No. of Printed Pages : 7

BIEL-028

DIPLOMA – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (DECVI) / ADVANCED LEVEL CERTIFICATE COURSE IN ELECTRONICS AND COMMUNICATION ENGINEERING (ACECVI)

Term-End Examination

00786

June, 2016

BIEL-028 : CIRCUITS AND NETWORKS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. Question no. **1** is **compulsory**. All questions carry equal marks. Symbols used have their usual meaning. Use of scientific calculator is permitted.*

1. (a) Superposition theorem is valid only for

(i) linear circuits

(ii) non-linear circuits

(iii) both linear and non-linear circuits

(iv) Neither of the two

(b) Maximum power transfer occurs at

(i) 100% efficiency

(ii) 50% efficiency

(iii) 25% efficiency

(iv) 75% efficiency

(c) What is the phase angle of a series RLC circuit at resonance ?

(i) Zero

(ii) 90°

(iii) 45°

(iv) 30°

(d) The differential equation of an electric current in a circuit containing resistance R and a capacitor C in series with the voltage source V is given by

(i) $\frac{dV}{dt} = Ri + \int \frac{1}{C} idt$

(ii) $\frac{dV}{dt} = R\frac{di}{dt} + \int \frac{1}{C} idt$

(iii) $\frac{dV}{dt} = R\frac{di}{dt} + \frac{i}{C}$

(iv) $V = R\frac{di}{dt} + \frac{i}{C}$

(e) The time constant of a series RL circuit is

(i) LR

(ii) $\frac{L}{R}$

(iii) $\frac{R}{L}$

(iv) $e^{-R/L}$

(f) The transfer impedance is defined as

(i) the ratio of transform voltage to transform current at the same port

(ii) the ratio of transform voltage at one port to the transform current at the other port

(iii) Both (i) and (ii)

(iv) None of the above

(g) For a two-port bilateral network, the three transmission parameters are given by $A = \frac{6}{5}$, $B = \frac{17}{5}$, and $C = \frac{1}{5}$. What is the value of D ?

(i) 1

(ii) $\frac{1}{5}$

(iii) $\frac{7}{5}$

(iv) $\frac{11}{5}$ *7×2=14*

2. (a) Find the current through the 30 Ω resistor in the circuit shown in Figure 1 using nodal analysis method. 7

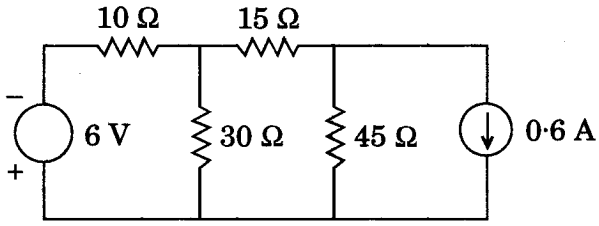

Figure 1

(b) For the circuit shown in Figure 2, determine the current in the branch AB by using Superposition theorem. 7

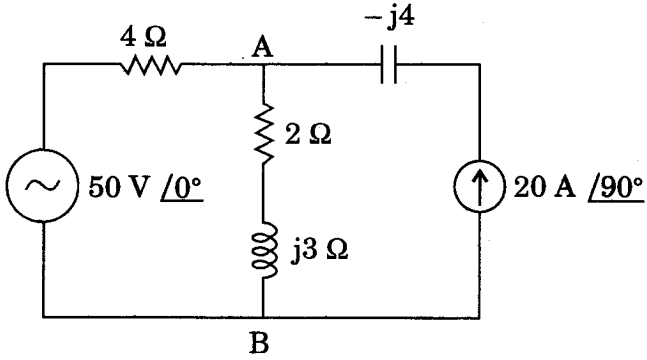

Figure 2

3. (a) For the circuit shown in Figure 3, determine the current through the resistance, inductance and capacitance for $i_s(t) = 10\ e^{-2t}$. Take R = 1 Ω, L = 0·1 H, and C = 1 μF. Use Laplace Transform method. 7

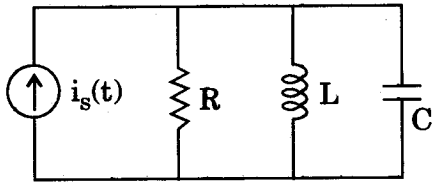

Figure 3

(b) For the parallel circuit shown in Figure 4, R = 5 kΩ, L = 35 μH, and C = 450 μF. Find the resonance frequency, quality factor, lower and upper cut-off frequencies and bandwidth. 7

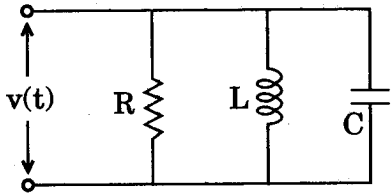

Figure 4

4. (a) For the network shown in Figure 5, determine the transfer functions $G_{21}(s)$ and $Z_{21}(s)$. 7

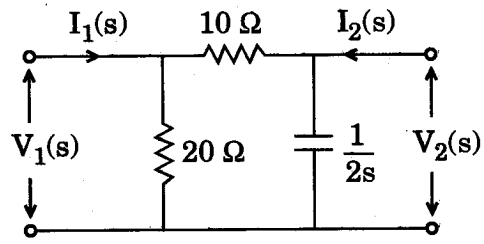

Figure 5

(b) For the network shown in Figure 6, find the driving point input impedance and plot the pole-zero pattern of the network. 7

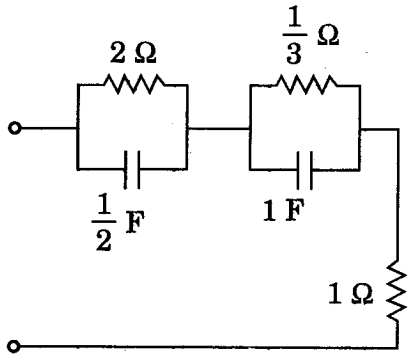

Figure 6

5. (a) Find the Y-parameters for the network shown in Figure 7. 7

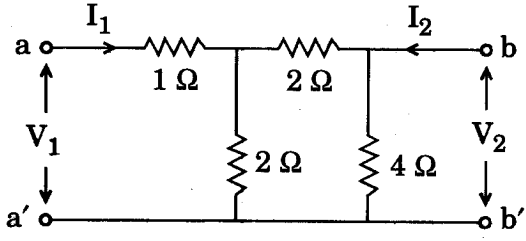

Figure 7

(b) Obtain the transmission parameters of the circuit shown in Figure 8. Find whether the network is symmetrical or not. 7

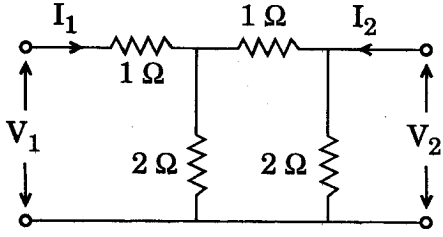

Figure 8

6. (a) Design an m-derived low pass filter having cut-off frequency of 1 kHz, design impedance of 400 Ω and resonant frequency of 1100 Hz. 7

(b) Derive the expressions of characteristic impedance for (i) symmetrical T-section, and (ii) symmetrical Π-section. 7

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Source transformation

(b) Impedance and selectivity in series resonance

(c) Four-terminal network and its classification

(d) Solution of RC circuit step resposne

(e) Time domain behaviour from pole-zero plot