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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| **Date:** 03- 01 - 2025 **Time:** 1:00 pm – 4:00 pm |

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| **School:** SOE/SOCSE | **Program:** B.Tech **-** Physics Cycle | |
| **Course Code :** ECE2007 | **Course Name :** Digital Design | |
| **Semester**: I | **Max Marks**: 100 | **Weightage**:50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **26** | **36** | **38** |  |  |

**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. 10 x 2 Marks=20 Marks** | | | | |
| **1** | Mention some advantages of Digital systems. | **2 Marks** | **L1** | **CO1** |
| **2** | Identify the logic gate when output is high, when one of the input is high.When all of the inputs are high or low, the output is low. Construct the truth table with logic symbol and write the Boolean expression using AND-OR -NOT operators. | **2 Marks** | **L1** | **CO1** |
| **3** | Show that AB+BC+B'C = AB+C. | **2 Marks** | **L1** | **CO1** |
| **4** | Identify the device with the block diagram that selects between several analog or digital input signals and forwards the selected input to a single output line.The selection is directed by a separate set of digital inputs known as select lines. | **2 Marks** | **L1** | **CO2** |
| **5** | Define an encoder and write the truth table for 4\*2 encoder. | **2 Marks** | **L1** | **CO2** |
| **6** | Define even and odd parity generator and checker. | **2 Marks** | **L1** | **CO2** |
| **7** | Define combinational and sequential circuits. Mention some examples for the same. | **2 Marks** | **L1** | **CO3** |
| **8** | Bring out some differences between a Latch and Flip-flop. | **2 Marks** | **L1** | **CO3** |
| **9** | Mention the different types of triggering methods. Also define the same | **2 Marks** | **L1** | **CO3** |
| **10** | Define synchronous and Asynchronous counter. What is the purpose of using a clock in the sequential circuits? | **2 Marks** | **L1** | **CO3** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** | **a.** | Logic gates are the basic building block of a digital system which can take two or more inputs and produce one output. Explain all different types of logic gates with truth table , logic symbol and expressions. Also implement special gates using NAND gates. | **20 Marks** | **L2** | **CO1** |
| **Or** | | | | | |
| **12.** | **a.** | A Boolean expression always produces a Boolean value.For the given boolean expression, construct the truth table and implement using basic gates F=A'C+A'B+AB'C+BC.Also express the given function as a sum of minterms. Find the minimal SOP expression using k-map. | **20 Marks** | **L2** | **CO1** |
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| **13.** | **a.** | The multiplexers are commonly used in communication systems,telephone networks,computer memories. Explain with the truth table, implementation of all the logic gates using 2\*1 multiplexer. | **20 Marks** | **L2** | **CO2** |
| **Or** | | | | | |
| **14.** | **a.** | Encoders are used in the design of ALUs to perform arithmetic and logical operations. Design an 8 to 3 octal to binary encoder using basic gates. Also construct the truth table for 4 to 2 encoder. | **20 Marks** | **L2** | **CO2** |

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| **15.** | **a.**  **b.** | Multiplexers function as switches to control the flow of data between different sources. Implement the given boolean function F(A,B,C,D)=Σ(1,3,4,11,12,13,14,15) using 8\*1 and 4\*1 multiplexers.  Flip-flops form the building blocks of registers, counters,and memory systems.Using NAND gates draw the logic diagram for the JK Flip-flop and explain its operation with necessary truth table,characteristic table and excitation table with boolean expressions . | **10+10=20 Marks** | **L2** | **CO2/CO3** |
| **Or** | | | | | |
| **16.** | **a.**  **b.** | The parity bit is used to ensure simple error detection during data transmission or storage. Along with the implementation discuss about 3 variable even parity generator.  Flip-flops are essential components for **storing, processing, and controlling data** in all digital systems.Using NAND gates draw the logic diagram for the D Flip-flop and explain its operation with necessary truth table, characteristic table and excitation table with boolean expressions. | **10+10=20 Marks** | **L2** | **CO2/CO3** |

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| **17.** | **a.** | A **counter** is a sequential circuit that **counts pulses** or events in digital systems.Design a **3-bit counter** using **JK flip-flops**. The counter should start from binary 000 and count **upwards** sequentially.Use a **synchronous clock and** Derive the **state table, excitation table, Boolean expressions, and circuit diagram** for the counter. | **20 Marks** | **L3** | **CO3** |
| **Or** | | | | | |
| **18.** | **a.** | Registers are used to transfer data between memory, input/output devices, and the processor. Define and classify the types of Registers. With a necessary block diagram explain the different types of registers. | **20 Marks** | **L3** | **CO3** |

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