NCD-003-027202 Seat No. _____

M. Sc. (Electronics, Computer & Instrumentation) (Sem. II) (CBCS) Examination

April / May - 2017

Basic Circuit Analysis : Paper - 6

Faculty Code : 003

Subject Code : 027202

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

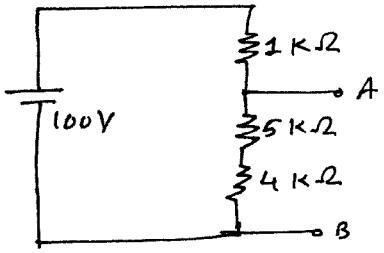
1 Answer the following : (Any **Seven**) **14**

(1) Define Voltage and Current.

(2) What are the bilateral and unilateral elements? Give examples.

(3) Prove that for inductor $i(t)=\frac{1}{L}\int_0^t v\,dt+i(0)$.

(4) Find the voltage between A and B for the following circuit.



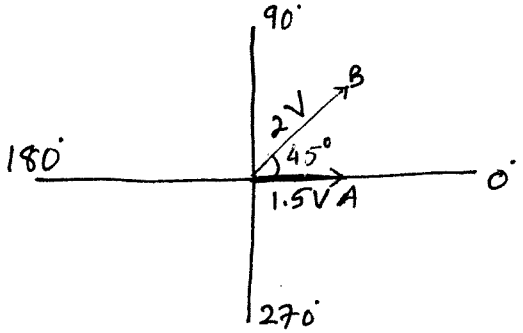
(5) Define tree, co-tree, twig and link.

(6) Write the condition for any network to become "supermesh" and "supernode".

(7) State Thevenin and Norton theorems.

(8) Prove the $v_{av}=0.637v_p$ for sine wave.

(9) Draw the waveform from the following phasor diagram,

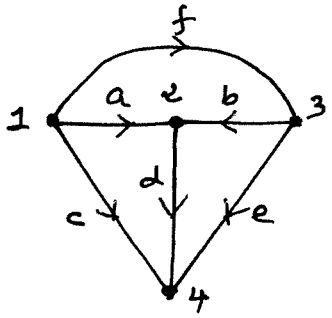


(10) Determine the average power, P_{av}, delivered to the circuit consisting of an impedance $Z = 5 + j8$ when current flowing through the circuit is $I = 5\angle 30^\circ$.

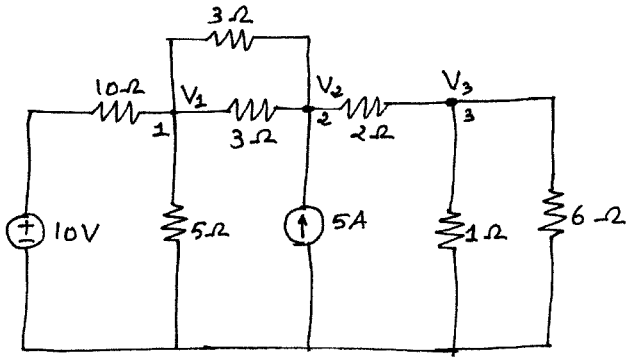
2 Answer any **two** from the following :

(1) Write the Kirchhoff's current law. Explain current division rule. **7**

(2) Draw all possible trees for the following graph : **7**

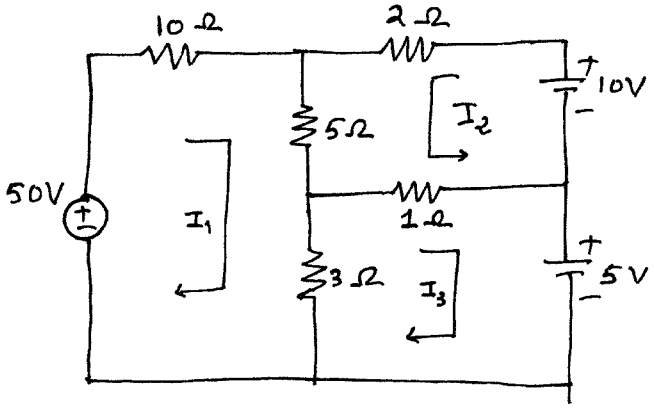


(3) Determine the voltage at each node for the circuit shown below : **7**



3 Answer the following :

(1) Determine mesh currents I_1, I_2 and I_3 in the following circuit. **7**



(2) Draw star and delta network. Prove that 7

$$R_A = \frac{R_1 R_2}{R_1 + R_2 + R_3}, R_B = \frac{R_1 R_3}{R_1 + R_2 + R_3} \text{ and } R_c = \frac{R_2 R_3}{R_1 + R_2 + R_3}$$

Where R_A, R_B and R_C are resistances of star network and R_1, R_2 and R_3 are resistances of delta network.

OR

3 Answer the following :

(1) Explain superposition theorem with one example. 7

(2) Explain duals and duality with one example. 7

4 Answer any **two** from the following :

(1) Explain following for sine wave 7

(A) Phase of sine wave

(B) RMS value

(C) Peak value

(D) Form factor

(2) Discuss series RLC circuit in terms of its phase relation of V_R, V_L and V_C and Impedance. 7

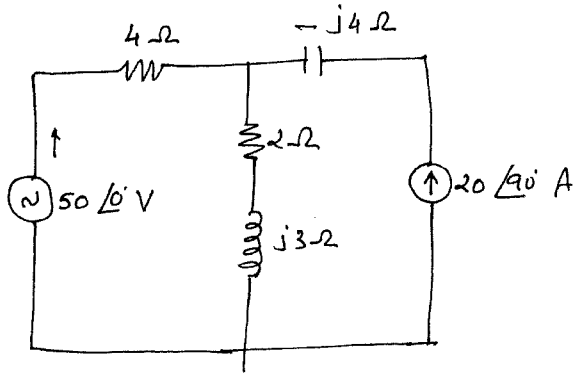
(3) Explain the following with necessary mathematical steps. 7

(A) Average power

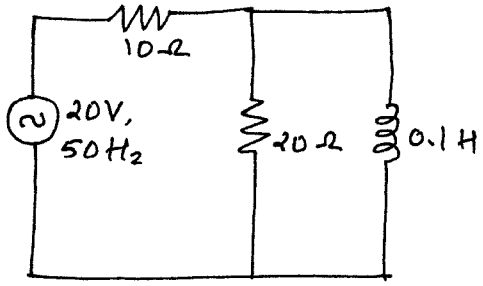
(B) Apparent power.

5 Answer any **two** from the following :

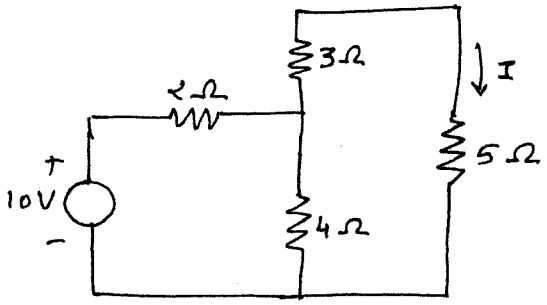
(1) For the circuit shown below, determine the current in $(2 + j3)$ ohm by using the superposition theorem. 7



(2) For the circuit shown below find X_L, Z_T, I_T *and* θ. **7**



(3) Verify the reciprocity theorem for the following circuit. **7**



(4) For following circuit find the power delivered by 4V source using mesh analysis and voltage across the 2 ohm resistor. **7**