Hall Ticket No | | | | | | | | | | | Question Paper Code: AEEB01

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-II

B.Tech I Semester End Examinations, November- 2019

Regulations: R18

FUNDAMENTALS OF ELECTRICAL ENGINEERING

(CSE/IT)

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

MODULE– I

1. a) State Kirchhoff's voltage law and Kirchhoff's current law. Make short notes on practical sources and ideal sources. **[7M]**

   b) Find the current flowing through network shown in Figure 1. **[7M]**

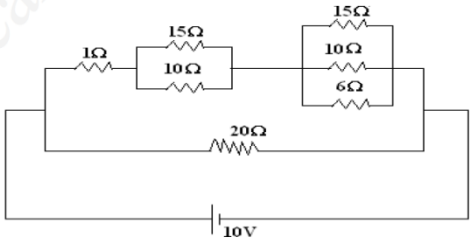

Figure 1

2. a) Calculate the power delivered by the source in the circuit as shown in the Figure 2. **[7M]**

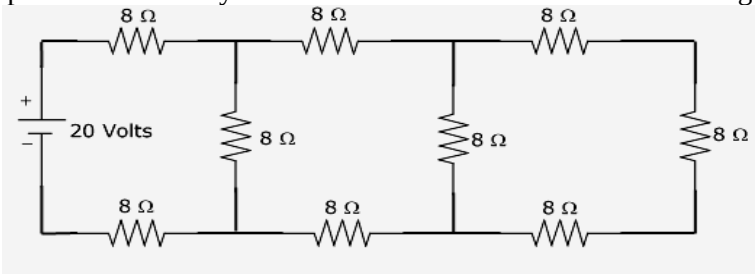

Figure 2

   b) Derive the V-I relationship, power and energy stored in capacitor. **[7M]**

MODULE – II

3. a) Determine the value of the source current for the circuits shown in the Figure 3, using delta star transformation. **[7M]**

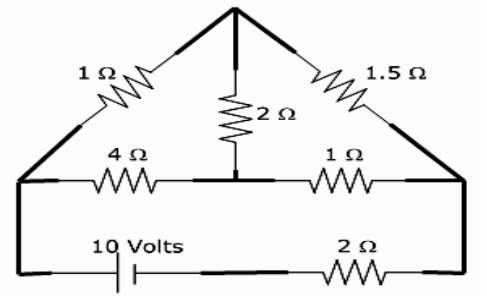

Figure 3

b) Using inspection method, compute the current in each mesh and power loss in each element as shown in Figure 4. **[7M]**

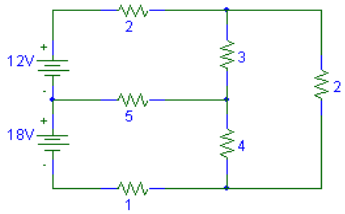

Figure 4

4. a) State and verify nortan's theorem with an example for DC excitation. **[7M]**

b) Determine the current through branch a-b using mesh analysis as shown in Figure 5 below. **[7M]**

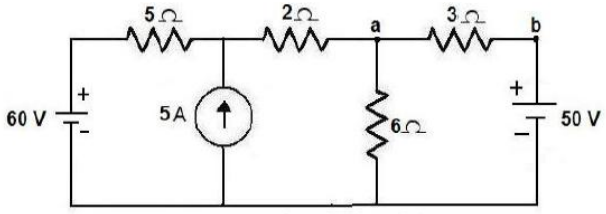

Figure 5

MODULE – III

5. a) Define the terms peak, peak to peak, average, RMS values, peak factor and form factor of sine wave. **[7M]**

b) Find RMS value for a given waveform as shown in Figure 6. **[7M]**

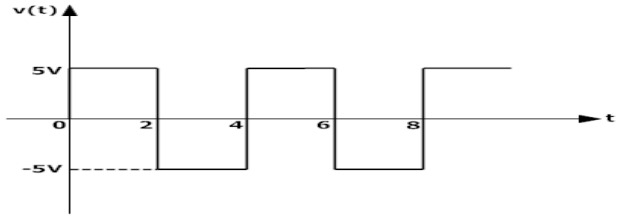

Figure 6

6. a) Summarize the features of electrical network with DC and AC excitation. **[7M]**

b) A 50 Ω, resistor is connected in parallel with an inductive reactance of 30 Ω. A 20V signal is applied to the circuit. Find the total impedance and line current in the circuit. **[7M]**

MODULE – IV

7. a) Explain the concept of active, reactive, apparent power and draw power triangle for pure RC. **[7M]**

   b) If the voltage applied is (10-8j) V and current flowing through circuit is (3–5j) A, Determine complex power and circuit constants **[7M]**

8. a) Co-relate the voltage triangle with power triangle and explain In detail. **[7M]**

   b) The voltage of a circuit is $\upsilon = 200 \sin (wt + 300)$ and the current is $i = 50 \sin (wt + 600)$. Determine **[7M]**

   i) The average power, reactive power and apparent power.

   ii) The circuit elements if $w = 100\pi$ rad /sec.

MODULE – V

9. a) Derive the relation between twig voltages and branch voltages and write current equations. **[7M]**

   b) Develop the fundamental tie-set matrix for the circuit shown in Figure 7. **[7M]**

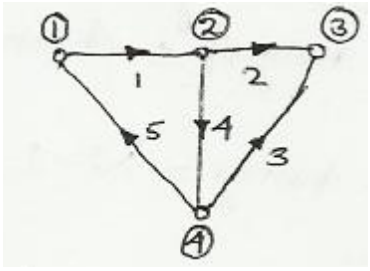

Figure 7

10. a) Define terms tree, co-tree, branches, links, nodes, graph and degree of the node. **[7M]**

    b) Draw the following **[7M]**

    i. Graph
    ii. Tree
    iii. Dual network of Figure 8 shown below.

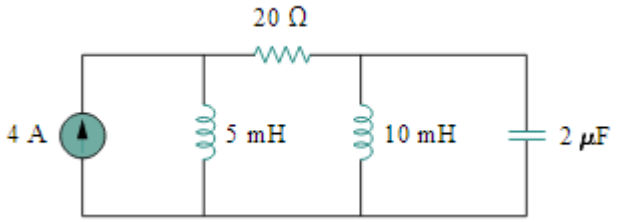

Figure 8

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COURSE OBJECTIVES:

The course should enable the students to:

I	Understand the basic electrical circuits and circuit laws to study behavior of electrical networks.
II	Use different network reduction techniques to study characteristics of electrical networks.
III	Analyze series and parallel AC circuits using complex notation.
IV	State and use DC circuit theorems to determine unknown currents and voltages.

COURSE OUTCOMES (COs):

CO 1	Understand the basic concepts of electricity, electrical circuits elements, application's of Kirchhoff laws to complex circuits.
CO 2	Explore to the working of mesh analysis and nodal analysis, inspection method, super mesh, super node analysis.
CO 3	Summarize various alternating quantities such as instantaneous, peak, RMS, average, form factor and peak factor for different periodic wave forms.
CO 4	Discuss the basic theory of real, reactive, apparent power and complex power, power factor.
CO 5	Explain the concepts of graph, tree, incidence matrix, basic cut set and basic tie set matrices for planar networks, duality and dual networks.

COURSE LEARNING OUTCOMES (CLOs):

AEEB01.01	Define the various nomenclature used to study the DC electrical circuits.
AEEB01.02	Understand the concept of electrical circuit and classify electrical circuit's elements.
AEEB01.03	Analyze the circuits using Kirchhoff's current and Kirchhoff's voltage law.
AEEB01.04	Use of series-parallel concepts for simplifying circuits.
AEEB01.05	Describe source transformation technique to determine equivalent resistance and source current.
AEEB01.06	Apply network reduction techniques to calculate unknown quantities associated with electrical circuits.
AEEB01.07	Summarize the procedure of mesh analysis and nodal analysis, inspection method, super mesh, super node analysis.
AEEB01.08	Apply the concept of network theorems.
AEEB01.09	Summarize the procedure of thevenin's and norton's theorems to reduce complex network into simple equivalent network.
AEEB01.10	List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.
AEEB01.11	Interpret the alternating quantities with its instantaneous, average and root mean square values.

AEEB01.12	Illustrate the concept of impedance, reactance, admittance, susceptance and conductance.
AEEB01.13	Understand the phase and phase difference and j notation.
AEEB01.14	Discuss representation of rectangular and polar forms.
AEEB01.15	Analyze the steady state behavior of R, L and C elements with sinusoidal excitation.
AEEB01.16	Analyze the steady state behavior of series and parallel RL and RC circuits with sinusoidal excitation.
AEEB01.17	Analyze the steady state behavior of series and parallel RLC circuits with sinusoidal excitation.
AEEB01.18	Illustrate the concept of real, reactive, apparent power and complex power.
AEEB01.19	Interpret the power factor in single phase AC circuits.
AEEB01.20	Discuss the various nomenclatures related with network topology.
AEEB01.21	Formulate incidence, tie-set and cut-set matrix which are used to solve the behavior of complex electrical circuits.
AEEB01.22	Understand the concepts of duality and importance of dual networks.

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	AEEB01.01	Analyze the circuits using Kirchhoff's current and Kirchhoff's voltage law.	CO 1	Understand
	b	AEEB01.03	Use of series-parallel concepts for simplifying circuits.	CO 1	Understand
2	a	AEEB01.02	Use of series-parallel concepts for simplifying circuits.	CO 1	Understand
	b	AEEB01.04	Understand the concept of electrical circuit and classify electrical circuit's elements.	CO 1	Understand
3	a	AEEB01.09	Describe source transformation technique to determine equivalent resistance and source current.	CO 2	Understand
	b	AEEB01.09	Summarize the procedure of mesh analysis and nodal analysis, inspection method, super mesh, super node analysis.	CO 2	Understand
4	a	AEEB01.06	Apply the concept of network theorems.	CO 2	Understand
	b	AEEB01.08	Summarize the procedure of mesh analysis and nodal analysis, inspection method, super mesh, super node analysis.	CO 2	Understand
5	a	AEEB01.14	List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.	CO 3	Understand
	b	AEEB01.14	Interpret the alternating quantities with its instantaneous, average and root mean square values.	CO 3	Understand
6	a	AEEB01.13	Illustrate the concept of impedance, reactance, admittance, susceptance and conductance.	CO 3	Understand
	b	AEEB01.13	Illustrate the concept of impedance, reactance, admittance, susceptance and conductance.	CO 3	Understand
7	a	AEEB01.15	Illustrate the concept of real, reactive, apparent power and complex power.	CO 4	Understand
	b	AEEB01.16	Interpret the power factor in single phase AC circuits.	CO 4	Understand
8	a	AEEB01.15	Illustrate the concept of real, reactive, apparent power and complex power.	CO 4	Understand

	b	AEEB01.17	Interpret the power factor in single phase AC circuits.	CO 4	Understand
9	a	AEEB01.20	Discuss the various nomenclatures related with network topology.	CO 5	Understand
	b	AEEB01.21	Formulate incidence, tie-set and cut-set matrix which are used to solve the behavior of complex electrical circuits.	CO 5	Understand
10	a	AEEB01.20	Formulate incidence, tie-set and cut-set matrix which are used to solve the behavior of complex electrical circuits.	CO 5	Understand
	b	AEEB01.22	Understand the concepts of duality and importance of dual networks.	CO 5	Understand

Signature of Course Coordinator **HOD, CSE**