2018

CBCS

1st Semester

ELECTRONICS

PAPER—C1T

(Honours)

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Basic Circuit Theory and Network Analysis
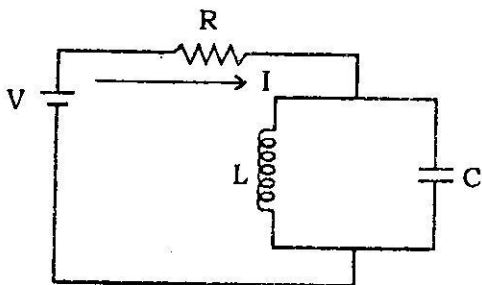
Group—A

1. Answer any *five* questions :   5×2

   (i) Write down what should be the internal impedences of a voltage source and a current source in an ideal condition.

(ii) State and explain the superposition theorem.

(iii) Determine the current I in the following circuit.

(iv) What do you mean by the 0 factor of a series L-C-R circuit ?

(v) What do you mean by Linear impedences and independent energy sources ?

(vi) Define the terms branch, node, mesh and link.

(vii) What do you mean by true power and apparent power ?

(viii) Two networks N_1 and N_2 are connected in series. The ABCD parameters of network N_1 is $\begin{bmatrix} A_1 & B_1 \\ C_1 & D_1 \end{bmatrix}$

and for Network N_2 it is $\begin{bmatrix} A_1 & B_1 \\ C_1 & D_1 \end{bmatrix}$. Determine the ABCD parameters of the entire network.

Group—B

2. Answer any *four* questions : 4×5

(i) Calculate the series and parallel resonant frequencies of a capacitor of capacitance $0.005\,\mu F$ and and inductor having inductance 100 mH and resistance $250\,\Omega$. Calculate the impedence of the circuit both at series resonance and parallel resonance. $2\frac{1}{2} + 2\frac{1}{2}$
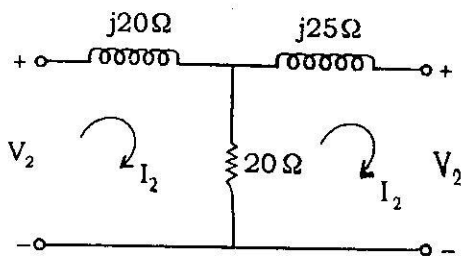
(ii) State and prove the maximum power transfer theorem. $1+4$

(iii) Using the Venin's theorem determine the current in branch AB of the following circuit : 5
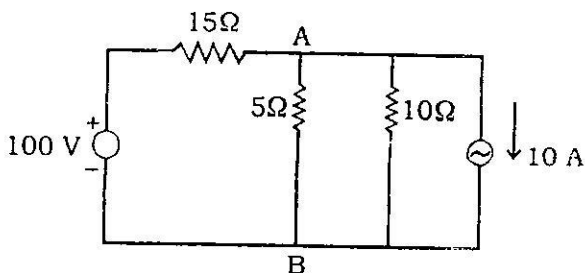
(iv) Determine z and y parameters of the following network. 5

(v) The reduced incidence matrix of an oriented graph

is $[A] = \begin{bmatrix} 0 & -1 & 1 & 1 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$ 5

Draw the graph

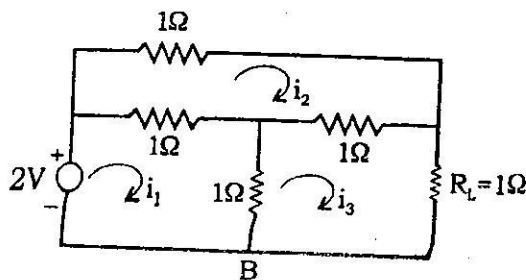(vi) Give the circuit of a Colpilt oscillator and explain its principle of operation. 2+3

Group—C

3. Answer any *one* question : 1×10

(i) (a) Apply mesh method to find out the current through the resistance R_L of the following network.

(b) An inductor of inductance 0·25H and resistance 50 Ω resonates with a series capacitor at 1 kHz. Find the magnitude of the voltage across the capacitor at 1 kHz and 2 kHz, assuming that the supply is 5 V.   5+5

(ii) (a) In the following circuit find one reading of : voltmeter V. Inter change the current source and the voltmeter and verify the reciprocity theorem.

(Continued)
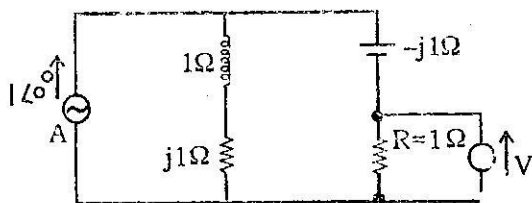
(b) The following circuit is driven by a current source $i = 4\sqrt{2} \sin 2t$ A and is in the steady state. Find the impedence faced by the current source and the power dissipated. 5+5