Reg. No.															

Question Paper Code	13310

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

First Semester

Computer Science and Business Systems

20ESEE105 - PRINCIPLES OF ELECTRICAL ENGINEERING

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	What is the unit of electric current? (a) Ohm (b) Volt (c) Ampere (d) Watt	1	K1	CO1
2.	Which law is used in nodal analysis of circuits? (a) Ohm's Law (b) Kirchhoff's Current Law (KCL) (c) Faraday's Law (d) Coulomb's Law	1	K1	CO1
3.	What is a practical voltage source characterized by? (a) Ideal voltage with no resistance (b) Constant current supply (c) Internal resistance (d) Dependence on power	1	K1	CO1
4.	What is the maximum power transfer theorem used to determine? (a) Voltage in a circuit (b) The load resistance for maximum power transfer (c) Current in a short circuit (d) Power factor improvement	1	K1	CO1
5.	Which transformation converts a delta circuit to a star circuit? (a) Norton Transformation (b) Star-Delta Transformation (c) Thevenin's Transformation (d) Superposition Theorem	1	K1	CO2
6.	Norton's theorem is associated with converting a complex network into what? (a) A single voltage source and series resistance (b) A single current source and parallel resistance (c) A combination of series and parallel components (d) None of the above	1	K1	CO2
7.	In an AC circuit, what is the ratio of peak to RMS voltage called? (a) Peak factor (b) Form factor (c) Power factor (d) Impedance	1	K1	CO2
8.	Which component is used to oppose changes in current in AC circuits? (a) Resistor (b) Capacitor (c) Inductor (d) Transformer	1	K1	CO2
9.	In three-phase systems, the type of connection used for a balanced load is: (a) Delta-Delta (b) Star-Star (c) Both Delta-Delta and Star-Star (d) Star-Delta only	1	K1	CO3
10.	What does the electrostatic field strength depend on? (a) Distance and mass (b) Charge and distance (c) Voltage and resistance (d) Current and time	1	K1	CO3
11.	The primary unit of capacitance is: (a) Farad (b) Coulomb (c) Volt (d) Ohm	1	K1	CO3
12.	Faraday's Law is related to which phenomenon? (a) Electrostatic force (b) Electromagnetic induction (c) Power dissipation (d) Capacitance	1	K1	CO3
13.	Which of the following is a piezoelectric sensor primarily used to measure? (a) Temperature (b) Pressure (c) Humidity (d) Voltage	1	K1	CO4
14.	A thermocouple generates voltage in response to changes in: (a) Light (b) Sound (c) Temperature (d) Humidity	1	K1	CO4
15.	Earthing is essential in electrical systems primarily for: (a) Enhancing efficiency (b) Safety and protection (c) Voltage regulation (d) Load balancing	1	K1	CO4

16. The unit of electric power in single-phase systems is: *1 K1 CO4*
(a) Volt (b) Watt (c) Ohm (d) Coulomb

17. The principle of operation of a transformer is based on which law? *1 K1 CO5*
(a) Ohm's Law (b) Faraday's Law of Electromagnetic Induction
(c) Coulomb's Law (d) Kirchhoff's Voltage Law

18. Mutual inductance is the property of two coils to: *1 K1 CO5*
(a) Resist current flow
(b) Produce magnetic flux
(c) Induce voltage due to a change in current in another coil
(d) Store electrical energy

19. Ampere's Law is primarily used to calculate: *1 K1 CO5*
(a) Magnetic field due to a current-carrying conductor (b) Electric field due to a charge
(c) Capacitance of a capacitor (d) Voltage drop across a resistor

20. The unit of magnetic flux is: *1 K1 CO5*
(a) Tesla (b) Weber (c) Henry (d) Farad

PART - B (10 × 2 = 20 Marks)

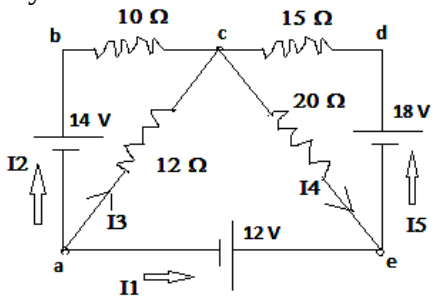
Answer ALL Questions

21. Compare active and passive elements. *2 K2 CO1*
22. Define terms Node & branch. *2 K1 CO1*
23. List the steps to solve the Thevenin's Theorem. *2 K1 CO2*
24. Define maximum power transfer theorem. *2 K1 CO2*
25. Name the concept of impedance. *2 K1 CO3*
26. Define the active and reactive powers. *2 K1 CO3*
27. Recall on capacitor composite. *2 K1 CO4*
28. Define Ampere's Law. *2 K1 CO4*
29. Compare between sensors and transducers. *2 K2 CO5*
30. Explain the concept of mutual inductance and its significance in electrical circuits. *2 K2 CO5*

PART - C (6 × 10 = 60 Marks)

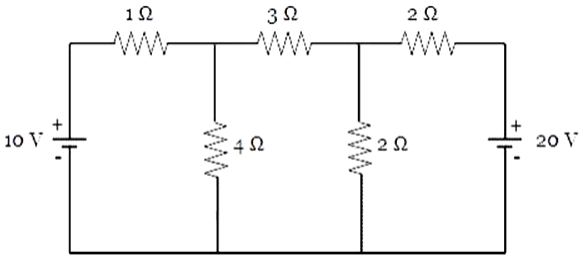
Answer ALL Questions

31. a) Infer the current supplied by the batteries in the circuit shown in Figure. *10 K2 CO1*



OR

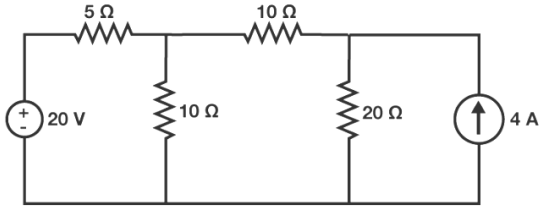
b) Infer the mesh currents in the circuit shown below. *10 K2 CO1*



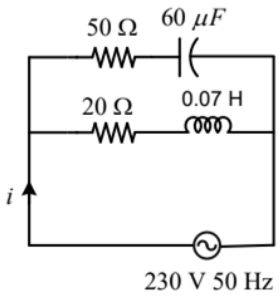
32. a) Develop the step by step procedure to the Norton's Theorem Formula. Also State the merits and demerits of it. *10 K3 CO2*

OR

b) Identify the current flowing through 20 Ω using the superposition theorem. *10 K3 CO2*



33. a) Two parallel circuits comprising of (i) a coil of resistance of 20Ω and inductance of 0.07 H and (ii) a resistance of 50 Ω in series with a condenser of capacitance 60 µF are connected across 230 V, 50 Hz. Solve for the main current and power factor of the arrangement. *10 K3 CO3*



OR

b) Three identical coils having resistance of 10 Ω and an inductance of 0.05 H each are connected in star across a 3 φ, 400 V 50 Hz balanced supply. Identify the line current and the power consumed. What will be the reading of two wattmeters connected to measure the total power? *10 K3 CO3*

34. a) Outline an expression for energy of a charged capacitor. Show that the dielectric in between the plates of a parallel plate capacitor experiences a force and derive an equation for it. *10 K2 CO4*

OR

b) Show the role of dielectric materials in capacitors and how they impact the overall capacitance. Provide examples of applications where dielectric properties are critical. *10 K2 CO4*

35. a) Outline the various types of drawing used for electrical wiring. Explain in detail. *10 K2 CO5*

OR

b) Explain the Construction and working principle of piezoelectric transducers and thermocouples. *10 K2 CO5*

36. a) i) Compare between self-inductance and mutual inductance in an electromagnetic circuit. *5 K2 CO4*

ii) Explain the Working of PMMC. *5 K2 CO5*

OR

b) i) Explain the principles behind the operation of a single-phase transformer. *5 K2 CO4*

ii) Explain Earthing and its types. *5 K2 CO5*