No. of Printed Pages : 7

BIEE-033

DIPLOMA IN ELECTRICAL ENGINEERING (DELVI)

00696

Term-End Examination

June, 2015

BIEE-033 : ELECTRICAL CIRCUIT THEORY

Time : 2 hours *Maximum Marks : 70*

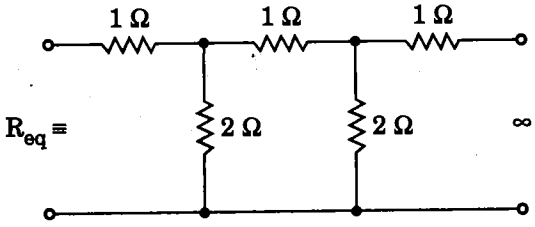
Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is allowed. Assume missing data, if any.*

1. (a) (i) Current through a load changes linearly with the applied voltage. State the law pertaining to this situation. *2*

(ii) A current of $3te^{-100t}$ flows through a load on application of supply voltage of $(0{\cdot}006 - 0{\cdot}6t)\ e^{-100t}$ volts. What power is being absorbed by the load at the time t = 5 ms ? *5*

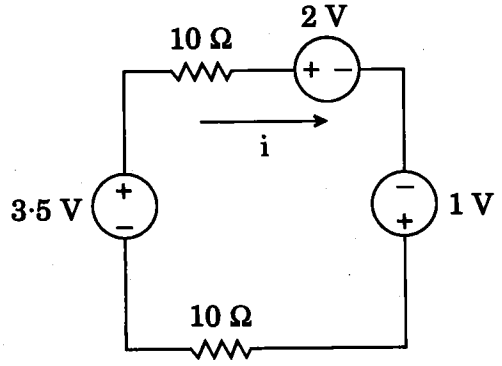
(b) (i) Define Kirchhoff's voltage law, using mathematical expressions and circuit diagrams. *2*

(ii) Resistors were connected together to form an infinite network as shown below : 3

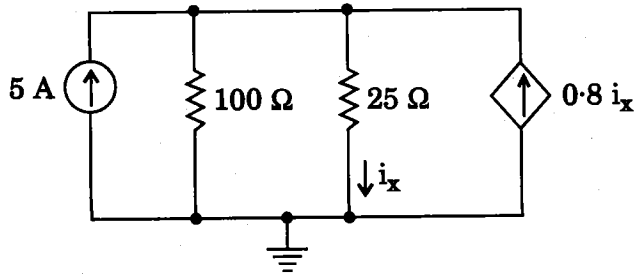


Determine the equivalent resistance, R_{eq}.

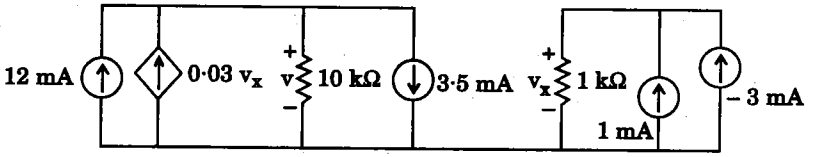
(iii) Use KVL to determine the current, i, in the following circuit : 2



2. (a) In the circuit shown below, determine the power absorbed by 5 A current source : 7

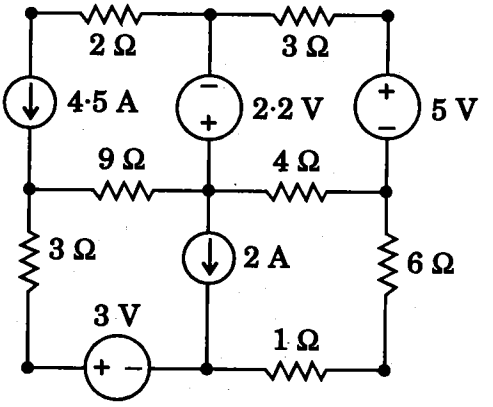


(b) Determine the voltage v in the following circuit : 7

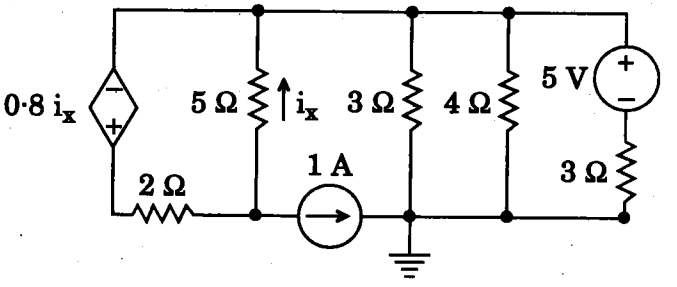


3. (a) (i) Give reason for defining a supermesh during mesh method of circuit analysis. 2

(ii) Determine the power supplied to the 2·2 V source using supermesh concept. 5



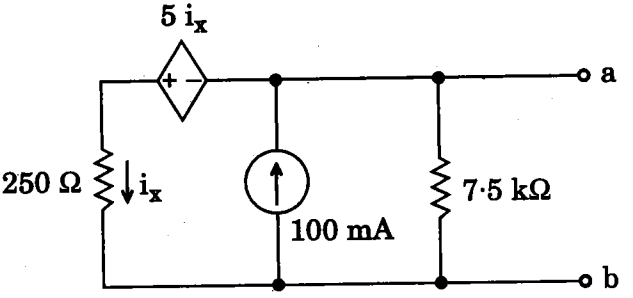
(b) Determine the current i_x in the following circuit : 7



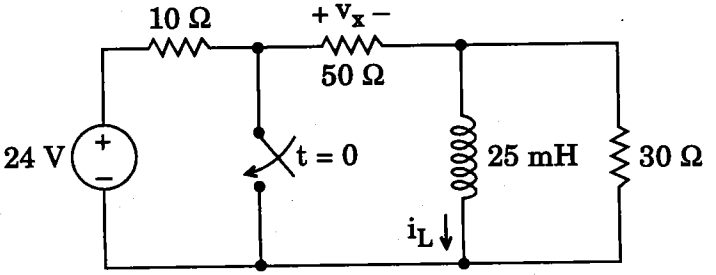
4. (a) (i) Using circuit diagrams, explain how source transformation takes places from Thevenin's equivalent circuit to Norton's equivalent circuit. *4*

(ii) Explain how Thevenin's equivalent resistance is determined in a circuit having only dependent sources. *3*

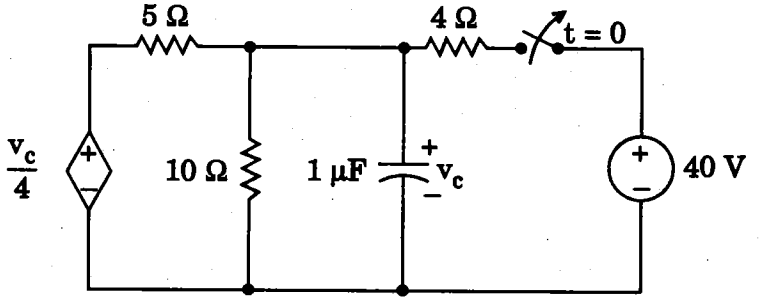
(b) Determine Thevenin's and Norton's equivalent of the following network : *7*



5. (a) In the following circuit, the switch is closed at time, t = 0. Determine v_x and i_L as a function of time for $t \geq 0$. *7*



(b) In the following circuit, the switch is opened at time, t = 0. Determine v_c as a function of time. 7



6. (a) Define the following for a parallel RLC circuit :

(i) Resonant frequency 1

(ii) Exponential clamping coefficient 1

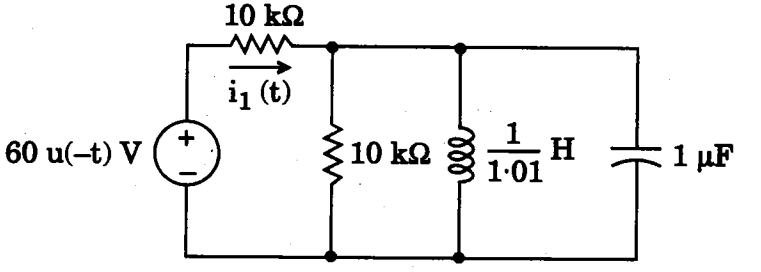
(iii) Complex frequencies as root of characteristic equation 2

(iv) Overdamped condition 1

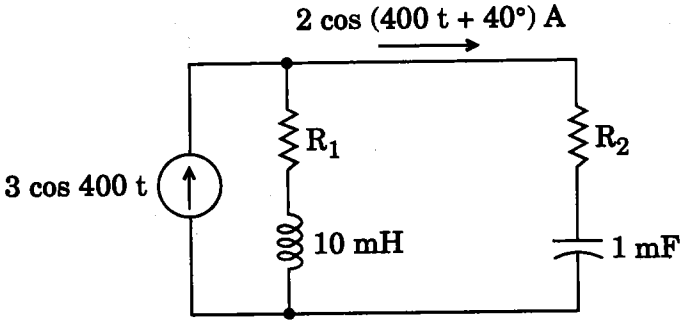
(v) Critical damping condition 1

(vi) Underdamped natural frequency 1

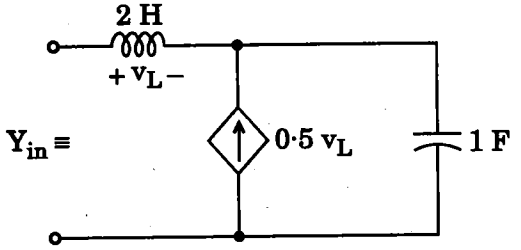
(b) Determine i_1 as a function of time t for $t > 0$ in the following circuit : 7



7. (a) Determine R_1 and R_2 in the following circuit : 7

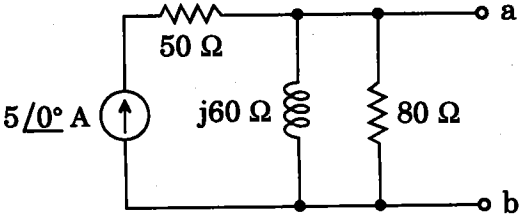


(b) Determine the input admittance, Y_{in}, in the following circuit : 7



Given $\omega = 1$ rad/sec.

8. (a) Determine the impedance to be connected across 'a – b' and the maximum power to be transferred to it in the following circuit : 7



(b) Determine the apparent power generated by the source, in the following circuit : 7