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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech I Semester End Examinations (Supplementary) - January, 2019

Regulation: IARE – R18

## FUNDAMENTALS OF ELECTRICAL ENGINEERING

Time: 3 Hours

(Common to CSE | IT | CE)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

### UNIT – I

- Describe active elements and passive elements. Classify active elements and Draw the symbols of different controlled sources. [7M]
  - Find the current through 20 ohm resistance in the given circuit shown in Figure 1. [7M]

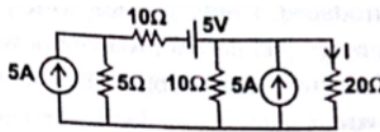


Figure 1

- Explain the Kirchhoff's laws with example and neat diagrams. Estimate the equivalent capacitance of series and parallel connections of capacitor elements. [7M]
  - Calculate the equivalent resistance across AB terminal for the network shown in Figure 2. [7M]

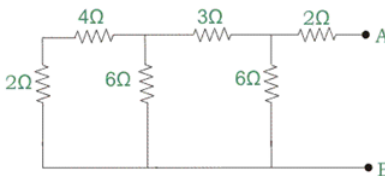


Figure 2

## UNIT – II

3. (a) Write the expressions of star to delta transformation and delta to star transformations. If three equal value resistors are in delta, determine their equivalent values in star connection. If three equal value resistors are in star, calculate their equivalent values in delta connection. [7M]
- (b) Calculate the voltage to be applied across AB in order to drive a current of 5A in the circuit shown in Figure 3 by using star-delta transformation. [7M]

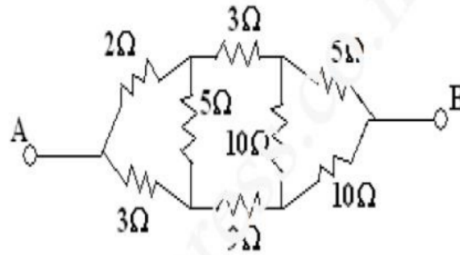


Figure 3

4. (a) Define super mesh and super node. Write the limitations of mesh analysis and nodal analysis. [7M]
- (b) Calculate the mesh currents for the given circuit along with voltage across and power consumed by 3 ohms resistor for shown in Figure 4. [7M]

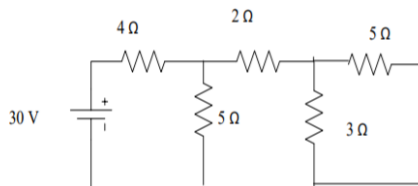


Figure 4

## UNIT – III

5. (a) Represent the alternating current and voltage in terms of sine function. Define the peak, peak to peak, average value, RMS value, peak factor and form factor of sine function. [7M]
- (b) Find the RMS and average values for the given circuit shown in Figure 5, and also find the form factor. [7M]

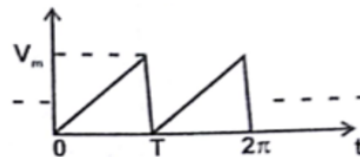


Figure 5

6. (a) Define the power factor of the circuit and give its importance. Draw the impedance triangle and power triangle explain in detail. [7M]
- (b) If two impedances  $Z_1$  and  $Z_2$  are connected in series with a voltage source  $V = 50\angle 0^\circ$ . Find the voltage across each impedance and draw the voltage phasor. [7M]

**UNIT – IV**

7. (a) Define the following terms in network topology of i) Graph ii) Branch iii) Node iv) Path v) Mesh vi) planar graph vii) Non- planar graph [7M]
- (b) Determine the tie set matrix of the following graph in Figure 6. [7M]

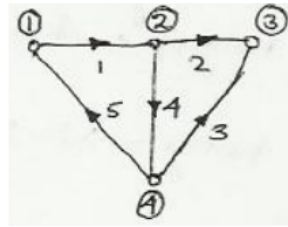


Figure 6

8. (a) Define the duality and dual elements with neat example. [7M]
- (b) Draw the oriented graph for the given network in Figure 7 and write the cut set matrix? [7M]

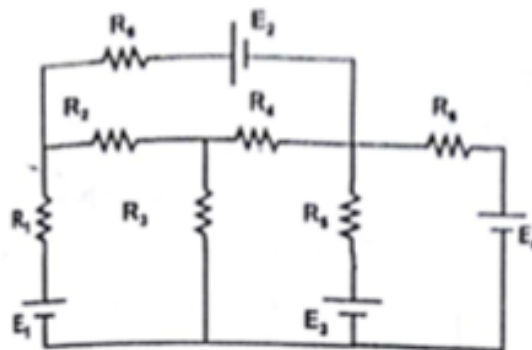


Figure 7

**UNIT – V**

9. (a) State and explain procedure for solving problems using super position theorem. [7M]
- (b) Apply the reciprocity for the circuit shown in Figure 8 and compare them? [7M]

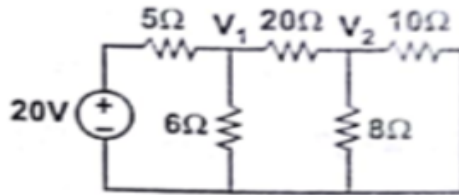


Figure 8

10. (a) Explain the Thevenin's equivalent and Norton's equivalent circuit with their importance. [7M]
- (b) Using Millman's theorem, find the current through and voltage across the resistor  $R_L$  shown in Figure 9. [7M]

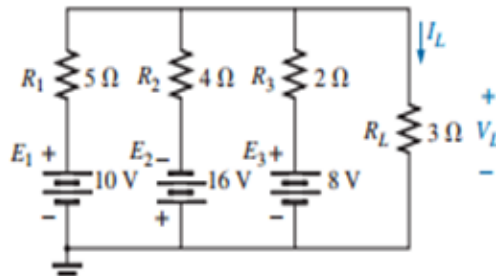


Figure 9

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