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INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2019

Regulation: IARE – R18

ELECTRICAL CIRCUITS

Time: 3 Hours

(EEE)

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

1. (a) Classify types of electric circuit elements depending on their characteristics and explain in detail. Differentiate resistor, inductor and capacitor elements using their voltage-current characteristics. [7M]
- (b) Find the drop between the terminals a and b in the network of Figure 1. [7M]

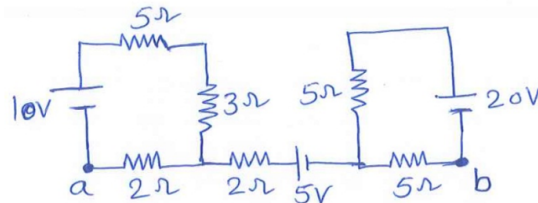


Figure 1

2. (a) Define an ideal voltage source and current source. Compare practical sources and ideal sources. With relevant diagrams explain types of dependent sources. [7M]
- (b) The voltage waveform shown in Figure 2 is applied to a capacitor of $100 \mu\text{F}$. Determine and sketch the capacitor current $i(t)$. [7M]

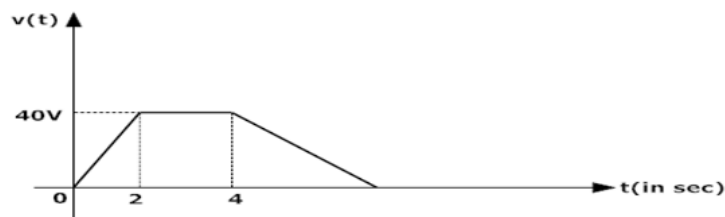


Figure 2

UNIT – II

3. (a) Define network topology and write its importance in electrical circuits. Give the properties of incidence matrix. For 8 element 5 node graph, determine number of links. [7M]

- (b) The graph of a network is shown in Figure 3. Write the incidence matrix and f-cut set matrix. [7M]

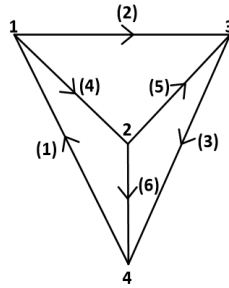


Figure 3

4. (a) Define the duality and the dual elements. Write the expressions of star to delta transformation and delta to star transformation. [7M]
 (b) Draw the dual of the network shown in Figure 4 [7M]

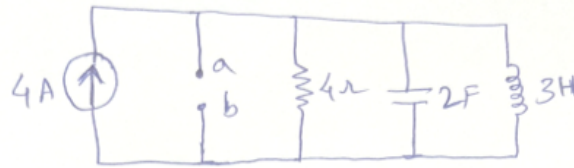


Figure 4

UNIT – III

5. (a) Write the expression for reactance offered by inductor and capacitor. Draw the impedance triangle & power triangle and explain in detail. [7M]
 (b) A series RLC circuit operates with 100V, 50Hz having circuit parameters $R=12\ \Omega$, $L=150\text{mH}$, $C=10\ \mu\text{F}$. Calculate
 i. Impedance of the circuit
 ii. Current drawn from the supply
 iii. Power factor
 iv. Reactive Power [7M]
6. (a) Define the peak, peak to peak, average, RMS value also peak and form factor of sine function. Explain why average value is defined for half cycle of sine wave. [7M]

(b) Determine average and RMS value of sinusoidal waveform shown in Figure 5.

[7M]

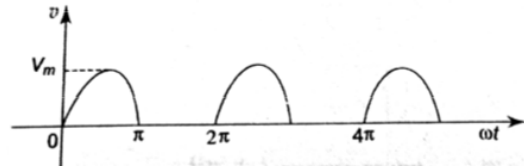


Figure 5

UNIT – IV

7. (a) Bring out the similarities and differences between electric and magnetic circuits. [7M]
(b) A three phase balanced delta connected load of $(4+j8)$ ohm is connected across a 400V, 3- ϕ balanced supply. Determine the phase currents and line currents. Assume the phase of sequence to be RYB. Also calculate the power drawn by load. [7M]
8. (a) Show that the power consumed by 3-phase balanced load can be measured using two wattmeters. Also, deduce the expression for power factor in terms two wattmeter readings. [7M]
(b) Two wattmeters are used to measure power in a 3-phase three wire load. Determine the total power, power factor and reactive power, if the two wattmeter's read i) 1000W each, both positive ii) 1000W each, but of opposite sign [7M]

UNIT – V

9. (a) What is battery? How it works and write types batteries? Enlist the ideal characteristics of a battery. [7M]
(b) Explain the working of a Lead Acid Storage battery with neat diagram. [7M]
10. (a) What is switch fuse unit? Write its salient features, operating mechanism and applications? [7M]
(b) What are MCB and ELCB and how do they differ? Explain the working and operation of MCB with a neat diagram. [7M]

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