Printed Pages : 4

EEE-402

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121406

Roll No.

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15

NETWORK ANALYSIS & SYNTHESIS

Time : **3** Hours] [Total Marks : **100**

Note : Attempt all questions.

1 Attempt **any TWO** parts of the following: **10×2=20**

(a) Explain the followings matrices taking a suitable example:
- (i) Reduced Incidence Matrix
- (ii) Basic Cutset Matrix
- (iii) Basic Tieset Matrix

(b) Derive the KCL and KVL using network graph variables.

(c) Explain the concept of duality. Find the dual of the network shown in figurel.

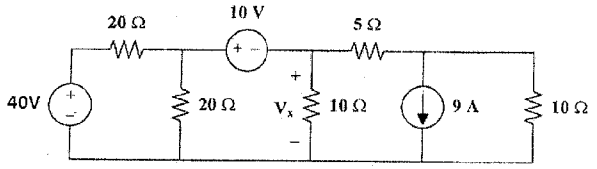

Fig.1

2 Attempt **any FOUR** parts of the following. **5×4=20**

(a) Find the current I and voltage V_{ab} in figure2.

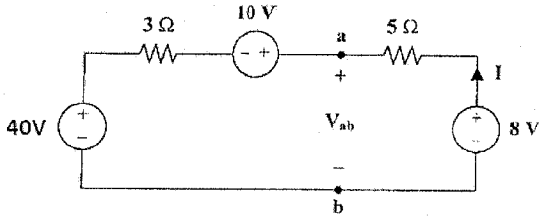

Fig.2

(b) Derive the maximum power transfer theorem for the case when the source impedance is complex and the load is variable with its power factor being unity.

(c) Find the voltage V_o in figure 3 below.

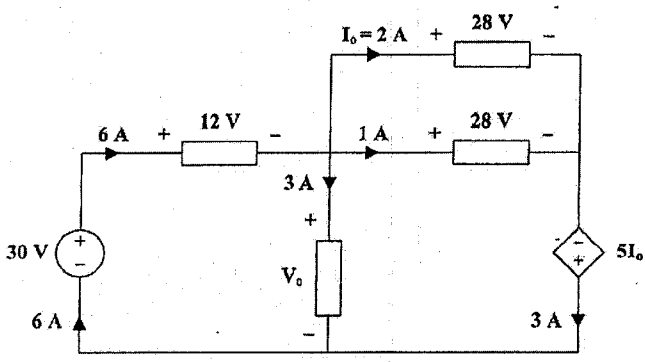

Fig.3

(d) Find the current I_x through the 5 ohm resistor using Thevenin's theorem in figure 4.

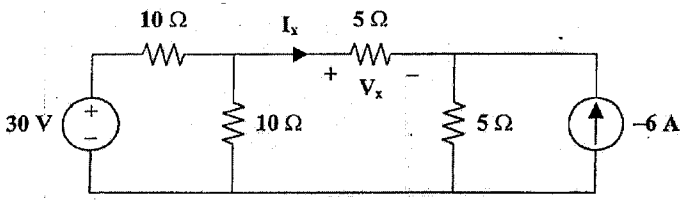

Fig.4

(e) Find .the current I_o using source transformation in figure 5.

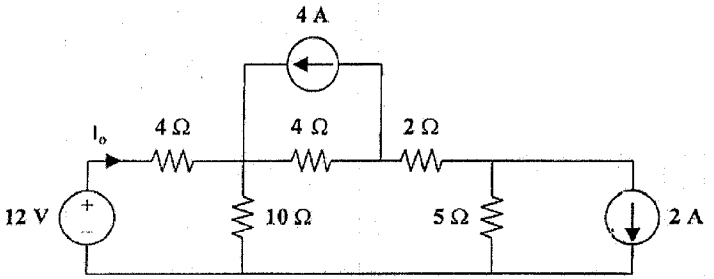

Fig.5

(f) State and prove the Tellegen's theorem.

3. Attempt **any TWO** parts of the following. **10×2=20**

(a) (i) In the circuit shown in figure 6, the switch is kept closed for a long time and is then opened at t=0.

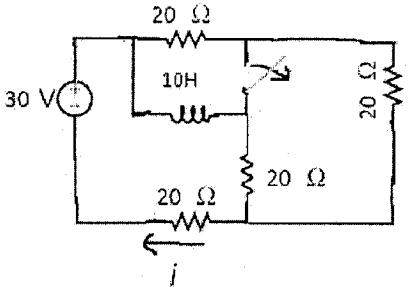

Fig.6

Find the values of current i just before opening the switch ($t = 0^-$) and just after opening the switch ($t = 0^+$).

(ii) In the figure7 shown, the ideal switch has been open for a long time. If it is closed at t=0, then find the magnitude of current (in mA) through the 4k Ω resistor at $t=0^+$?

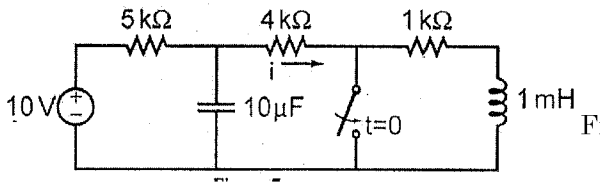

Fig.7

(b) Find the expression of the current i(t) in the circuit of figure 8 assuming that the switch is opened at t=0, the steady state having already reached before that.

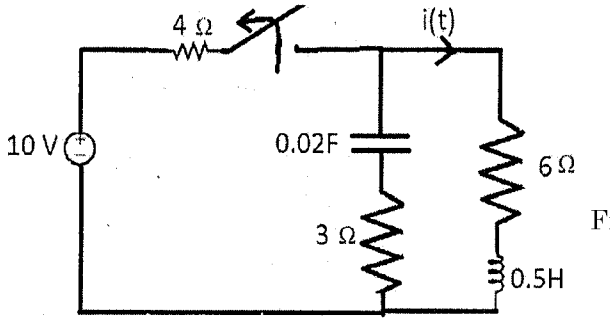

Fig.8

(c) Find the voltage V_o in the circuit of figure 9. The switch was open for a long time before it was closed at t=0.

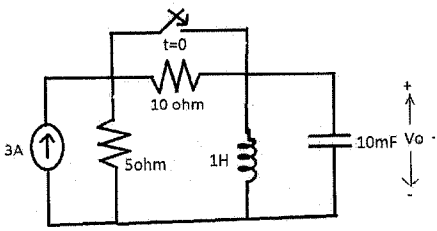

Fig.9

4 Attempt **any FOUR** parts of the following: **5×4=20**

(a) Write the necessary conditions for the existence of transfer functions giving a suitable example.

(b) What is meant by reciprocal and symmetric networks? Explain with the help of an example.

(c) Derive the condition of reciprocity and symmetry for h-parameters.

(d) Prove that if two 2-port networks are connected in cascade, the transmission parameter matrix of the composite two port network is the product of the two individual transmission parameter matrices.

(e) Find the Y and h parameters of the network shown in figure 10.

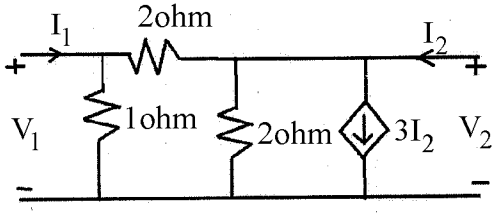

Fig.10

(f) Prove that the star delta conversion does not bring any change in the Z parameter matrix for the case of a resistive network.

5 Attempt **any TWO** parts of the following. **10×2= 20**

(a) Given $Z(s) = \dfrac{10(s^2+4)(s^2+6)}{s(s^2+5)}$.

Find the Foster I and Cauer II forms of network.

(b) Explain the properties of positive real functions, LC functions and R-L functions.

(c) What is image parameter? Derive its expression.
What are active and passive filters? Explain the advantages of active filters.