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BIEE-033

DIPLOMA IN ELECTRICAL ENGINEERING (DELVI)

00301

Term-End Examination

December, 2013

BIEE-033 : ELECTRICAL CIRCUIT THEORY

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. All questions can carry **equal** marks. Use of scientific calculator is **permitted**.*

1. (a) Explain the difference between : **6**

(i) Active and Passive element

(ii) Linear and Non-linear network

(iii) Ideal voltage source and Non-ideal voltage source

(b) State and explain Thevenin's Theorem. **4**

(c) For the network shown in fig. 1, determine **4**

(i) The voltage drop across each resistor.

(ii) The current through each resistor.

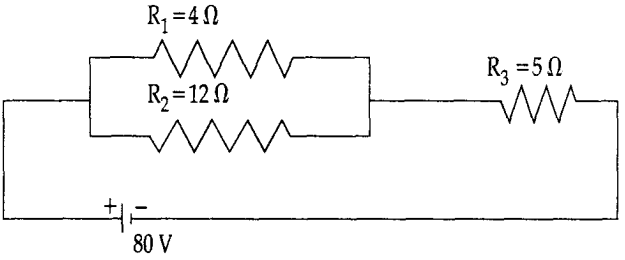

Fig. 1

2. (a) Twelve identical wires of resistance(r) 6 Ω each are arranged to form edges of a cube as shown in fig. 2. A current of 40 m A is fed into the cube at one corner and out on the other corner. Calculate the potential difference developed between these corners and the net resistance of the network. 7

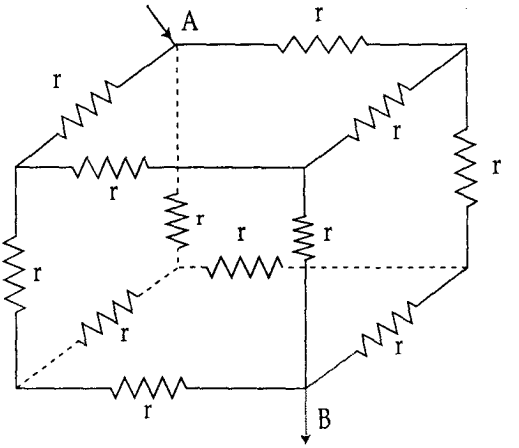

Fig. 2

(b) In the network shown in fig.3, use source transformation to determine the current through and voltage across the 5 Ω resistor. 7

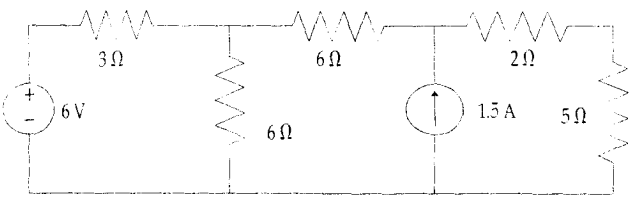

Fig. 3

3. (a) State and prove maximum power transfer theorem. 7

(b) Determine the current I_L through the 15 Ω resistor in the network in the given fig 4. by Norton's theorem. 7

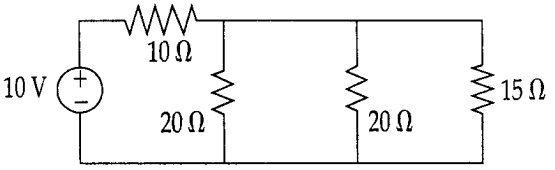

Fig.4

4. (a) Write and explain KCL and KVL with suitable examples. 7

(b) Define form factor and peak factor and explain their significance. 7

5. (a) Four voltages are represented by 7

$v_1 = 100 \sin 314\ t$

$v_2 = 250 \cos 314\ t$

$v_3 = 150 \sin (314\ t + \frac{\pi}{6})$

$V_4 = 200 \sin (314\ t - \frac{\pi}{4})$

Calculate the resultant voltage and express it in the form of $v=V_m \sin (314\ t \pm \phi)$.

(b) A 100V, 80W lamp is to be operated on a 240 V, 50 Hz supply. Calculate the value of : 7

(i) Non-inductive resistor

(ii) pure inductor and

(iii) Pure capacitor, that would be placed in series with lamp in order that it may be used at its rated voltage.

6. (a) Explain active power, reactive power and apparent power. Also explain their significance. 7

(b) Explain the phenomenon of resonance in series RLC circuit. Derive expression for resonant frequency. 7

7. (a) Show that the resonant frequency of a series RLC circuit is geometric mean of the lower and upper half power frequency. 10

(b) Define quality factor of a coil. 4

8. Write short note on **any four** of the following : **4x3.5=14**

(a) Norton's Theorem

(b) Inductive and capacitive reactance

(c) Duality and dual network

(d) Bandwidth of resonant circuits

(e) Power triangle