



MCA-003-027201

Seat No. _____

M. Sc. (ECI) (Sem. II) (CBCS) Examination

April / May - 2018

Paper - 6 : Basic Circuit Analysis
(Old Course)

Faculty Code : 003

Subject Code : 027201

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

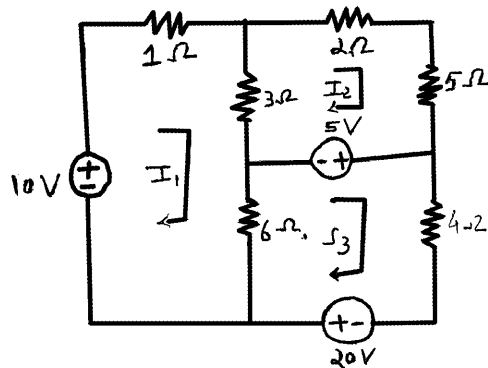
1 Answer Any Seven from the following : 14

- (1) Define voltage and current.
- (2) Write the voltage formula of inductor and derive its current formula from it.
- (3) Very briefly write on Kirchhoff's voltage law.
- (4) Define co-tree and incidence matrix.
- (5) What is Tie set matrix? Explain very briefly.
- (6) What is fundamental cut set? Explain very briefly.
- (7) Derive the formula to find out the voltage across any resistor in the series circuit made of resistors only.
- (8) Derive the formula for the equivalent resistance in parallel circuit containing R_1, R_2, R_3 up to R_M resistors in parallel.
- (9) Write general mesh equations for a network which contains three resistive meshes. Explain the same.
- (10) Write and explain briefly general nodal equations for a three node network in which one node is a reference node.

2 Answer Any Two from the following :

- (A) Derive the formula to decide the current flowing through any branch of a parallel circuit consisting of two resistors and three resistors. (Current division formula). Then infer the general formula from these two cases. **7**

- (B) Write the mesh equations for the following circuit and then obtain I_1 . 7

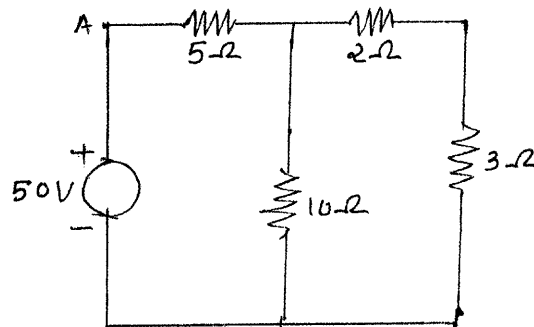


- (C) Discuss the Δ to Y conversion. 7

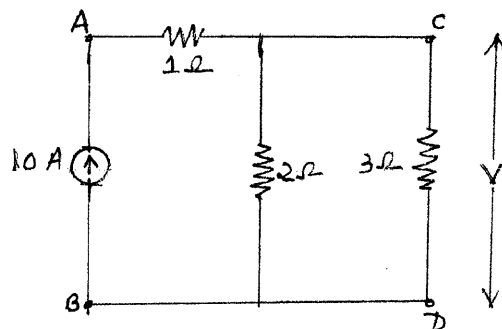
3 Answer the following :

- (A) Write the statements of Thevenin's and Norton's theorems. 7

Use Thevenin's theorem to find out the current in 3Ω resistor in following circuit :



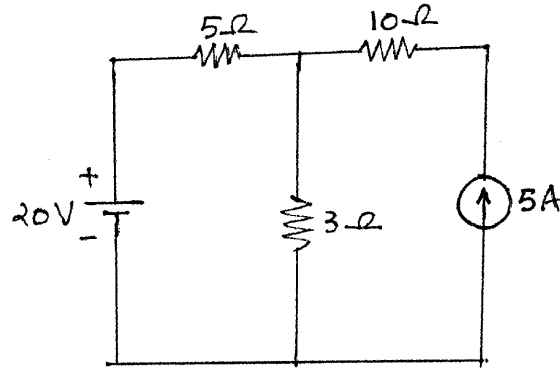
- (B) Write the statements of Tellegen's and Millman's theorems. Verify the reciprocity theorem for the following circuit : 7



OR
2

3 Answer the following :

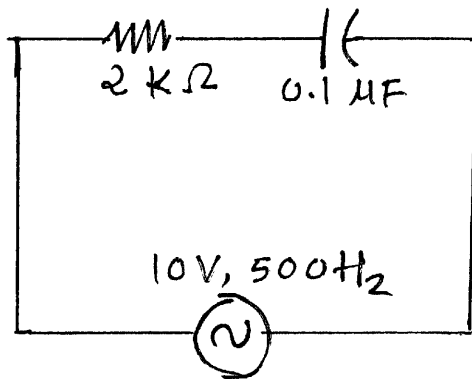
- (A) Write the statements for superposition theorem and compensation theorems. Find out the current flowing through 3Ω resistor for following circuit : 7



- (B) Explain the dual circuits with one example. 7

4 Answer the following :

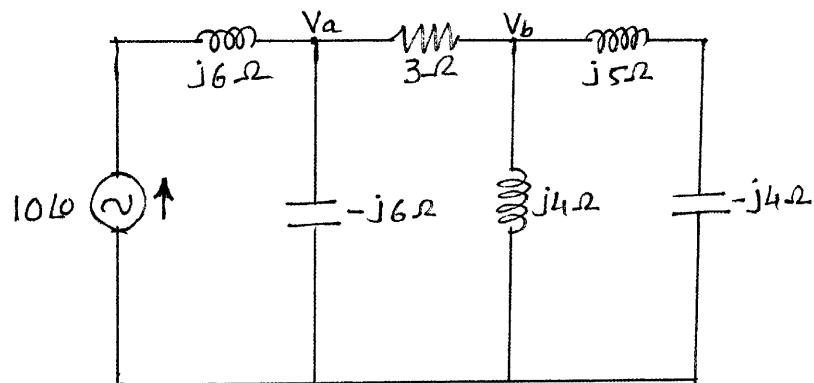
- (A) Write on RMS value of sine wave. Discuss phase relation in pure inductor. 7
- (B) A sine wave generator supplies a 500 Hz , 10 V rms signal to a $2\text{ k}\Omega$ resistor with a $0.1\text{ }\mu\text{F}$ capacitor as shown in the following circuit. Determine the total impedance Z , current I , phase angle θ , capacitive voltage V_C , and resistive voltage V_R . 7



5 Answer any two from the following :

(A) Write on average power, apparent power, power factor and reactive power. 7

(B) Determine the V_a and V_b for the, following circuit : 7



(C) Discuss Maximum power transfer theorem for DC circuit with one example. 7

(D) Explain the following : 7

- (1) Active and passive components
- (2) Bilateral and unilateral components
- (3) Linear and non-linear components
- (4) Lumped and distributed components