Reg. No.															

Question Paper Code	13347

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024 (JAN - 2025)

First Semester

Computer Science and Business Systems

24ESEE101 - PRINCIPLES OF ELECTRICAL ENGINEERING

Regulations - 2024

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Which of the following is a passive element in an electric circuit? (a) Resistor (b) Capacitor (c) Inductor (d) Transistor	*1*	*K1*	*CO1*
2.	Which of the following is according to Kirchhoff's Voltage Law (KVL), the sum of the voltages around a closed loop is: (a) Equal to zero (b) Equal to the sum of the current sources (c) Equal to the total resistance (d) Equal to the supply voltage	*1*	*K1*	*CO1*
3.	In an ideal current source, the current is: (a) Dependent on the load (b) Constant regardless of the voltage across it (c) Variable with voltage (d) Zero when the load is open	*1*	*K1*	*CO1*
4.	According to the Maximum Power Transfer Theorem, maximum power is transferred to the load when the load resistance is: (a) Twice the source resistance (b) Equal to the source resistance (c) Half of the source resistance (d) Zero	*1*	*K2*	*CO2*
5.	Thevenin's theorem states that any linear network can be reduced to (a) A current source and parallel resistance (b) A voltage source and series resistance (c) A voltage source and parallel resistance (d) A current source and series resistance	*1*	*K1*	*CO2*
6.	Infer primary difference between mesh and nodal analysis is (a) Mesh analysis uses voltage loops, while nodal analysis uses current loops (b) Mesh analysis is only for AC circuits (c) Nodal analysis focuses on currents at nodes, while mesh analysis deals with voltage around loops (d) Nodal analysis applies only to passive circuits	*1*	*K2*	*CO2*
7.	What is the form factor of a pure sinusoidal AC waveform? (a) 1.11 (b) 0.707 (c) 1.41 (d) 2.22	*1*	*K1*	*CO3*
8.	In an AC circuit, the ratio of the peak value to the RMS value is known as the: (a) Power Factor (b) Form Factor (c) Frequency Factor (d) Peak Factor	*1*	*K1*	*CO3*
9.	Which component is used to store electrical energy in an electric field? (a) Resistor (b) Inductor (c) Capacitor (d) Transformer	*1*	*K1*	*CO3*
10.	What happens to the electric field strength if the distance between two charged plates is doubled, while maintaining the same potential difference? (a) Electric field strength doubles (b) Electric field strength halves (c) Electric field strength becomes zero (d) Electric field strength remains unchanged	*1*	*K1*	*CO4*
11.	When the distance between the plates of a capacitor is doubled, what happens to the capacitance? (a) It doubles (b) It halves (c) It remains the same (d) It quadruples	*1*	*K1*	*CO4*
12.	What will happen to the discharge time of a capacitor if the resistance in the circuit is increased? (a) It decreases (b) It remains the same (C) It increases (d) It becomes zero	*1*	*K1*	*CO4*
13.	In the Hysteresis cycle, the value of H needed to make the intensity of magnetization zero is called: (a) Retentive force (b) Eddy current force (c) Coercive force (d) Lorentz Force	*1*	*K1*	*CO5*

14.	What is the unit of mutual inductance? (a) Tesla (b) Henry (c) Volt (d) Ampere	1	K1	CO5
15.	Which of the following is a unit of magnetic flux? (a) Tesla (b) Weber (c) Henry (d) Ampere	1	K1	CO5
16.	What is the purpose of the laminated core in a transformer? (a) To increase resistance (b) To reduce eddy current losses (c) To increase inductance (d) To decrease capacitance	1	K1	CO5
17.	What type of instrument is a watt-hour meter? (a) Indicating (b) Integrating (c) Recording (d) Oscillating	1	K1	CO6
18.	Which material is commonly used in piezoelectric sensors to generate an electric charge? (a) Silicon (b) Quartz (c) Copper (d) Iron	1	K2	CO6
19.	_____ instruments are those which measure the total quantity of electricity delivered in a particular time. (a) Absolute (b) Indicating (c) Recording (d) Integrating	1	K2	CO6
20.	Which device is used to measure current in a circuit? (a) Voltmeter (b) Ammeter (c) Wattmeter (d) Thermocouple	1	K2	CO6

PART - B (10 × 2 = 20 Marks)

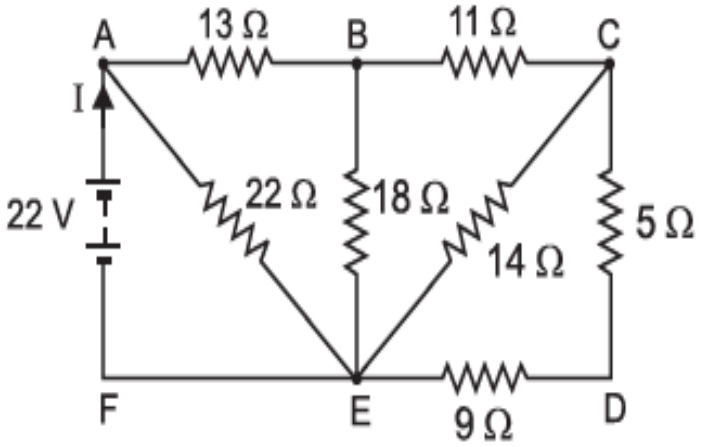
Answer ALL Questions

21.	Define Dependent Current source and draw its symbol.	2	K1	CO1
22.	Write the formula for voltage and current division rule with suitable circuit.	2	K2	CO1
23.	List the steps to find Thevenin's voltage.	2	K1	CO2
24.	Outline the condition for maximum power transfer in DC circuits.	2	K2	CO2
25.	Write the expression for determining reactive and apparent power in a three-phase circuit.	2	K1	CO3
26.	Define RMS value.	2	K1	CO3
27.	Define permittivity.	2	K1	CO4
28.	Give the expression for electric field strength due to a point charge and identify each term.	2	K2	CO4
29.	Compare magnetic and electric circuits.	2	K2	CO5
30.	Outline How does an integrating instrument differ from a recording instrument in its function.	2	K2	CO6

PART - C (6 × 10 = 60 Marks)

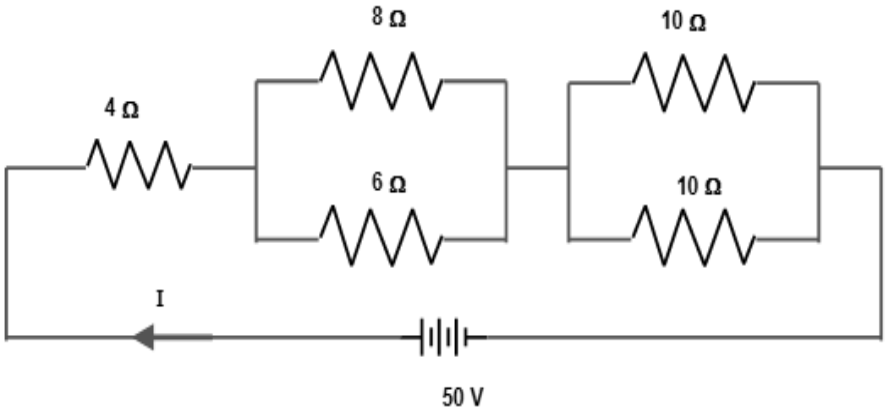
Answer ALL Questions

31.	a)	Solve the circuit shown in figure and find the value of current in the branch AF.	10	K3	CO1

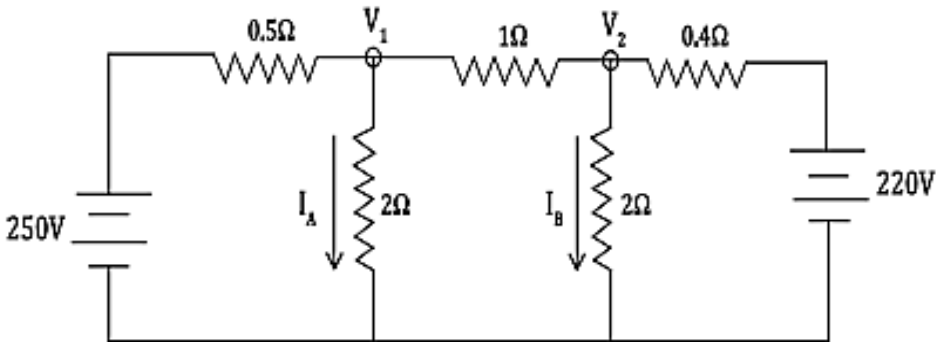


OR

b) Calculate the total current I and total power dissipated in the given electrical network. *10 K3 CO1*

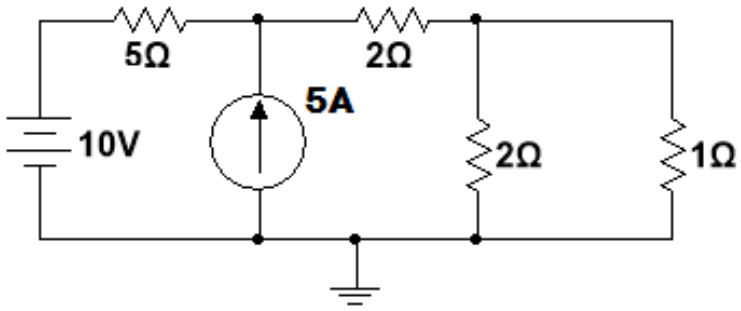


32. a) Apply nodal analysis method and identify the value of V_1, V_2 and V_3 as shown in Fig. *10 K3 CO2*



OR

b) Apply Nortons Theorem; find the power loss in 1Ω resistor as shown in figure. *10 K3 CO2*



33. a) Explain and derive the average value, RMS value, form factor and peak factor for (i) half wave rectified alternating current and (ii) full wave rectified alternating current. *10 K2 CO3*

OR

b) Explain the operation of RC series AC circuit with relevant phasor diagram and derive the formulas for phase angle, Impedance, Admittance and power. And also draw the power curve of RL Series AC circuit. *10 K2 CO3*

34. a) Explain the process of charging and discharging in capacitors. Derive the equations for voltage across the capacitor as a function of time during both charging and discharging in an RC circuit. *10 K2 CO4*

OR

b) Explain how permittivity affects the electric field in dielectrics. Derive the expression for the energy stored in a capacitor and explain the significance of each term in the formula. *10 K2 CO4*

35.	a)	Explain Faraday's Law of Electromagnetic Induction and derive the expression for the EMF induced in a coil when the magnetic flux changes with time.	*10*	*K2*	*CO5*
		OR			
	b)	Interpret in detail about the operation of a transformer and obtain the expression for transformation ratio with the help of its emf equation.	*10*	*K2*	*CO5*
36.	a)	Explain the construction and working principle of Permanent Magnet Moving Coil (PMMC) instruments.	*10*	*K2*	*CO6*
		OR			
	b)	Illustrate the working of a piezoelectric transducer using a functional block diagram.	*10*	*K2*	*CO6*