Hall Ticket No | | | | | | | | | | | Question Paper Code: AEE002

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular/Supplementary) - May, 2018

Regulation: IARE – R16

ELECTRICAL CIRCUITS

Time: 3 Hours **(Common to ECE | 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) The Voltage wave form shown in Figure 1 is applied to a pure capacitor of 1F. Obtain the current and energy wave forms in the capacitor. **[7M]**

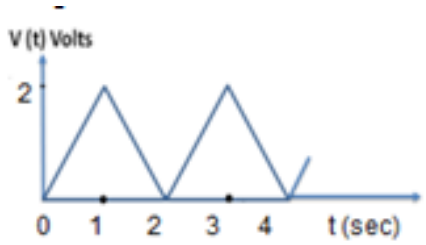

Figure 1

(b) If the 12Ω resistor draws a current of 1A as shown in the Figure 2, apply KCL and KVL to determine the value of resistance R. **[7M]**

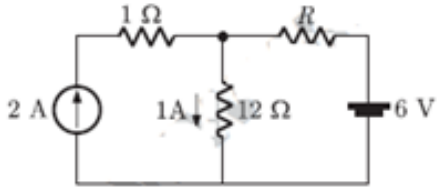

Figure 2

2. (a) Differentiate following elements with examples. i. Active and Passive elements ii. Linear and Non-linear elements. **[7M]**

(b) Use a series of source transformations to find the power associated with 6V source for the circuit shown in Figure3. **[7M]**

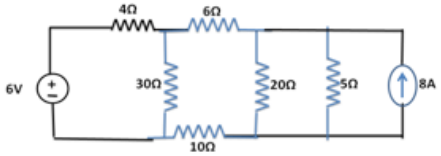

Figure 3

UNIT – II

3. (a) For the circuit shown in Figure 4, use Mesh analysis, determine the current through 8Ω resistor. **[7M]**

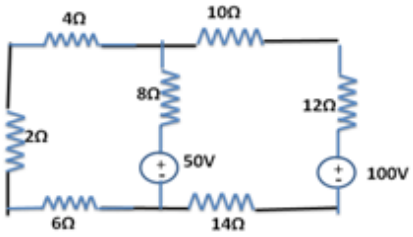

Figure 4

(b) Determine the equivalent resistance across AB for the network shown in Figure 5. **[7M]**

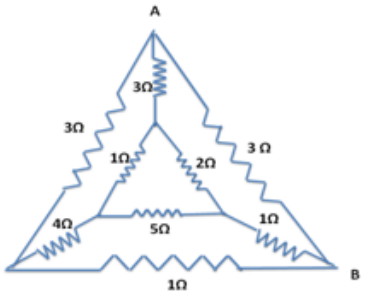

Figure 5

4. (a) Use Nodal analysis to determine the current through 40Ω resistor in the circuit given in Figure 6. **[7M]**

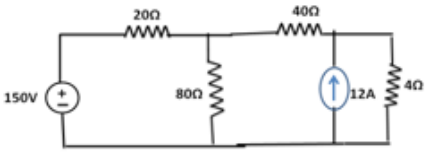

Figure 6

(b) Draw a linear oriented graph, tree and cotree for the circuit in Figure 7. Develop cut set matrix and tie-set matrix. **[7M]**

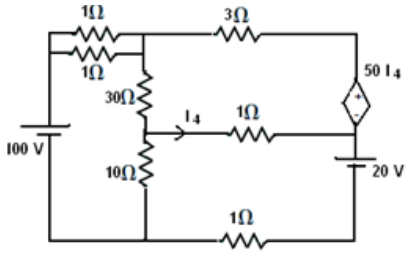

Figure 7

UNIT – III

5. (a) Find the RMS value, average value, peak factor and form factor for the waveform shown in Figure 8. **[7M]**

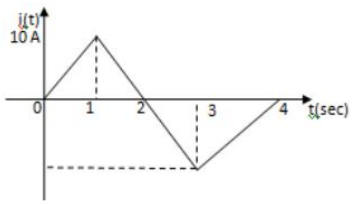

Figure 8

(b) Define active and reactive power. Mention their units. Also explain the importance of power factor in an AC circuit. **[7M]**

6. (a) Determine the apparent power, true power and reactive power for the circuit shown in Figure 9. **[7M]**

Figure 9

(b) An inductor 0.1H with a resistance of 5Ω is connected in series with a 25Ω resistor. A 100V RMS supply is applied to the circuit. The phase angle of current is to be adjusted to 60^0 by adjusting the supply frequency. Determine the appropriate frequency and current in the circuit. Represent the phasor diagram. **[7M]**

UNIT – IV

7. (a) An inductance of L Henry with internal resistance of R = 5Ω is connected in parallel with the series combination of a capacitor having reactance –j12Ω and resistance of 10Ω. Determine the value of inductor to maintain the circuit at resonance. **[7M]**

(b) Find the voltage across the –j6Ω capacitor for the network shown in Figure 10. **[7M]**

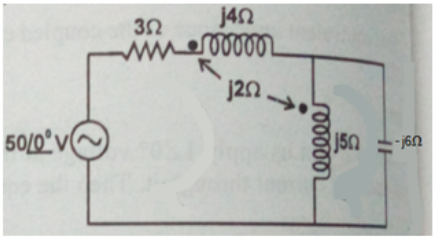

Figure 10

8. (a) In a RLC series circuit, the inductance is variable. The circuit is connected to a 200V, 50Hz supply. The maximum current through the circuit is 0.3144A and the volatge across the capaciatnec is 300V. Find R, L and C Values. **[7M]**

(b) Explain the concept of self inductance and mutual inductance and also write the expression for coefficient of coupling in mutually induced coils. **[7M]**

UNIT – V

9. (a) Determine the current through AB in the circuit shown in Figure 11, by using super position theorem. **[7M]**

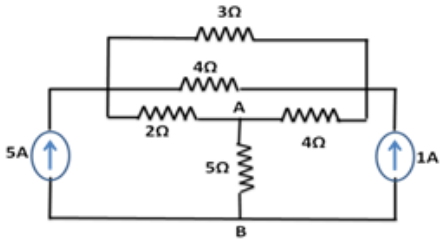

Figure 11

(b) For the circuit shown in Figure-12, determine the load current I_L by using Norton's theorem. **[7M]**

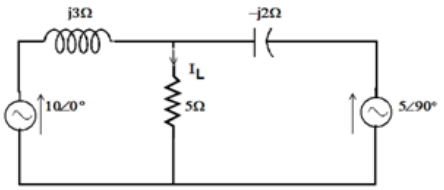

Figure 12

10. (a) For the circuit shown in Figure 13, compute the current flowing through 10Ω by using Millman's theorem. **[7M]**

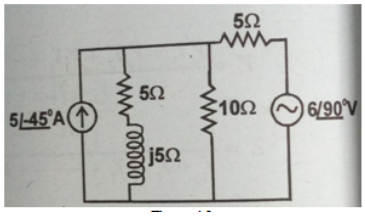

Figure 13

(b) Verify the Reciprocity theorem with respect to AB for the circuit shown in Figure 14. **[7M]**

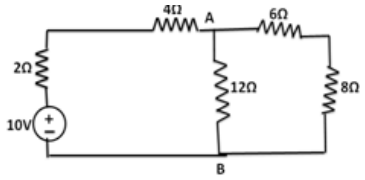

Figure 14

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