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

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech I/II Semester Supplementary Examinations - July, 2017
Regulation: IA-R16
ELECTRICAL CIRCUITS
[Common for : II Semester (ECE and 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) Derive the voltage, current and power relationship of the elements which stores magnetic field and the electric field. **[6M]**

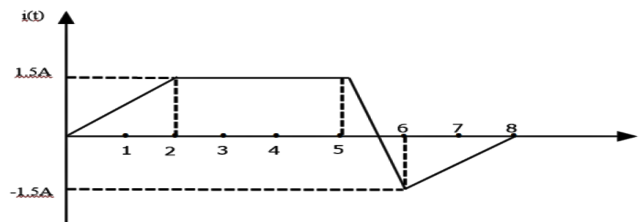   (b) A current wave i(t) is applied to an inductance of 10H as shown in Figure 1 .Find v(t). **[8M]**

Figure 1

2. (a) A battery B_1 of emf 40V and internal resistance 2Ω is connected with another battery B_2 of emf 44V and internal resistance 2Ω. A load resistance of 6Ω is connected across the batteries. Calculate the current through each battery and the load. **[7M]**

    (b) Can practical voltage source be converted into practical current source and vice versa, if yes prove with necessary derivations and examples. **[7M]**

UNIT – II

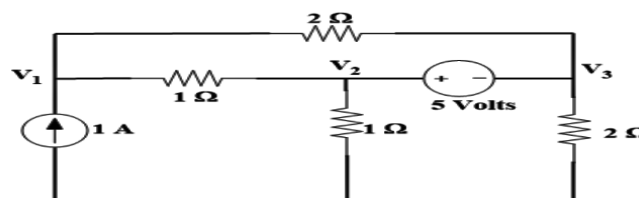3. (a) Find the node voltages for the circuit shown in Figure 2. **[7M]**

Figure 2

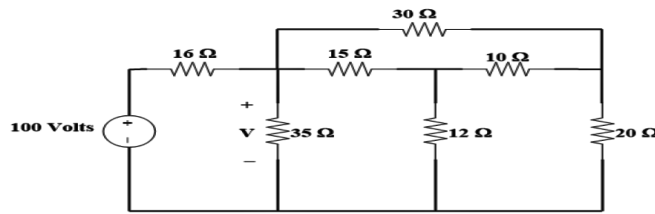(b) Determine 'V 'in the circuit shown in Figure 3 **[7M]**

Figure 3

4. (a) Using any example explain a tree, link current, branch current and tie set schedule of the graph. **[7M]**

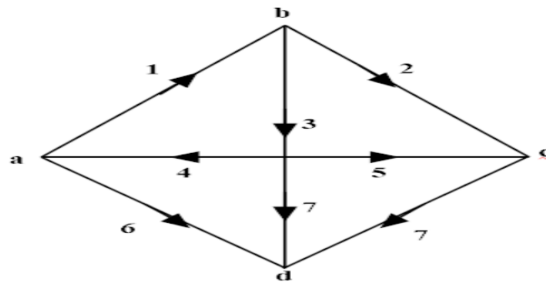(b) Explain cutest matrix. Obtain the cutest matrix for the graph given in Figure 4. **[7M]**

Figure 4

UNIT – III

5. (a) Derive the expression for RMS value and average value of sine wave their by Obtain form factor of sinusoidal ac wave form. **[7M]**

(b) A resistance of 20 ohm and inductance of 0.02H and capacitance of $100\mu F$ are connected in series across 220V, 50Hz supply. Determine **[7M]**
   i. impedance
   ii. current
   iii. voltage across R, L and C
   iv. power in Watts
   v. power factor

6. (a) A resistance of 24Ω, a capacitor of 150µF and an inductor of 0.16H are connected in series with each other. A supply of 240V, 50Hz is applied to the ends. Calculate **[7M]**
   i. the current in the circuit
   ii. the potential difference across each element
   iii. the frequency to which the supply would need to be changed so that the current would be at unity power factor and
   iv. find the current at this frequency.

(b) Explain the relation between apparent power, active power and reactive power. Write their units. Also explain the significance of power factor. **[7M]**

UNIT – IV

7. (a) State and Explain Faraday's laws of Electromagnetic Induction. Also define all nomenclature related to magnetic circuits **[7M]**

   (b) A series RLC circuit has R=10Ω and L=60mH.At a frequency of 25HZ the power factor of the circuit is 45 degrees lead .At what frequency will the circuit be resonant? **[7M]**

8. (a) Two coils having 100 and 150 turns respectively are wound side by side on a closed iron circuit of cross section 125cm2 and mean length 200cm. If the permeability of iron is 2000, calculate**[7M]**
   - i. self-inductance of the coil
   - ii. mutual inductance between them
   - iii. the emf induced in the second coil if current in the first coil changes from 0 to 5 A in 0.02 seconds.

   (b) Compare the resonance in series and parallel RLC circuits. **[7M]**

UNIT – V

9. (a) Obtain Thevenenin's equivalent circuit at A B as shown in Figure 5 **[7M]**
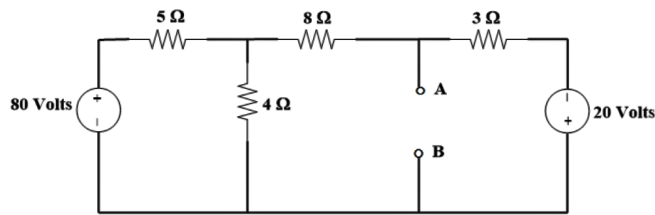

Figure 5

   (b) Calculate the value of R which will absorb maximum power from the circuit show in Figure 6. Also compute the value of maximum power. **[7M]**
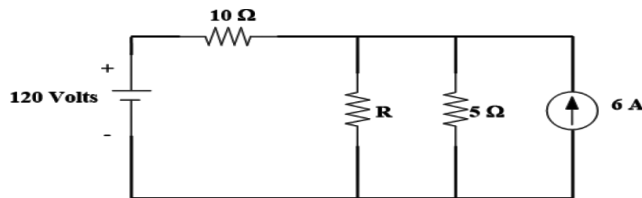

Figure 6

10. (a) State and explain superposition theorem. **[7M]**

(b) Calculate current I in the circuit given in Figure 7 using superposition theorem. [7M]
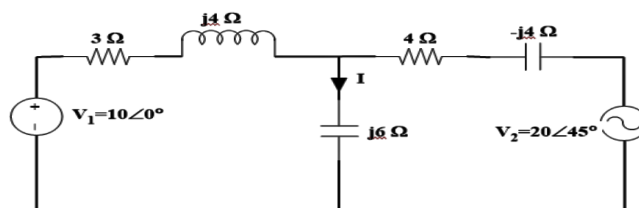

Figure 7

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