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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**Make up Examinations - December 2025**

Semester: MK

Course Code: ECE220

Course Name: DIGITAL ELECTRONICS

Program : B. Tech

Date: 31-12-2025

Time: 09-30 AM TO 12:30 PM

Max Marks: 100

Weightage: 50%

**Instructions:**

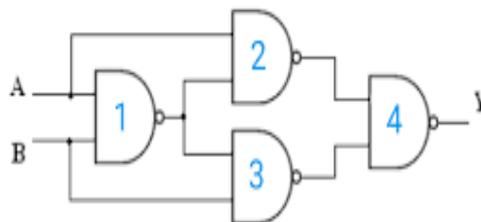
- (i) Read the all questions carefully and answer accordingly.
- (ii) Scientific and non-programmable calculators are permitted.

**Part A [Memory Recall Questions]**

Answer all the Questions. Each question carries 2 marks.

(10Qx2M=20M)

1. Identify which UNIVERSAL gate the below given circuit represents. Write the output equation at point Y.



[2M] (CO1, Knowledge)

2. In Boolean Algebra,  $A + BC + A =$  \_\_\_\_\_ .

[2M] (CO1, Knowledge)

3. The decimal number 326 is equivalent to \_\_\_\_\_ in binary.

[2M] (CO1, Knowledge)

4. If a 2-input OR gate has four input possibilities, out of those possibilities, \_\_\_\_\_ will result in a LOW output.

[2M] (CO1, Knowledge)

5. According to the De Morgan's theorem,  $\overline{A + B + C} =$  \_\_\_\_\_ and  $\overline{A.B.C} =$  \_\_\_\_\_.

[2M] (CO1, Knowledge)

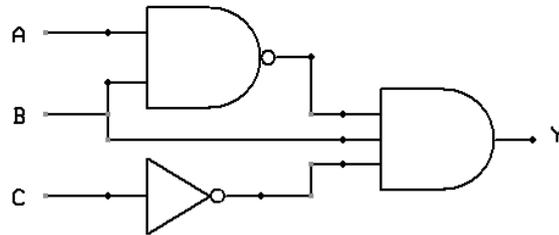
6. Write the characteristic equation and truth table for JK flip flop and SR flip flop.

[2M] (CO3, Knowledge)

7. Write the truth table of 1:4 DEMUX. [2M] (CO2, Knowledge)

8. Solve the following SOP expression  
 $A.B.C + A.B'.C'$  [2M] (CO1, Knowledge)

9. The Boolean expression for the logic circuit shown below is \_\_\_\_\_. [2M] (CO1, Knowledge)



10. Simply the given Boolean expression,  
 $F = A + AB + ABC$  [2M] (CO1, Knowledge)

### Part B [Thought Provoking Questions]

**Answer the Questions. (4Qx20M=80M)**

11. Design a two-bit magnitude comparator that compares the magnitude of two inputs A and B. Input A is made up of two bits A1 and A0 while input B contains B1 and B0. Draw the circuit using basic gates.

[20M] (CO2, Comprehension)

OR

12. Design a 4-bit Priority Encoder with "Valid bit indicator" which will set if at least one input is high. The circuit outputs a binary code corresponding to the MSB of the input being high.

[20M] (CO2, Comprehension)

13. Design a combinational circuit that adds three bits A, B and Cin to produce Sum and Carryout as outputs. Implement the equations for Sum and Carryout using basic gates.

[20M] (CO2, Comprehension)

OR

14. Design a full subtractor using two half subtractors and an OR gate. [20M] (CO2, Comprehension)

15. Explain T flip flop with the help of truth table, characteristic table and characteristic equation, excitation table, and circuit.

[20M] (CO3, Comprehension)

OR

16. Design a 3-bit synchronous UP counter using JK flip flop that counts a sequence 000 to 111.

[20M] (CO3, Application)

17. Simplify using Karnaugh Map and draw the logic diagrams of the simplified expression:

a)  $F = \sum m(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$

b)  $F(A, B, C, D) = \prod M(4, 5, 6, 7, 15) + d(13, 8)$

[20M] (CO1, Application)

**OR**

18. Implement the Basic gates AND, OR and NOT, Exclusive gates XOR and XNOR using Universal gates NAND and NOR.

[20M] (CO1, Comprehension)