

B. TECH (CSE, IT, MAE, CE, AE, NS&T, S&AE),
 B. TECH (CSE & CE) + MBA DUAL DEGREE
 PROGRAMMES, B. TECH + M. TECH (NS & T) -
 DD & B. TECH (AE) + M. TECH (A) - DD

FIRST SEMESTER END TERM EXAMINATION:
 NOVEMBER - 2012

ELECTRICAL SCIENCE

Time : 3 Hrs.

Maximum Marks : 70

Note: Attempt questions from all sections as directed.

SECTION - A (30 Marks)

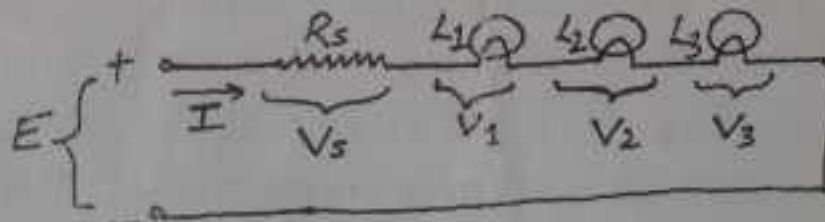
Attempt any 5 questions.

Each question carries 6 marks.

1. A circuit shown below has three 6V, 3W lamps. Also, $E = 50V$, and $R_S = 64\Omega$.

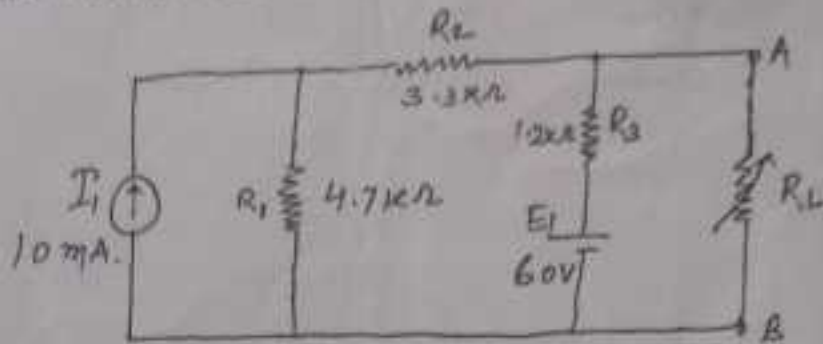
(a) Determine the voltage at the terminals of lamp L_2 if L_2 becomes open circuited. (3)

(b) If L_2 becomes short circuited, calculate the current flow through the circuit and the power dissipated in each of the other two lamps. (3)

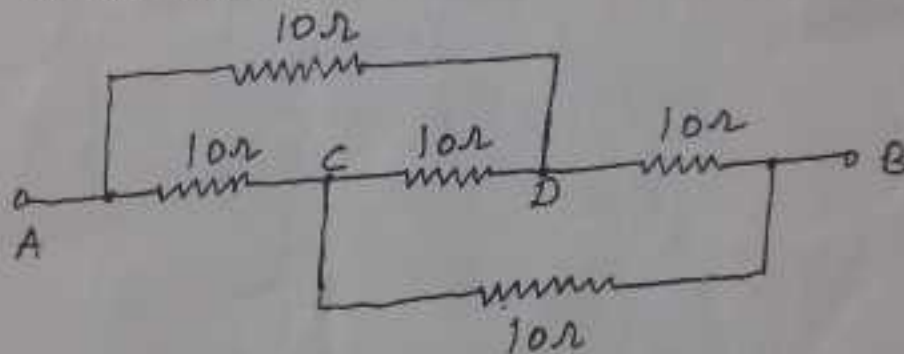


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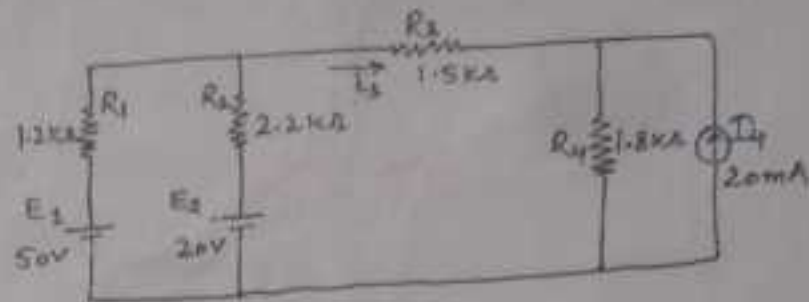
2. Derive the Thevenin and Norton equivalent circuit for the network shown below



3. Discuss in brief about Δ -Y Transformations, also write their conversion formula. Calculate the equivalent resistance between the terminals A and B in the network shown below



4. What is transformer efficiency? Derive the condition for maximum efficiency of a transformer. Also derive an expression for output kVA of a transformer corresponding to maximum efficiency.
5. State the Superposition theorem and list the steps involved in applying it to an analysis of a resistor network. For the circuit shown below, use the superposition theorem to determine the current through resistor R_3 .



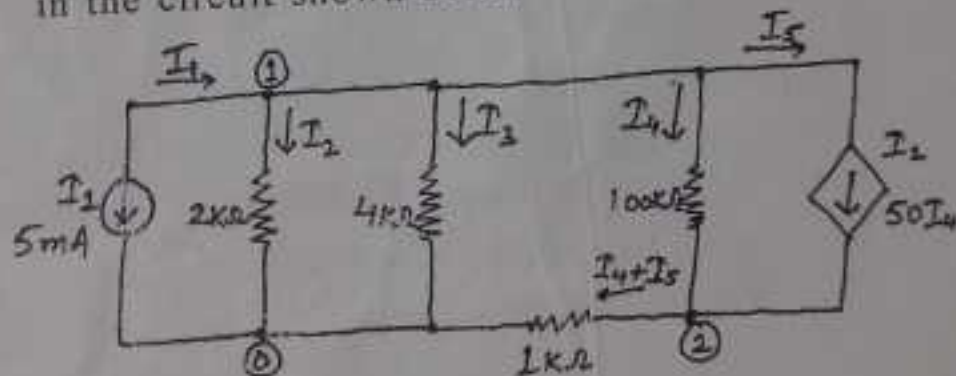
6. (a) Differentiate between independent and controlled sources. (3)
- (b) Explain the difference between Active, Reactive and Apparent Power. (3)

SECTION - B (20 Marks)

Attempt any two questions.

Each question carries 10 marks.

7. Define a voltage node, and list the procedure for nodal analysis of resistor circuits. Also calculate V_1 and V_2 in the circuit shown below



8. Explain the following terms
- (a) Peak value (b) Average value
- (c) R.M.S. value (d) Form factor and
- (e) Peak factor

P.T.O.

Also derive an expression for the maximum voltage induced in a conducting loop rotated in a magnetic field.

9. A 40 kVA transformer has iron loss of 450W and full load copper loss of 850W. If the power factor of load is 0.8 lagging, calculate
- Full load efficiency
 - The kVA load at which maximum efficiency occurs and
 - Maximum efficiency

SECTION - C (20 Marks)
(Compulsory)

10. (a) Explain the open circuit and short circuit testing procedure, and develop the necessary equations for calculating R_0 , X_0 , R_e and X_e from the test results. (8)
- (b) (i) What is Resonance, classify it and explain what happens at resonance frequency, also derive an expression for resonance frequency of a series RLC circuit. (6)
- (ii) Define Q factor with respect to series resonance circuit, and derive an expression for the circuit Q factor of a series resonant circuit in terms of R, L and C. (6)