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BIEL-028

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

Term-End Examination

December, 2015

BIEL-028 : CIRCUITS AND NETWORKS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **five** questions in all. Question no. **1** is **compulsory**.*

1. Choose the correct alternative.

(a) The Laplace transform of u(t) is 2

(i) $\frac{1}{s^2}$

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

(iii) $\frac{2}{s^3}$

(iv) 1

(b) Three inductances of 4 H each are connected in series. The equivalent inductance is 2

(i) 11 H

(ii) 64 H

(iii) 12 H

(iv) 10 H

(c) If a circuit element has the capability of enhancing the energy level of a signal passing through it, it is called a/an _____ . 2

(i) passive element

(ii) active element

(iii) Both active and passive

(iv) Either passive or active

(d) The frequency that separates the pass band and the attenuation band is known as _____ frequency. 2

(e) Q-factor of a series resonating circuit is 2

(i) $Q = \frac{1}{\omega_0 RC}$

(ii) $Q = \frac{1}{R}\sqrt{\frac{L}{C}}$

(iii) Both (i) and (ii)

(iv) None of the above

(f) ABCD parameters are also known as _____ parameters. 2

(g) The current in any inductor is given by 2

(i) $L\int v(t)\,dt$

(ii) $\frac{1}{L}\int v(t)\,dt$

(iii) $L\frac{d}{dt}[v(t)]$

(iv) $L^2\int v(t)\,dt$

2. (a) Calculate the power loss across the 10 Ω resistor using Thevenin's theorem for the circuit shown in Figure 1. 7

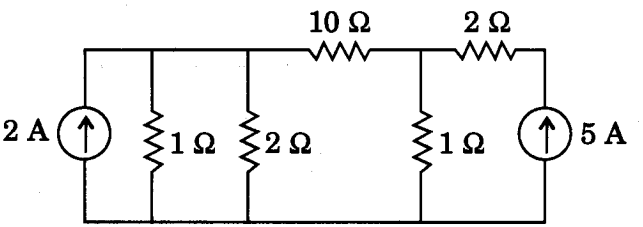

Figure 1

(b) Find V by superposition theorem in Figure 2. 7

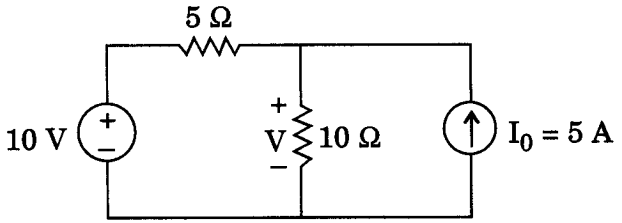

Figure 2

3. (a) A series LCR circuit has inductance of 10 mH and resistance of 2 Ω. What is the value of capacitance that will produce resonance at 15·9 kHz ? 6

(b) Define figure of merit, current bandwidth, impedance and selectivity in series resonance. 8

4. (a) In a series RC circuit, the resistance is of 2 Ω while the capacitor is of 1/4 f. Find the transfer function of the voltage and the drop across the capacitor assuming the supply voltage to be $V_0(t) = tu(t)$. 8

(b) Find i(t) in Figure 3. Assume zero initial response. 6

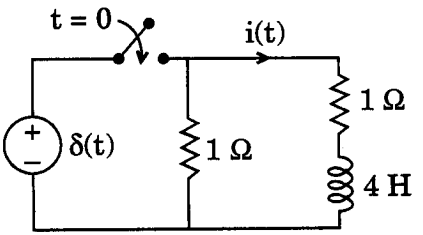

Figure 3

5. (a) Design a constant k high pass filter having f_c = 4 kHz and design impedance, $R_0 = 600\ \Omega$ (π section). 7

(b) Design a constant k low pass filter having $f_c = 2$ kHz and design impedance $R_0 = 600\ \Omega$. Obtain the value of attenuation at 4 kHz. 7

6. (a) Obtain the transfer function $V_2(s)/V_1(s)$ in Figure 4. 7

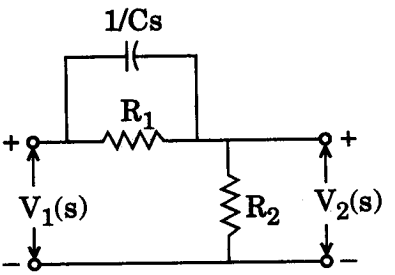

Figure 4

(b) In the network of Figure 5, find the pole-zero plot. 7

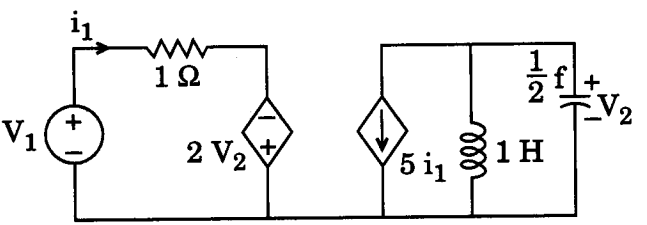

Figure 5

7. (a) Derive the Reciprocity condition of Y parameter. 7

(b) Find the Z-parameters for the network shown in Figure 6. 7

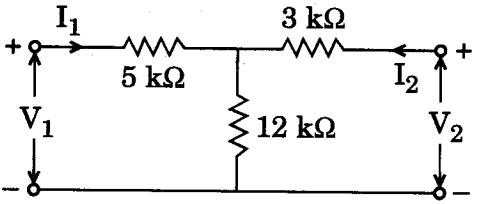

Figure 6

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

(a) Applications of Resonance Circuits

(b) Norton's Theorem

(c) Hybrid Parameters

(d) Attenuators

(e) Parallel Resonance