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

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

ELECTRICAL CIRCUITS

(Common for 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) Using Kirchhoff's current law, find the value of I_s in the circuit shown in figure1. Take $V_1 = 2$V. **[7M]**

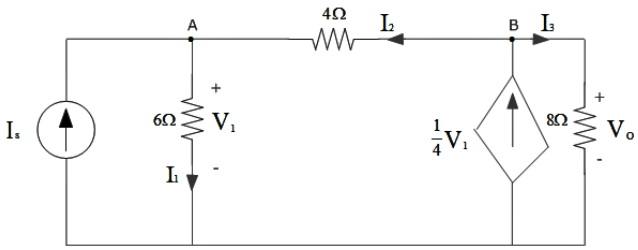

Figure 1

(b) Differentiate between **[7M]**
   i. dependent and independent sources
   ii. ideal and practical sources.

2. (a) A bulb rated 110V, 60W is connected with another bulb rated 110V, 100 W across a 220V mains. Calculate the resistance which should be joined in parallel with the first bulb so that both the bulbs may take their rated power. **[7M]**

(b) A current as shown in figure2 is applied across a 5Ω resistor. Find and Plot v(t) and p(t). **[7M]**

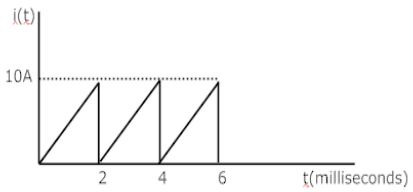

Figure 2

UNIT – II

3. (a) What is meant by dual of a network? Draw the dual circuit for the given circuit shown in figure3 **[7M]**

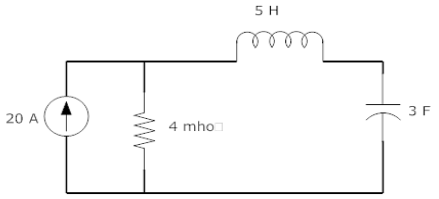

Figure 3

(b) Using nodal analysis find the current through the branch AB for the network shown in figure4. **[7M]**

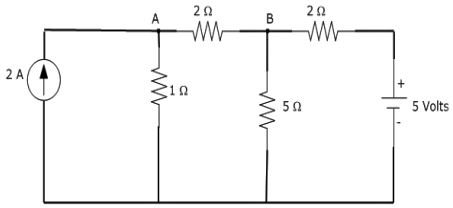

Figure 4

4. (a) In the network shown in figure5, find the current I_1 supplied by the battery using star/delta transformation. **[7M]**

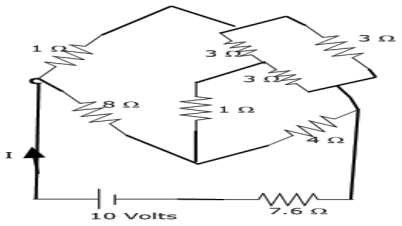

Figure 5

(b) Using an appropriate circuit, explain graph, tree and basic tie set matrix. **[7M]**

UNIT – III

5. (a) Draw the phasor diagram for the series circuit shown in figure6 when the current in the circuit is 2A. Find the values of V_1 and V_2 and show these voltages on the phasor diagram. **[7M]**

(b) A inductive coil draw 10A current and consumes 1KW power from a 200V, 50HZ AC supply. Determine Impedance, power factor, Real power and Reactive power. **[5M]**

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

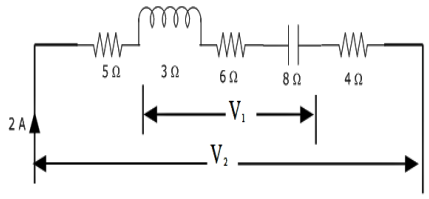

Figure 6

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

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 Maximum Transfer Theorem for AC and DC excitations. **[7M]**

(b) A series RLC circuit has R=10Ω,C=10μF and L=60mH.At a frequency of 25HZ the power factor of the circuit is 45^0 lead .At what frequency will the circuit be resonant? **[7M]**

8. (a) Explain **[7M]**

i. Faraday's laws of electromagnetic induction

ii. band width and Q factor of series resonance circuits.

(b) A cast steel electromagnet has an air gap length of 3mm and iron path of length 40cm. Find the number of ampere-turns necessary to produce a flux density of 0.7wb/m^2 in the gap. Neglect leakage and fringing. Assume ampere turns required for air gap to be 70% of the total ampere turns. **[7M]**

UNIT – V

9. (a) State and explain reciprocity theorem. **[7M]**

(b) State Millman's theorem. Calculate the current I for the circuit shown in Figure7 using Millman's theorem. **[7M]**

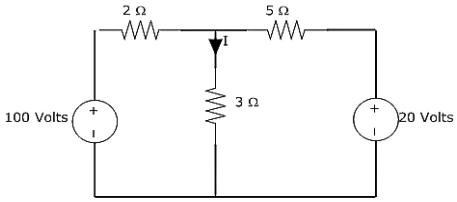

Figure 7

10. (a) State and Explain Tellegen's theorem. **[7M]**

(b) With a suitable circuit explain the solution of a circuit using Thevenin's theorem. **[7M]**