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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

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

Regulation: IARE – R16

ELECTRICAL CIRCUITS

(Common to ECE | EEE)

Time: 3 Hours

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) State Kirchoff's laws. Draw the basic electric circuit with proper labelling and write importance of each part. [7M]
- (b) The current wave form shown in Figure 1 is passed through an inductance of 3mH. Determine and sketch the voltage $V(t)$ across the inductor. [7M]

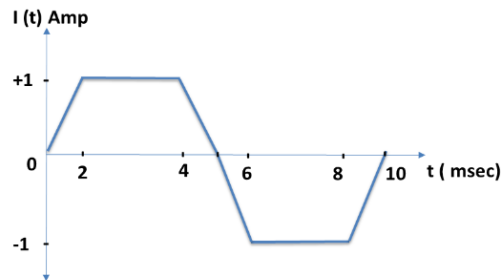


Figure 1

2. (a) Explain the following with characteristics. [7M]
 - (i) Ideal and Practical Energy Sources
 - (ii) Dependent and Independent energy sources.
- (b) Use a series of source transformations to find the voltage V in the circuit shown in Figure 2 [7M]

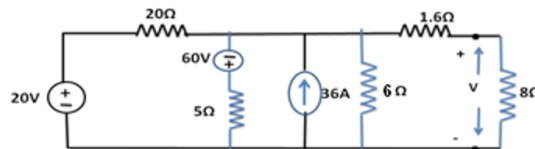


Figure 2

UNIT – II

3. (a) Write the expressions of star to delta transformation and delta to star transformation. [7M]
 (b) For the electrical network shown Figure 3, draw oriented graph and develop incidence matrix and tie set matrix. [7M]

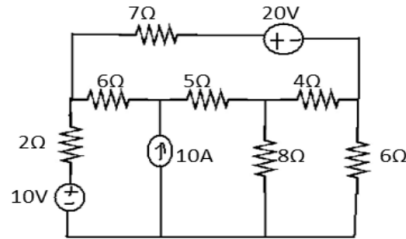


Figure 3

4. (a) Discuss the method used to determine loop currents for multiple loop network with an neat example. [7M]
 (b) Find the equivalent resistance across AB for the network shown Figure 4 [7M]

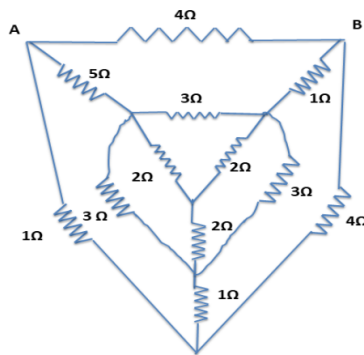


Figure 4

UNIT – III

5. (a) Define the peak, peak to peak, average, RMS value also peak and form factor of sine function. [7M]
 (b) Find the RMS value, average value, peak factor and form factor for the waveform shown Figure 5. [7M]

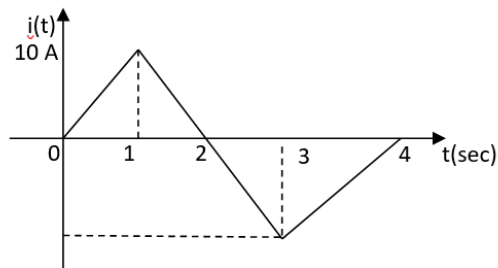


Figure 5

6. (a) Define the terms apparent power, true power and reactive power for AC circuits. [7M]
 (b) A series RC circuit with $R = 120$ and $C = 3.3 \mu\text{F}$ is connected to a 12 V RMS, 1 kHz supply. Determine the circuit current, the resistor voltage, the capacitor voltage and the phase angle of the current with respect to the supply voltage. Represent the phasor diagram and impedance triangle for the circuit. [7M]

UNIT – IV

7. (a) Define electrical resonance and give the condition for circuit to be under resonance. Define series and parallel resonance. [7M]
 (b) A series RLC circuit with 8 ohms resistance should be designed to have a band width of 50Hz , Determine value of L and so that the circuit resonates at 250Hz series RLC circuit. [7M]
8. (a) State Faraday’s law of electro-magnetic induction. Write flux density in terms of field intensity. [7M]
 (b) Given series RLC Circuit $R=10\text{ohms}$, $L=1\text{mH}$, $c=1\mu\text{F}$ is connected across sinusoidal source of 20V with variable frequency. Determine resonant frequency, Q factor under resonance and half power frequencies. [7M]

UNIT – V

9. (a) Explain the Thevenin’s equivalent and norton’s equivalent circuit with their importance. [7M]
 (b) In an series circuit the source impedance is $(3 + 8j)$ ohms with 100V supply Design load impedance to absorb maximum power and form the Nortan’s equivalent circuit. [7M]
10. (a) Give the application of reciprocity theorem. State and prove reciprocity theorem with an example for DC excitation. [7M]
 (b) In an network consisting three parallel branches, first across is defined as 20V in series with 5 ohms, second branch 7 ohms and third branch 10V in series with 4 ohms. Apply super-position theorem to Determine voltage drop across 7 ohms resistor. [7M]

