USN

Third Semester B.E. Degree Examination, June/July 2014

Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain :
i) Unilateral and bilateral elements
ii) Independent and dependant sources. **(06 Marks)**

b. Determine the power dissipated in the 2Ω resistor of the network shown in Fig. Q1(b), using Mesh analysis. **(09 Marks)**

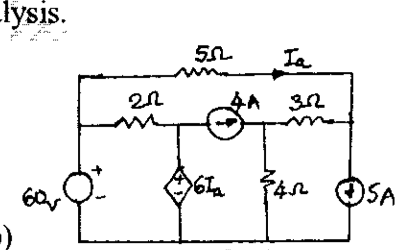

Fig. Q1(b)

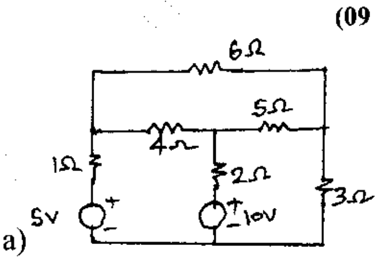

Fig. Q2(a)

c. Obtain expressions for an equivalent set of star connected impedances to replace a set of delta connected impedances. **(05 Marks)**

2 a. For the network shown in Fig. Q2(a) construct the tie set matrix by selecting a tree and there from obtain the equilibrium equations. **(10 Marks)**

b. Explain the principle of 'Duality' and its significance. **(04 Marks)**

c. Construct the dual of the circuit shown in Fig. Q2(c) by direct inspection. **(06 Marks)**

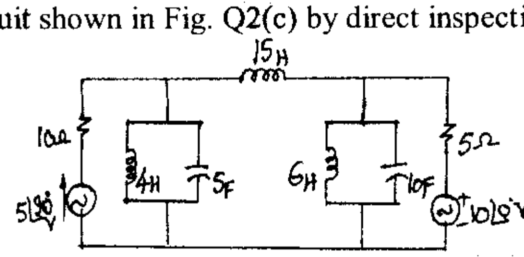

Fig. Q2(c)

3 a. Calculate the current in the 6Ω resistor of the circuit shown in Fig. Q3(a), using the principle of superposition. **(06 Marks)**

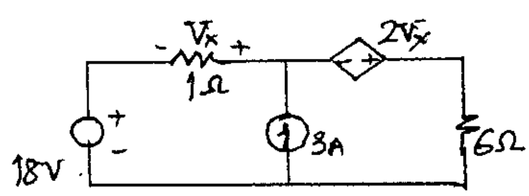

Fig. Q3(a)

b. Verify reciprocity theorem for the circuit shown in Fig. Q3(b). **(06 Marks)**

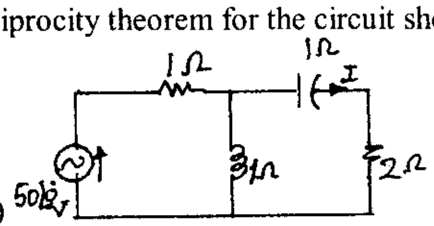

Fig. Q3(b)

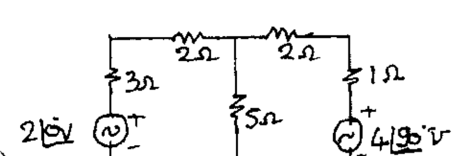

Fig. Q3(c)

c. Find the power delivered by the 5Ω resistor in the circuit sown in Fig. Q3(c) are find the current supplied by each source. Use Millman's principle. **(08 Marks)**

4 a. Obtain the Thevenin's and Norton's equivalent of the circuit shown in Fig. Q4(a) cross A–B. **(08 Marks)**

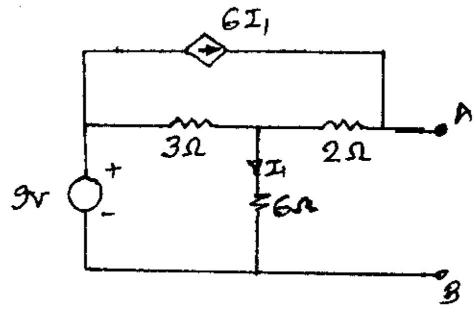

Fig. Q4(a)

b. Find the value of R_L for P_{max} and the value of P_{max} in the circuit shown in Fig. 4(b). **(06 Marks)**

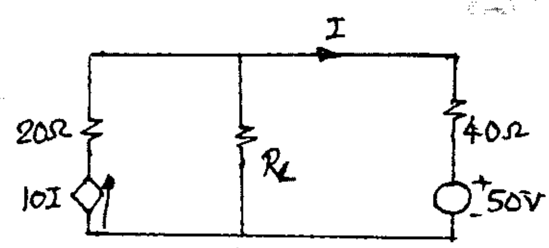

Fig. Q4(b)

c. State and prove the condition for maximum power transfer through a completely variable complex impedance load. **(06 Marks)**

PART – B

5 a. Define Q factor and obtain Q factor of i) R – L and ii) R – C series circuits. **(08 Marks)**

b. Two impedances $\overline{Z}_1$ and $\overline{Z}_2$ in parallel are connected in series with Z_3. Find the value of $\overline{Z}_3$ which produce resonance of the terminals a – b of Fig. Q5(b). given $Z_1 = (20 + J10)\Omega$, $Z_2 = (10 - j\,30)\Omega$ **(06 Marks)**

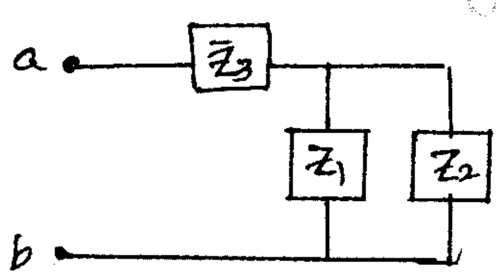

Fig. Q5(b)

c. For the circuit shown in Fig. Q5(c), find the resonant frequency. **(06 Marks)**

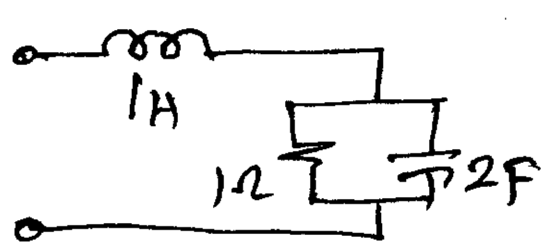

Fig. Q5(c)

6 a. In the circuit shown in Fig. Q6(a). The Switch 'S' is closed for a long time and is opened at $t = t_0$. Find the voltage $V_c(t)$ for $t \geq t_0$. $v(t) = A \sin(\omega t + \phi°)$ volts. **(10 Marks)**

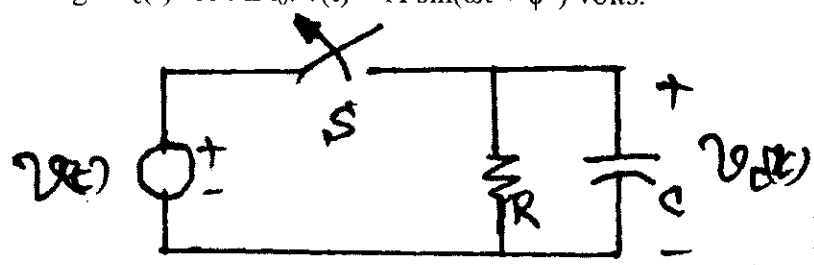

Fig. Q6(a)

b. In the circuit shown in Fig. Q6(b). The Switch 'S' is moved from position (i) to (2) at $t = 0$. If the circuit is in steady state at $t = 0_-$. Find $D^2 i$ at $t = 0_+$. **(10 Marks)**

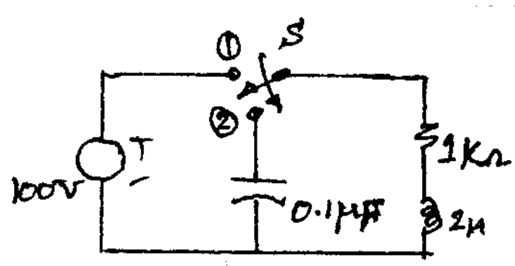

Fig. Q6(b)

7 a. Obtain the Laplace transform of a shifted function $f(t - t_0)\, u(t - t_0)$ and hence derive the Laplace transform of a periodic function of period T. **(08 Marks)**

b. Find $v_c(t)$ in the circuit shown in Fig. Q7(b), using Laplace transformations. **(08 Marks)**

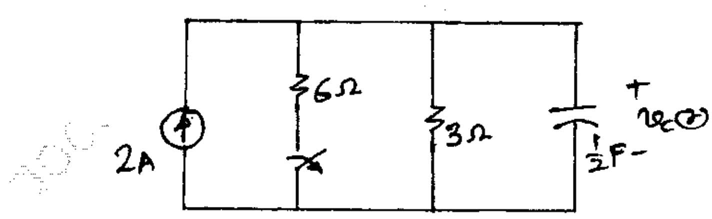

Fig. Q7(b)

c. Find the initial and final values of $I(s) = \dfrac{e^{-2s}(s+2)}{s(s^2+5)}$. Using the applicable theorem. **(04 Marks)**

8 a. Define h-parameters and express them in laws of y – parameters. **(08 Marks)**

b. For the network shown in Fig. Q8(b) determine eh Y and T parameters. **(09 Marks)**

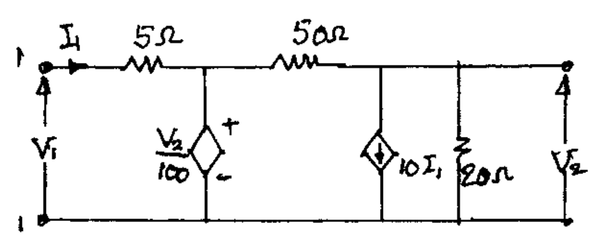

Fig. Q8(b)

c. A reciprocal network is having A = 5, C = 0.1 S and D = 0.2. Find the value of B. **(03 Marks)**

* * * * *