No. of Printed Pages : 4

BIEE-033

DIPLOMA – VIEP – IN ELECTRICAL ENGINEERING (DELVI)

Term-End Examination

December, 2017

00452

BIEE-033 : ELECTRICAL CIRCUIT THEORY

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *questions from questions no.* ***2*** *to* ***7****. All questions carry equal marks. Assume missing data, if any. Use of scientific calculator is allowed.*

1. (a) Draw the graphical representation of Resistance (R) versus Frequency (F).

(b) Identify two important properties of the inductor (L).

(c) What is the Q-factor of a resonant circuit ?

(d) For a balanced, three-phase delta (Δ) connected circuit, write the relations between line and phase voltages and currents.

(e) Why can the current through an inductor not change instantaneously ?

(f) Draw and explain, dependent current source.

(g) A network contains only independent current source and resistors. If values of all resistors are doubled then calculate the values of node voltages. *7×2=14*

2. (a) Using Star-Delta transformations, evaluate the equivalent resistance of the circuit shown in Figure 1 at the terminal of X and Y. *7*

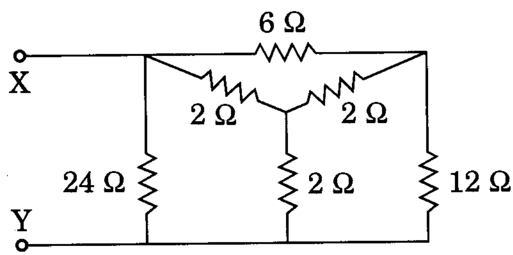

Figure 1

(b) In a resonant circuit as given in Figure 2, find the input impedance of the circuit at terminal A and B and also calculate the resonant frequency. *7*

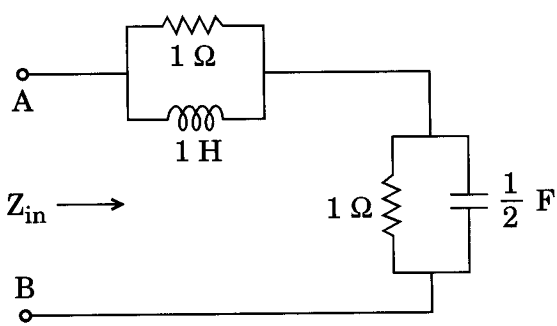

Figure 2

3. (a) Discuss Resonance in series RLC circuit. Establish the relation between the Quality Factor (Q), Resonant Frequency (ω) and Bandwidth. 7

(b) A 4 ohm resistor is connected to a 10 mH inductor across a 100 V, 50 Hz voltage source. Find input current, voltage drop across resistor and inductor, power factor of the circuit and the real power consumed in the circuit. 7

4. (a) Calculate the current in each branch of Figure 3 by superposition theorem. 7

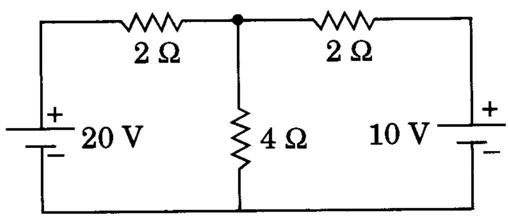

Figure 3

(b) For the circuit shown in Figure 4, draw the Thevenin's equivalent circuit across AB terminal. 7

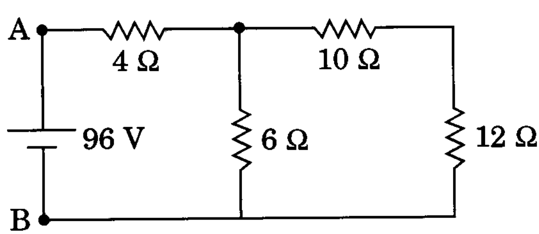

Figure 4

5. (a) Calculate (a) maximum value, and (b) the root mean square values of the following quantities :

   (i) $40 \sin \omega t$

   (ii) $B \sin (\omega t - \frac{\pi}{2})$

   (iii) $10 \sin \omega t - 17 \cdot 3 \cos \omega t$

   Draw the phasors showing the phase difference with respect to $A \sin (\omega t - \frac{\pi}{6})$. 7

   (b) What is Ohm's law ? State its limitations. 7

6. (a) State, prove and explain maximum power transfer theorem for DC and AC circuits separately. 7

   (b) Explain the concept of Complex Power. Define Active power and Reactive power using impedance triangle. 7

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

   (a) Star-Delta and Delta-Star Transformations

   (b) Duality and Dual Networks

   (c) Half-Power Frequencies in Resonant Circuits