Name: **Enrolment No:**	

UPES

End Semester Examination, May 2024

Course: Basic Electrical & Electronics Engg. **Semester : 2nd**

Program: B. Tech (Food Tech, Biomedical, Bio Tech) **Time : 03 hrs.**

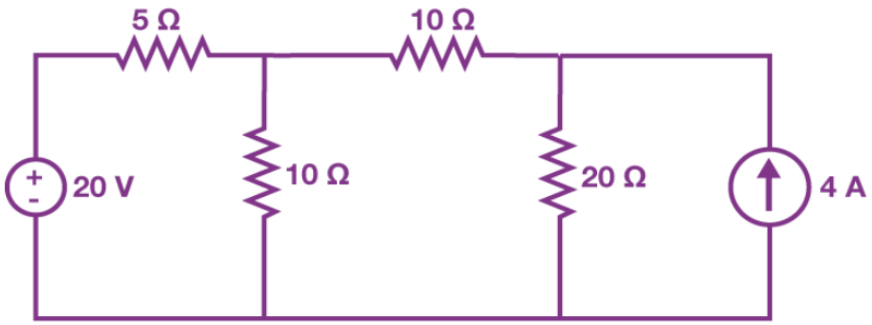
Course Code: ECEG 1005 **Max. Marks: 100**

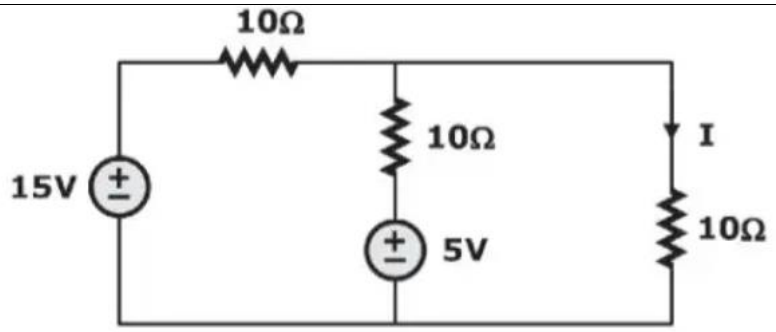
Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	A. Which of the following materials is commonly used as the core material in transformers? a) Copper b) Aluminum c) Iron d) Silver B. The working principle of a transformer is based on which physical phenomenon? a) Electromagnetic induction b) Nuclear fusion c) Chemical reaction d) Gravitational force C. In an ideal transformer, which of the following is true? a) Primary and secondary windings have resistance b) No magnetic flux leakage c) Perfect insulation between windings d) Losses due to hysteresis and eddy currents D. The losses occurring in a transformer due to the alternating magnetization and demagnetization of the core are called _____ losses.	**4**	**CO1**
Q 2	A. The torque-speed characteristic of a DC motor is typically: a) Linear b) Hyperbolic c) Parabolic d) Exponential B. The peak value of a sinusoidal waveform is _____ times its RMS value. C. In phasor representation, the amplitude of a sinusoidal waveform is represented by the _____ of the phasor. D. The impedance in an RL circuit consists of: a) Only resistance (R) b) Only inductance (L) c) Both resistance (R) and inductance (L) d) Neither resistance (R) nor inductance (L)	**4**	**CO1**
Q 3	A. The relationship between line current (I_line) and phase current (I_phase) in a delta (Δ) connection is: a) I_line = I_phase b) I_line = √3 * I_phase c) I_line = 1/√3 * I_phase d) I_line = 3 * I_phase B. The power factor correction is used to: a) Reduce the real power consumption b) Improve the efficiency of the system c) Reduce the reactive power component d) All of the above	**4**	**CO1**

	C. The unit of reactive power is: a) Volt-ampere (VA) b) Watt (W) c) Volt-ampere reactive (VAR) d) Ampere (A) D. In an RC circuit, the phase angle between voltage and current leads when the circuit is capacitive and lags when it is inductive. (True/False)		
Q 4	A. Which of the following is NOT an application of a transistor? a) Signal amplification b) Voltage regulation c) Switching circuits d) Digital logic circuits. B. In fixed bias configuration, the base current is determined by: a) A voltage divider network b) The emitter resistor c) A feedback resistor d) The collector resistor C. Emitter biasing involves connecting the emitter terminal to: a) Ground b) Positive supply voltage c) Negative supply voltage d) A variable resistor. D. In voltage divider bias configuration, the base bias voltage is obtained from the voltage across: a) The base-emitter junction b) The collector resistor c) The emitter resistor d) The voltage divider network.	**4**	**CO1**
Q 5	A. Boolean algebra is a mathematical system dealing with: a) Arithmetic operations b) Logical operations c) Geometric operations d) Trigonometric operations. B. The basic laws of Boolean algebra include: a) Commutative, associative, distributive b) Addition, subtraction, multiplication c) Differentiation, integration, limit d) None of the above C. De Morgan's theorem states that the complement of a product is equal to the: a) Product of the complements b) Sum of the complements c) Inversion of the product d) Inversion of the sum D. Which of the following logic gates is known as the Universal gate? a) NAND b) NOR c)Both (a) & (b) d) X-NOR	**4**	**CO1**
SECTION B (4Qx10M= 40 Marks)			
Q 6	A. What are the fundamental distinctions between alternating current (AC) and direct current (DC) in terms of their electrical properties, applications, and historical significance? B. Why can't AC be stored in batteries instead of DC?	**5+5**	**CO2**
Q 7	A. What is the periodic time, (T) of a 50Hz sinusoidal waveform. 2. what will be the oscillating frequency of a waveform that has a periodic time of 10mS.	**5+5**	**CO3**

	B. A sinusoidal alternating current of 6 amps is flowing through a resistance of 40Ω. Calculate the average voltage and the peak voltage of the supply.		
Q 8	Discuss the advantages and disadvantages of using DC motors compared to AC motors in specific applications. Consider factors such as efficiency, speed control, maintenance requirements, and cost-effectiveness. Or, Discuss the classification of DC motors based on their construction, working principles, and characteristics. Explain the differences between series, shunt, and compound DC motors, along with their respective advantages and applications.	**10**	**CO4**
Q 9	A. A single-phase 3300/240 V, 50 Hz transformer has a maximum magnetic flux of 0.0315 Wb in the core. Calculate the number of turns in primary and secondary windings. B. Differentiate between step up and step-down transformer. Or, A 3000/200V, 50 Hz, single-phase transformer is built on a core having an effective cross-sectional area of 150 cm^2 and has 80 turns in low-voltage winding. Calculate (a) The value of maximum flux density in the core. (b) The number of turns in the high voltage winding.	**10**	**CO4**
SECTION-C (2Qx20M=40 Marks)			
Q 10	A. State superposition theorem. Find the current flowing through 20 Ω using the superposition theorem.  B. State Norton's theorem? Find the current I of the following electric circuit using Norton's theorem.	**10+10**	**CO2**

			
Q 11	A. What is the equivalent expression for the Boolean expression x'y'z +yz+ xz? B. Explain De Morgan's Theorems and how they are used to simplify Boolean expressions. C. How do logic gates such as AND, OR, NAND, and NOR function in digital circuits? D. Calculate the decimal equivalent of the octal number 36.	**4*5**	**CO5**