Hall Ticket No:

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B.Tech II Semester End Examinations (Regular), MAY – 2018
Regulation: IARE-R16
FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to 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

UNIT – I

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

    b) Determine the value of the source current for the circuits shown in the Figure 1, using   [7M]
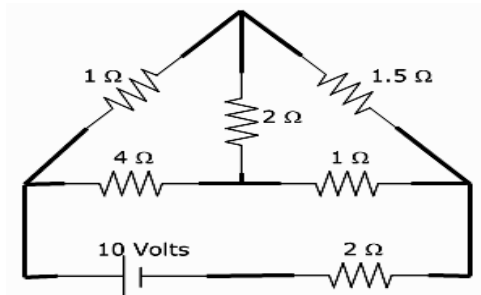   delta star transformation.

Figure 1

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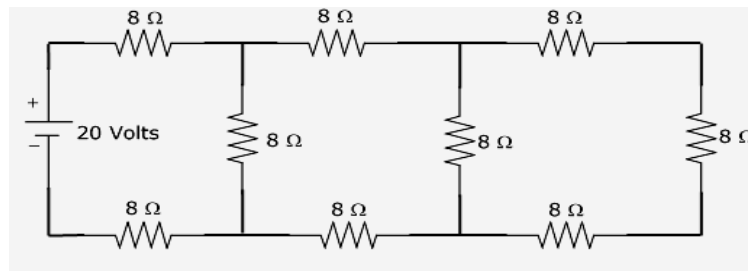

Figure 2

    b) Describe the concept of mutual inductance and derive the equation for energy stored in   [7M]
   mutual inductor.

UNIT – II

3. a) State and prove super-position and maximum power transformer theorem with an   [7M]
        example.

b) Calculate a) the equivalent resistances across the terminals of the supply, b) total current [7M] supplied by the source and c) power delivered to 16 ohm resistor in the circuit shown in the figure shown below
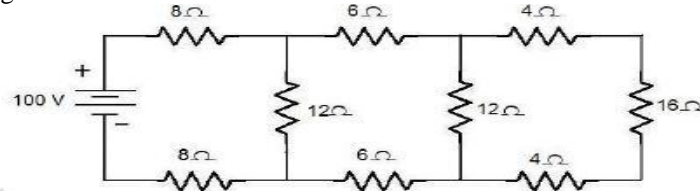
4. a) State and prove thevenin's and Norton's theorem with an example. [7M]

b) [7M]
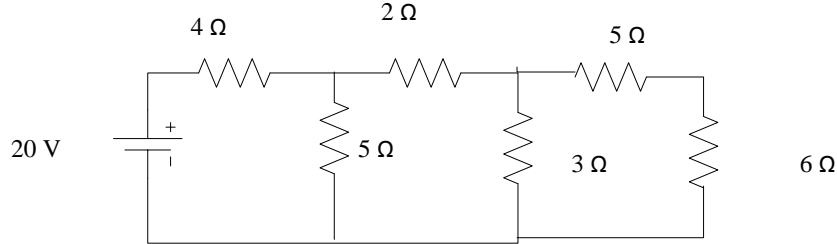
Apply mesh analysis and calculate the current through each element.

UNIT – III

5. a) Give the steady state response of series RL circuit with step input. [7M]
   b) A 50 Ω resistor is connected in parallel with an inductance reactance of 30 Ω A 20V signal is applied to the circuit find the total impedance. [7M]

6. a) Derive the three phase voltage equations of star in terms of delta voltages. [7M]
   b) If R=25 Ω, L = 64mH, C=80μF are connected in series with 110V and find current and V_R, V_L, V_C. [7M]

UNIT – IV

7. a) Discuss the following diode parameters: [7M]
   i) PIV ii) Dynamic resistance iii) Static resistance iv) Cut in voltage v) Reverse saturation current vi) Reverse breakdown voltage.

   b) Explain the working principle of a half wave rectifier with neat circuit diagram and related wave forms. Compute the output equations. [7M]

8. a) Describe the VI characteristics of Zener diode and give its application as voltage regulator. [7M]

   b) The i/p to the full wave rectifier is v(t) = 200sin50t. If R_L is 1kΩ and forward resistance of diode is 50Ω, calculate: [7M]
   i) DC current through the circuit ii) The AC (rms) value of current through the circuit iii) The DC output voltage iv) The AC power input v) The DC power output vi) Rectifier efficiency.

UNIT – V

9. a) Describe the functioning of BJT in common base configuration with the help of its input and output characteristics. [7M]

   b) Estimate the values of I_C and I_E for a transistor with α_{dc} = 0.99 and I_{CBO} =5μA, if I_B is measured as 20μA. [7M]

10. a) Summarize the common emitter circuit and sketch the input and output characteristics. Also explain active region, cutoff region and saturation region by indicating them on the characteristic curves. [7M]

   b) Compute the values of α, I_E and I_C in a common emitter transistor circuit if β = 100 and I_B = 50μA. [7M]

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COURSE OBJECTIVES:

I	State the Ohms law, Kirchhoff's laws associated with electrical network to study its characteristics and understand concept of mutual inductance.
II	Apply network reduction technique ,network theorems , graph theory to solve complex electrical network
III	Analyse the behaviour of RLC circuit with sinusoidal input and summarise futures of three phase supply
IV	Illustrate the V-I characteristics of various diodes and bi-polar junction transistor.

COURSE LEARNING OUTCOMES:
Students, who complete the course, will have demonstrated the ability to do the following:

CAEE001.01	Understand the concept of circuit, classification of elements and types of energy sources.
CAEE001.02	State different laws associated with electrical circuits and apply source transformation technique to determine equivalent resistance and source current
CAEE001.03	Explain Energy due to mutual induction and constraint on mutual inductance.
CAEE001.04	Define the various nomenclature related with network topology and give the importance of dual network.
CAEE001.05	Prove the law of conservation of energy, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitations.
CAEE001.06	Summarize the procedure of thevenin's, norton's and milliman's theorems to reduce complex network into simple equivalent network.
CAEE001.07	Explain the steps of compensation, zero current and voltage shift theorem to predict Constraints of electrical networks.
CAEE001.08	Analyze the steady state behavior of series and parallel RL, RC and RLC circuit with sinusoidal excitation.
CAEE001.09	Identify the alternating quantities with it instantaneous, average and root mean square values.
CAEE001.10	Explain balance and unbalanced three phase circuits.
CAEE001.11	Compare the operation of half wave, full wave and bridge rectifiers.
CAEE001.12	Differentiate the operation and biasing of semiconductor devices like diodes and transistor.
CAEE001.13	Apply the concept of diodes in converting AC to DC and can give the application of the rectifier circuit.
CAEE001.14	Distinguish between the different configurations of transistors and the applications depending on their characteristics.
CAEE001.15	Examine the voltage, current and frequency of electric network using CRO.
CAEE001.16	Apply the network reduction techniques, concept of graph theory, magnetic circuits, RLC circuits, AC signal measurement, three phase circuits and characteristics of PN junction diode and transistor.
CAEE001.17	Process the knowledge and skills for employability and to succeed national and international level competitive examinations.

MAPPING OF MODEL QUESTION PAPER QUESTIONS TO THE ACHIEVEMENT OF COURSE LEARNING OUTCOMES:

SEE QUESTION No.			COURSE LEARNING OUTCOMES	BLOOM TAXONOMY LEVEL
1	a	CAEE001.01	Understand the concept of circuit, classification of elements and types of energy sources.	Understand
	b	CAEE001.02	State different laws associated with electrical circuits and apply source transformation technique to determine equivalent resistance and source current	Understand
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	b	CAEE001.03	Explain Energy due to mutual induction and constraint on mutual inductance.	Remember
3	a	CAEE001.05	Prove the law of conservation of energy, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitations.	Understand
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4	a	CAEE001.05	Summarize the procedure of thevenin's, Norton's and milliman's theorems to reduce complex network into simple equivalent network.	Understand
	b	CAEE001.06	Prove the law of conservation of energy, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitations	Understand
5	a	CAEE001.08	Analyze the steady state behavior of series and parallel RL, RC and RLC circuit with sinusoidal excitation.	Understand
	b	CAEE001.10	Explain balance and unbalanced three phase circuits.	Understand
6	a	CAEE001.10	Explain balance and unbalanced three phase circuits.	Remember
	b	CAEE001.08	Analyze the steady state behavior of series and parallel RL, RC and RLC circuit with sinusoidal excitation.	Remember
7	a	CAEE001.11	Compare the operation of half wave, full wave and bridge rectifiers.	Understand
	b	CAEE001.12	Differentiate the operation and biasing of semiconductor devices like diodes and transistor.	Understand
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Signature of Course Coordinator   **HOD, ME**