Paper Code: EE-402 **Roll No.** | | | | | | | | | | |

B.Tech
(SEM IV) EVEN SEMESTER THEORY EXAMINATION, 2015-16
NETWORK ANALYSIS & SYNTHESIS

[Time: 3 Hours] **[Max. Marks: 100]**

Note: *Attempt all questions.*

1. Attempt any **TWO** parts of the following:- **[10x2=20]**

(a) Explain the following terms:
Graph, Tree, Co-Tree, Twig, Link, Oriented Graph, CutSet

(b) Find the ranks of the following matrices taking a suitable example:
(i) Reduced Incidence Matrix
(ii) Basic Cutset Matrix
*(iii)*Basic Tieset Matrix

(c) Explain the concept of duality. Find the dual of the network shown in figure1.

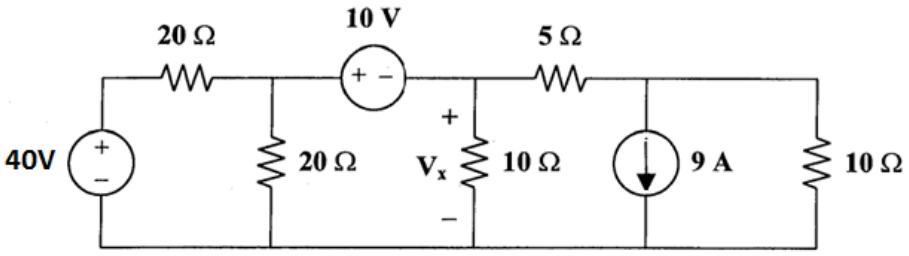

Figure 1

2. Attempt any **FOUR** parts of the following:- **[5x4=20]**

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

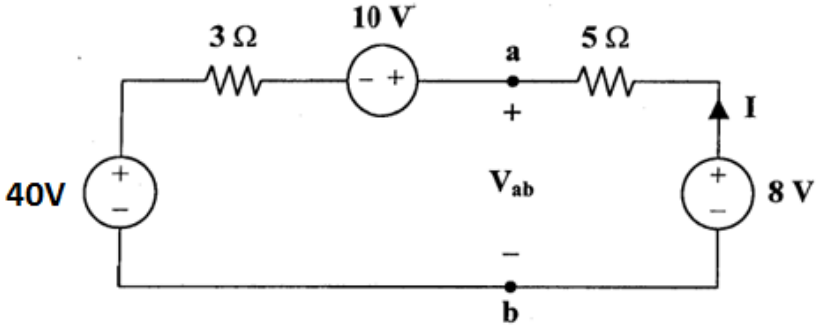

Figure 2

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

(c) State and prove the compensation theorem taking a suitable example. Where is it applied?

(d) Assuming both voltage sources are in phase, find the value of R in fig 3 for which maximum power is delivered from circuit A to circuit B

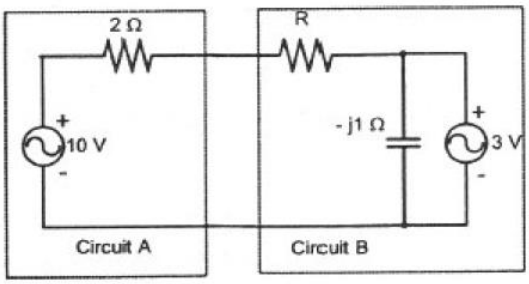

Figure 3

(e) In the circuit shown below in fig 4, if the source voltage is $V_s = 100\angle 53.13°$, then find the Thevenin's equivalent voltage in volts as seen by load resistance R_L

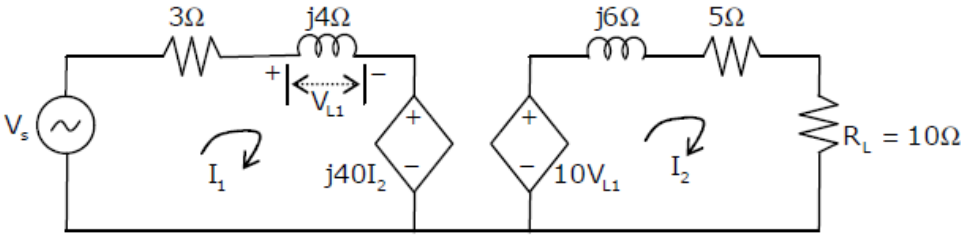

Figure 4

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

3. Attempt any **TWO** parts of the following:- **[10x2=20]**

(a) Find the voltage, Vc(t), over the capacitor for all time t>0 in fig 5.

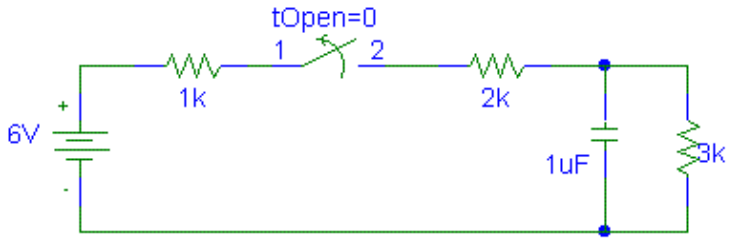

Figure 5

(b) In the circuit shown in fig 6, given Vc(0)=60 volts. Find Vc, Vx and i_0 for t>0.

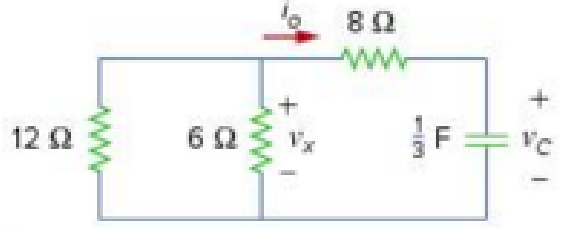

Figure 6

(C) The switch in the circuit shown in fig7 has been closed for a long time. At t=0 the switch is opened. Find i(t) for t>0.

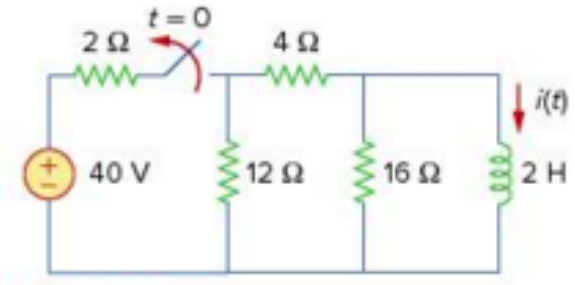

Figure 7

4. Attempt any **FOUR** parts of the following:- **[5x4=20]**

(a) Write the necessary conditions for the existence of transfer point 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 series, the Z parameter matrix of the composite two port network is the sum of the two individual Z parameter matrices.
(e) Find the Y and ABCD parameters of the network shown in figure 8.

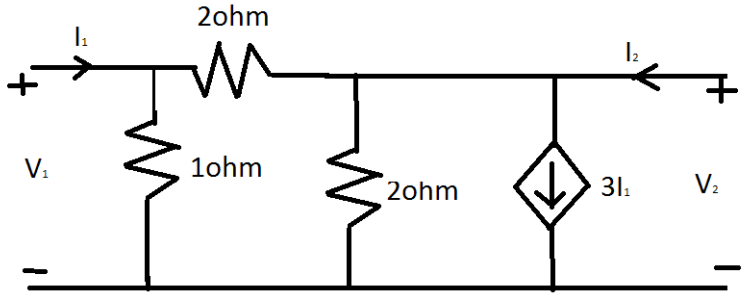

Figure 8

(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:- **[5x4=20]**

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

Find the Foster I and Cauer II forms of network.
(b) Explain the properties of Hurwitz functions, LC functions, R-C and R-L functions.
(c) Explain the concept of positive real functions. Also explain the complete procedure to test the positive realness of a network function.