Hall Ticket No | | | | | | | | | | |

Question Paper Code: AEED02

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech I SEMESTER END EXAMINATIONS (REGULAR) - FEBRUARY 2024

Regulation: BT23

ELECTRICAL CIRCUITS

Time: 3 Hours **(COMMON TO ECE | EEE)** **Max Marks: 60**

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Classify the various circuit elements with examples. Explain the concepts of independent and dependent sources with relevant examples. [BL: Understand| CO: 1|Marks: 6]

   (b) A 100V, 50Hz AC source is connected to a series RLC circuit with R=10Ω, L=0.5H and C=40μF. Calculate the impedance, current, power factor and true power. [BL: Apply| CO: 1|Marks: 6]

MODULE – II

2. (a) Describe in detail about star – delta transformation and derive the necessary equations [BL: Understand| CO: 2|Marks: 6]

   (b) Determine the mesh current I_1 in the circuit shown in the Figure 1. [BL: Apply| CO: 2|Marks: 6]

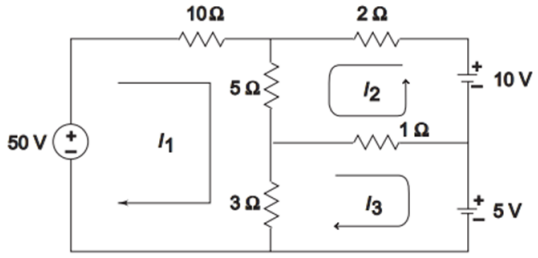

Figure 1

MODULE – III

3. (a) State and prove Norton's theorem for DC circuits with a suitable example. [BL: Understand| CO: 3|Marks: 6]

   (b) Determine the current through the 5 Ω resistor in the circuit shown in the Figure 2 using the Norton's theorem. [BL: Apply| CO: 3|Marks: 6]

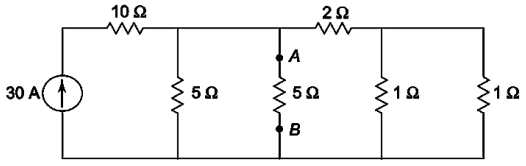

Figure 2

4. (a) State superposition theorem. Explain the principle of superposition and how it is applied to circuit analysis. [BL: Understand| CO: 4|Marks: 6]

   (b) For the resistive network shown in Figure 3, find the current in each resistor, using the superposition principle. [BL: Apply| CO: 4|Marks: 6]

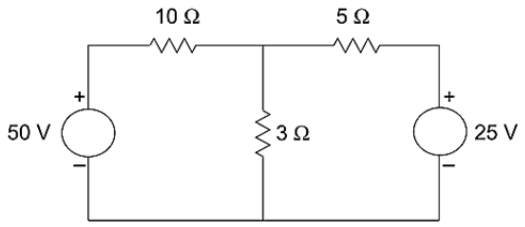

Figure 3

MODULE – IV

5. (a) Explain the dot convention for coupled inductors. Illustrate with examples. [BL: Understand| CO: 5|Marks: 6]

   (b) A magnetic circuit consists of two coils wound on a laminated iron core. Coil 1 has 300 turns and carries a current of 2A. Coil 2 has 500 turns and carries a current of 1A. The relative permeability of the iron is 1500 and length of the magnetic path is 0.5m. Determine the flux density in the core. [BL: Apply| CO: 5|Marks: 6].

6. (a) Write about self and mutual inductances. Establish the polarity of two mutually coupled coils on a single magnetic core. [BL: Understand| CO: 5|Marks: 6]

   (b) Two coupled inductors have self-inductances of 50mH and 75mH. If the coefficient of coupling is 0.8, find the mutual inductance. [BL: Apply| CO: 5|Marks: 6]

MODULE – V

7. (a) Why Z parameters are called open circuit impedance parameters? Determine the interrelations between Z parameters to Y parameters. [BL: Understand| CO: 6|Marks: 6]

   (b) Find the Y-parameters of a two port network having Z-parameters: $Z_{11} = 10\Omega$, $Z_{12} = 2\Omega$, $Z_{21} = 2\Omega$, $Z_{22} = 16\Omega$. [BL: Apply| CO: 6|Marks: 6]

8. (a) Summarize the terms graph, oriented graph, non-oriented graph, planar graph, non- planar graph, tree, co-tree, branches, links, nodes and degree of the node. [BL: Understand| CO: 6|Marks: 6]

   (b) Determine the brach voltages using cut-set marix for the graph shown in Figure 4. [BL: Apply| CO: 6|Marks: 6]

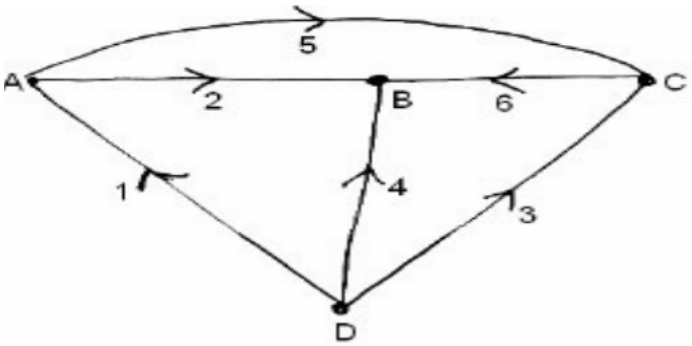

Figure 4