Total No. of printed pages = 4

EI-401/EC&N/4th Sem/2013/N

ELECTRICAL CIRCUIT AND NETWORK

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. (a) Define the following terms : 5×2=10

   (i) Circuit

   (ii) Linear circuit

   (iii) Non-linear circuit

   (iv) Bilateral network

   (v) Active network

   (b) Define Ohm's law. What are the limitations of Ohm's law ? 4

[Turn over

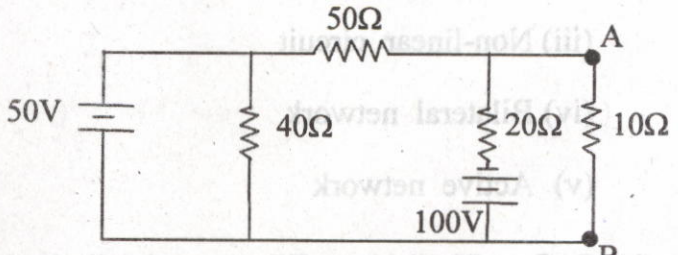
2. (a) State and explain Kirchhoff's laws. 8

(b) A bridge network ABCD is arranged as follows :

Resistances between terminals A-B, B-C, C-D, D-A and B-D are 10, 20, 15, 5 and 40 ohms respectively. A 20V battery of negligible internal resistance is connected between terminals A and C. Determine the current in each resistor. 6

3. (a) State and explain superposition theorem. 7

(b) Find the voltage across points A and B in the network shown below by using Norton's theorem. 7



4. A coil having resistance of 20Ω and inductance of 31·8 mH is connected across 230 volts 50 c/s supply. Calculate 14

(i) Power factor

(ii) Current taken

(iii) Power consumed.

5. (a) An alternating voltage is represented by $V = 141{\cdot}4 \sin 377\,t$.

Find :

(i) The maximum value

(ii) Frequency

(iii) The instantaneous value of voltage when $t = 3$ ms. 7

(b) A coil of negligible resistance and inductance of 200 μH is in parallel with a variable capacitor. The voltage of the supply is 200V at a frequency of 10^4 Hz.

Calculate the value of C to give resonance. 7

6. (a) Describe star-connection and delta connection of 3-phase system with diagram. 8

(b) Enumerate the advantages of 3-phase system over single phase system. 6

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

(a) R-L-C series circuit

(b) Maximum power transfer theorem

(c) Significance of J-operator.