s+1}.$$

Realise the network using Cauer's 1st and 2nd forms.