Name:

Enrolment No:

UPES

End Semester Examination, May 2025

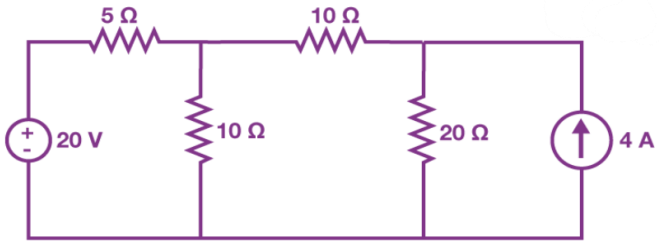
Course: Basic Electrical & Electronics Engg. **Semester : 2nd**

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

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

S. No.	Section A (20Qx1.5M=30Marks)	Marks	COs
Q 1	A. The losses occurring in a transformer due to the alternating magnetization and demagnetization of the core are called _____ losses. B. The torque-speed characteristic of a DC motor is typically: a) Linear b) Hyperbolic c) Parabolic d) Exponential.	1.5*2	CO2
Q 2	**Match the following:** **Column A** / **Column B** A Resonance in RLC Circuit — 1 Voltage leads current B Capacitive Circuit — 2 Current leads voltage C Inductive Circuit — 3 Frequency at which $X_L = X_C$ D Impedance (Z) — 4 Vector sum of resistance and reactance E Reactance (X) — 5 Opposition due to capacitance or inductance F Power in Purely Reactive Circuit — 6 Zero (no real power consumed)	1.5*6	CO1
Q 3	**Match the following:**		

<table>
<tr><td></td><td>
<table>
<tr><th>Column A (Logic Gates)</th><th>Column B (Truth Table)</th></tr>
<tr><td>A. AND Gate</td><td>1. Output is true only when both inputs are false.</td></tr>
<tr><td>B. OR Gate</td><td>2. Output is true if both inputs are true.</td></tr>
<tr><td>C. NOT Gate</td><td>3. Output is true only when one input is true.</td></tr>
<tr><td>D. NAND Gate</td><td>4. Output is true if either input is true.</td></tr>
<tr><td>E. NOR Gate</td><td>5. Output is false only when both inputs are true.</td></tr>
<tr><td>F. XOR Gate</td><td>6. Output is true only when both inputs are different.</td></tr>
</table>
</td><td>1.5*6</td><td>CO2</td></tr>
<tr><td>Q 4</td><td>Match the following:
<table>
<tr><th>Column A</th><th>Column B</th></tr>
<tr><td>A. A + A'</td><td>1. XOR Gate</td></tr>
<tr><td>B. A · A</td><td>2. NOR Gate</td></tr>
<tr><td>C. A + 0</td><td>3. OR Operation</td></tr>
<tr><td>D. A ⊕ B</td><td>4. Always equals 1</td></tr>
<tr><td>E. NOT (A + B)</td><td>5. AND Operation</td></tr>
<tr><td>F. A · 1</td><td>6. Always equals A</td></tr>
</table>
</td><td>1.5*6</td><td>CO2</td></tr>
<tr><td colspan="4">Section B
(4Qx5M=20 Marks)</td></tr>
<tr><td>Q 5</td><td>Explain the working principle of a Zener diode and describe its application in voltage regulation. Include a neat circuit diagram and voltage-current characteristics.</td><td>5</td><td>CO2</td></tr>
<tr><td>Q 6</td><td>What is the periodic time, (T) of a 50Hz sinusoidal waveform.
What will be the oscillating frequency of a waveform that has a periodic time of 10 mS.</td><td>2+3</td><td>CO1</td></tr>
<tr><td>Q 7</td><td>How do logic gates such as AND, OR, NAND, and NOR function in digital circuits?
Calculate the decimal equivalent of the octal number 36.</td><td>4+1</td><td>CO1</td></tr>
<tr><td>Q 8</td><td>What are the fundamental distinctions between alternating current (AC) and direct current (DC) in terms of their electrical properties, applications, and historical significance?</td><td>5</td><td>CO2</td></tr>
</table>

Section C **(2Qx15M=30 Marks)**			
Q 9	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.	**15**	**CO3**
Q 10	A. Define the following term: RMS Value of an AC Waveform, Average Value of an AC Waveform, Form Factor, Crest Factor, Phase Difference Equation. **B.** Explain Torque-Speed Characteristics of DC Motor.	**10+5**	**CO2**
Section D **(2Qx10M=20 Marks)**			
Q 11	State superposition theorem. Find the current flowing through 20 Ω using the superposition theorem. 	**2+8**	**CO4**
Q 12	A. Using Boolean identities, reduce the given Boolean expression: F(X, Y, Z) = X′Y + YZ′ + YZ + XY′Z′ B. Convert the decimal number 25 to binary. C. Convert the binary number 1101 to hexadecimal. D. Convert **2F** (hex) to octal. E. Convert **725** (octal) to decimal.	**2*5**	**CO4**