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BIEL-028

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

00989

Term-End Examination

December, 2017

BIEL-028 : CIRCUITS AND NETWORKS

Time : 2 hours *Maximum Marks : 70*

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

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1. Choose the correct answer from the given four alternatives : *7×2=14*

(a) In Figure 1, the value of resistance R in ohm is

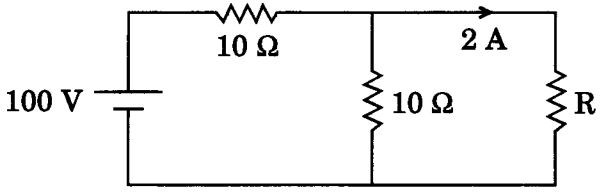

Figure 1

(i) 10

(ii) 20

(iii) 30

(iv) 40

(b) A practical current source is represented by

(i) A resistance in series with an ideal current source

(ii) A resistance in parallel with an ideal current source

(iii) A resistance in parallel with an ideal voltage source

(iv) None of the above

(c) The current through the 2 kΩ resistance in the circuit shown in Figure 2 is

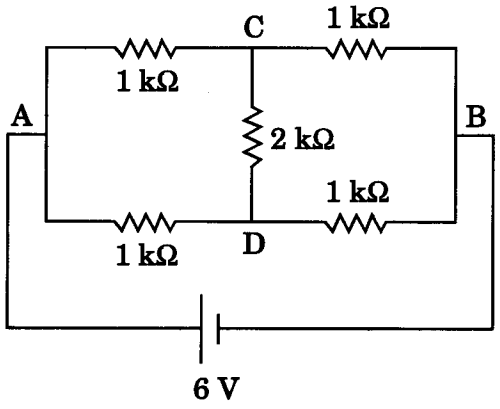

Figure 2

(i) 0 mA
(ii) 1 mA
(iii) 2 mA
(iv) 6 mA

(d) The switch in the circuit (Figure 3) has been closed for a long time. It is opened at $t = 0$. At $t = 0^+$, the current through the 1 μF capacitor is

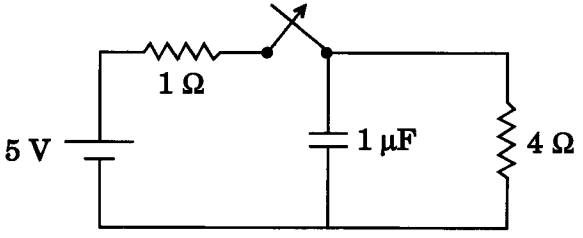

Figure 3

(i) 0 A
(ii) 1 A
(iii) 1·25 A
(iv) 5 A

(e) For the two-port network shown in Figure 4, the Z-matrix is given by

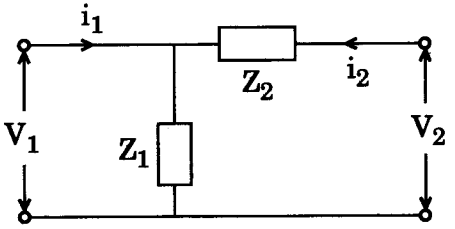

Figure 4

(i) $\begin{bmatrix} Z_1 & Z_1 + Z_2 \\ Z_1 + Z_2 & Z_2 \end{bmatrix}$

(ii) $\begin{bmatrix} Z_1 & Z_1 \\ Z_1 + Z_2 & Z_2 \end{bmatrix}$

(iii) $\begin{bmatrix} Z_1 & Z_2 \\ Z_2 & Z_1 + Z_2 \end{bmatrix}$

(iv) $\begin{bmatrix} Z_1 & Z_1 \\ Z_1 & Z_1 + Z_2 \end{bmatrix}$

(f) The time constant of the network shown in Figure 5 is

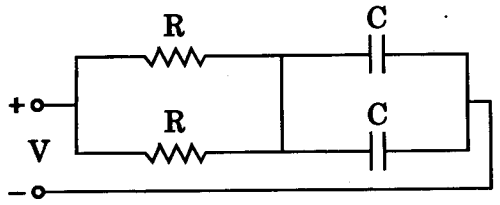

Figure 5

(i) CR

(ii) 2CR

(iii) CR/4

(iv) CR/2

(g) In a parallel RL circuit, if I_R is the current in the resistor and I_L is the current in the inductor, then

(i) I_R lags I_L by 90°

(ii) I_R leads I_L by 270°

(iii) I_L leads I_R by 270°

(iv) I_L lags I_R by 90°

2. (a) State the Superposition theorem with suitable example. 7

(b) Draw the Thevenin's equivalent of the circuit shown in Figure 6 and find the load current. 7

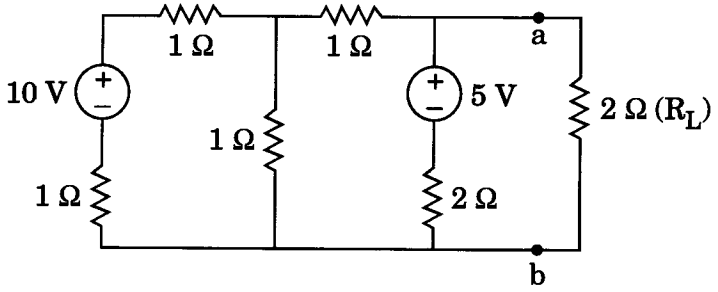

Figure 6

3. (a) A 15 mH inductor is in series with a parallel combination of 80 Ω resistor and 20 μF capacitor. If the angular frequency of the applied voltage is ω = 1000 radians/second, find the admittance of the network. 7

(b) A 10 mH coil is connected in series with a loss-free capacitor to a variable frequency source of 20 V. The current in the circuit has a maximum value of 0·2 A at a frequency of 100 kHz. Calculate the

(i) value of capacitance,

(ii) Q-factor of the coil, and

(iii) half power frequencies. 7

4. (a) Determine the transmission parameter of the network shown in Figure 7. 7

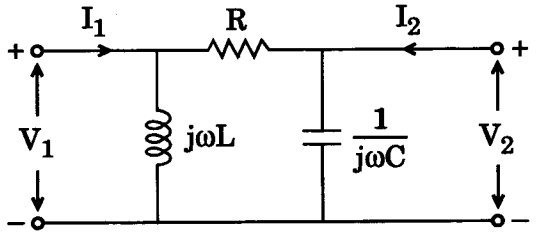

Figure 7

(b) Define Transfer Function with a suitable example. 7

5. (a) Design a prototype band pass filter having cut-off frequencies of 4 kHz and 6 kHz and a nominal characteristic impedance of 628 Ω. 7

(b) Calculate the driving point and transfer impedance of the network shown in Figure 8. 7

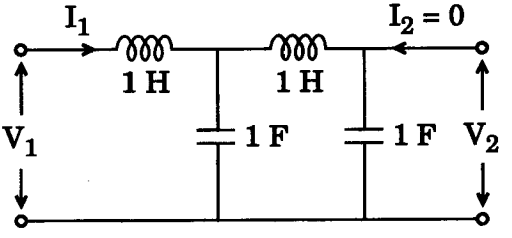

Figure 8

6. (a) Find the initial and final values of the following function, using initial value and final value theorems respectively : 7

$$\frac{s-1}{(s+1)(s+2)}$$

(b) A coil of resistance 40 Ω and inductance 0·75 H forms part of a series circuit for which resonant frequency is 55 Hz. If the supply is 250 V, 50 Hz, find the

(i) line current,

(ii) power factor,

(iii) power consumed, and

(iv) voltage across the coil. 7

7. Write short notes on any ***two*** of the following : *2×7=14*

(a) Maximum Power Transfer Theorem

(b) Interconnection of Two-Port Networks

(c) Hybrid Parameters