| BIEE-033 |

DIPLOMA IN ELECTRICAL ENGINEERING (DELVI)

Term-End Examination

□□З1З   **December, 2016**

BIEE-033 : ELECTRICAL CIRCUIT THEORY

Time : 2 hours   *Maximum Marks : 70*

*Note : Attempt any **five** questions. Question no. 1 is **compulsory**. All questions carry equal marks. Use of scientific calculator is allowed. Assume missing data, if any.*

1. Select the most appropriate alternative.   *7×2=14*

   (a) A network is said to be non-linear if it does **not** satisfy

   (i) Superposition condition

   (ii) Homogeneity condition

   (iii) Associative condition

   (iv) Both Superposition and Homogeneity conditions

   (b) The superposition theorem is applicable to

   (i) Current only

   (ii) Voltage only

   (iii) Both voltage and current

   (iv) Voltage, current and power

(c) When a source is delivering maximum power to load, the efficiency of a circuit

    (i) is always 50%

    (ii) depends upon circuit parameters

    (iii) is always 75%

    (iv) None of these

(d) In RLC circuit, the current at Resonance is

    (i) maximum in series circuit and minimum in parallel circuit

    (ii) maximum in parallel circuit and minimum in series circuit

    (iii) maximum in both the circuits

    (iv) minimum in both the circuits

(e) To neglect a voltage source, the terminals across the source are

    (i) short-circuited

    (ii) open-circuited

    (iii) replaced by a capacitor

    (iv) None of these

(f) Power factor of a pure capacitor is

    (i) unity

    (ii) zero

    (iii) 0·707 leading

    (iv) 0·707 lagging

(g) According to the statement of KCL, at any node

(i) outgoing currents are greater than incoming currents

(ii) outgoing currents are less than incoming currents

(iii) outgoing currents are equal to incoming currents

(iv) None of these

2. (a) Using the star-delta transformation technique, find the equivalent resistance of the circuit shown in Figure 1 at the terminals A and B. 7
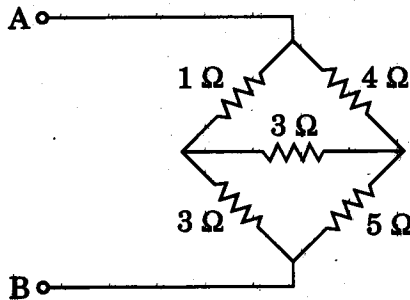
Figure 1

(b) In a series RLC circuit, if the magnitude of voltage across the inductance is 362 volts at resonance, what is the power factor and voltage across the capacitor at resonance ? 7

3. (a) What do you understand by quality factor of a circuit ? Establish the relation between bandwidth, quality factor and resonant frequency of a resonant circuit. 7

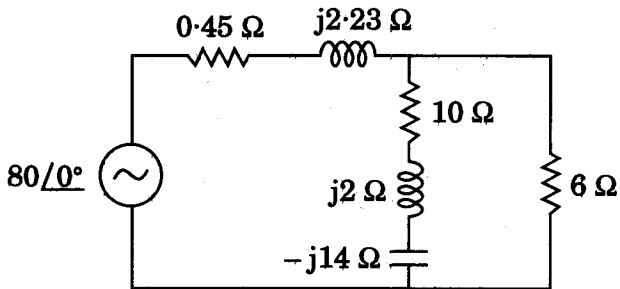(b) For the circuit shown in Figure 2, determine the active power and apparent power. 7

Figure 2

4. (a) Determine the Thevenin equivalent of the circuit across AB terminals as shown in Figure 3. 7
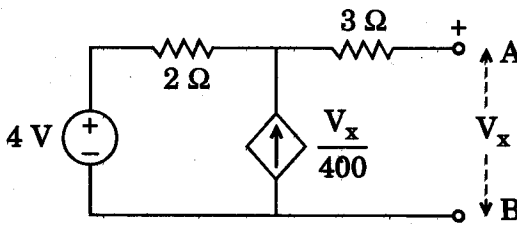

Figure 3

(b) Draw the Norton's equivalent circuit for the given network as shown in Figure 4 at A and B.   7
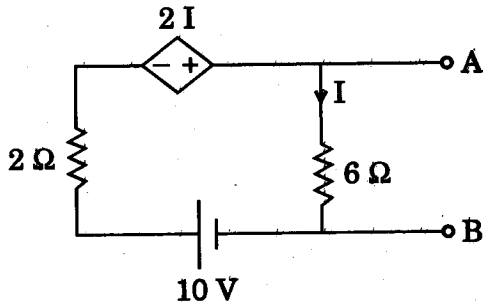

Figure 4

5. (a) Draw the phasor diagrams for (i) RL circuit, and (ii) RC circuit: 7

   (b) Find the heat dissipated by a 30 Ω resistor, if it carries a current of $i = 10 \sin 314\ t$.   7

6. (a) State, prove and explain maximum power transfer theorem.   7

   (b) Differentiate between series and parallel resonance.   7

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

   (a) Duality and Dual Networks

   (b) Types of Dependent Sources

   (c) Half-power Frequencies and Bandwidth of Resonant Circuits