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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| **Date:** 08 – 01- 2025 **Time:** 01:00 pm – 04:00 pm |

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| **School:** School of Information Science | **Program:** Bachelor of Computer Application | |
| **Course Code:** ECE2009 | **Course Name:** Digital Computer Fundamentals | |
| **Semester**: 1 semester | **Max Marks**:100 | **Weightage**: 50% |

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| **CO – Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **18** | **46** | **36** |  |  |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1** | Draw NOT gate using NAND gate. | **2 Marks** | **L1** | **CO2** |
| **2** | Write the truth table for two variable DE Morgan law. | **2 Marks** | **L1** | **CO1** |
| **3** | List the condition of the output in SR flip flop, when S=0 R=1, and S=0 R=0. | **2 Marks** | **L1** | **CO3** |
| **4** | Define a combinational circuit? | **2 Marks** | **L1** | **CO1** |
| **5** | Describe flip flop with an example? | **2 Marks** | **L1** | **CO3** |
| **6** | Draw block diagram of 4x1 multiplexes. | **2 Marks** | **L1** | **CO2** |
| **7** | Describe sequential circuit with block diagram. | **2 Marks** | **L1** | **CO2** |
| **8** | Hexadecimal numbers are represented with respect to base 16. Convert (BCA)16= ( )2 | **2 Marks** | **L1** | **CO1** |
| **9** | List difference between positive edge triggered and negative edge triggered clock flip flop. | **2 Marks** | **L1** | **CO3** |
| **10** | Draw OR gate using NAND gate. | **2 Marks** | **L1** | **CO1** |

**Part B**

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| **Answer the Questions Total 80 Marks** | | | | | |
| **11.** | **a.** | Logic gates are the fundamental components of all digital circuits and systems. Explain in brief Basic gates and universal gates, with truth table, logic equations and logic symbol. | **10**  **Marks** | **L 2** | **CO1** |
| **Or** | | | | | |
| **12.** | **a.** | K- Map is a simplification technique used for Boolean equation. Using the K map express simplified equation.   1. F(WXYZ)=∑(0,1,11,12,13,14,15) **(5 marks )** 2. F(ABCD) =∑(0,1,3,9,11, 12,13) **(5 marks )** | **10**  **Marks** | **L 2** | **CO1** |
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| **13.** | **a.** | A magnitude digital Comparator is a combinational circuit that compares two digital or binary numbers. Design a one-bit magnitude comparator with truth table, K map, logic equation and implement using basic gates. | **10**  **Marks** | **L 3** | **CO2** |
| **Or** | | | | | |
| **14.** | **a.** | The full adder is used to add three 1-bit binary numbers A, B, and carry C. Construct a full adder circuit with truth table, K map logic equations and implement using basic gate only. | **10**  **Marks** | **L 3** | **CO2** |

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| **15.** | **a.** | The 8-to-3-line Encoder is also known as Octal to Binary Encoder. Construct an encoder with 8 inputs and 3 outputs with suitable truth table, logic equations and implement using basic gates. | **10**  **Marks** | **L3** | **CO2** |
| **Or** | | | | | |
| **16.** | **a.** | In the 2-to-4-line decoder, there is a total of two inputs, i.e., A0, and A1 and four outputs, i.e., Y0, Y1, Y2, and Y3. Design 2:4 decoder with suitable block diagram, truth table, logic equations implement using basic gates. | **10**  **Marks** | **L 2** | **CO2** |

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| **17.** | **a.** | A flip flop is a memory device in digital circuit. Write block diagram of D flip flop, implement using NAND gate, also include truth table, excitation table, characteristic table and equation using K Map. | **15**  **Marks** | **L2** | **CO3** |
| **Or** | | | | | |
| **18.** | **a.** | Construct a two-bit up counter using JK flip flops, also include the truth table indicating present state and next state values of the counter and respective flip flops values, state diagram, excitation table, K map and final Implementation using required number of JK flip flops. | **15**  **Marks** | **L3** | **CO3** |

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| **19.** | **a.** | A flip-flop is a sequential digital electronic circuit having two stable states that can be used to store one bit of binary data. Illustrate T flip flop using NAND gate, also write truth table, excitation table, characteristic table and equation using K Map. | **15**  **Marks** | **L3** | **CO3** |
| **Or** | | | | | |
| **20.** | **a.** | Construct a 3-bit Down counter using JK flip flops, also include the truth table indicating present state and next state values of the counter and respective flip flops values, state diagram, excitation table, K map and final implementation using required number of JK flip flops. | **15**  **Marks** | **L 3** | **CO3** |

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| **21.** | **a.**  **b.** | The combinational circuit that changes the binary information into 2N output lines is known as Decoders. Construct a full adder using suitable decoder also write the truth table for the full adder circuit. **(10 marks).**  A combinational logic circuit which converts N input lines into a maximum of 2N output lines is called a decoder. Implement the given Boolean function using 3:8 decoder. Y=AB’+AC. **(10 marks).** | **20**  **Marks** | **L 3** | **CO2** |
| **Or** | | | | | |
| **22.** | **a.** | A multiplexer is a [combinational circuit](https://www.geeksforgeeks.org/what-is-combinational-circuit/)that has many data inputs and a single output. Implement the given Boolean equation using 8x1, 4x1, 2x1 Multiplexers, Y=∑m (0,1,5,6,9,10,11,14,15). Also write the truth table and final implementation using multiplexers. | **20**  **Marks** | **L 3** | **CO2** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***