BCA
SEMESTER-1ST
DIGITAL LOGIC & DESIGN
BCA-104

Duration: 3 Hrs.

Marks: 70

Part : A (Objective) = 20
Part : B (Descriptive) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins.

Marks: 50

[Answer question no. One (1) & any four (4) from the rest]

1. (a) Obtain 1's and 2's complements of the following: 4+6=10
     i. 1010101   ii. 0111000
    (b) Construct the truth table and logic gate for AND, OR and NOT.

2. Describe full subtractor with truth table and logic diagram. Construct full adder   7+3=10
    using two half adders and one OR gate.

3. Explain Master-Slave JK flip-flop. Discuss positive edge triggered SR and D   4+6=10
    flip-flops with truth tables and diagrams.

4. (a) For a 3 bit shift register explain the operations for the following categories   6+4=10
    with the help of block diagram.
    i.Serial in – serial out.   **ii.**Serial in – parallel out.   **iii.**Parallel in – parallel out.
    (b) Design a MOD-6 negative edge triggered up counter.

5. Simplify the following using K-map: 5+5=10
     i.$f = \sum (0,2,3,5,6,7,9,11,13,15)$ ii.$f = \sum (2,3,5,6,7,9,11,13,14)$

6. For the given Boolean function, $f = a b' (c+bd) + a' b'$ 3+4+3=10
    i.Simplify the function using Boolean algebra.   ii.Draw the logic diagram.
    iii.Obtain the truth table of the original expression.

7. (a) Convert the following to binary: 6+4=10
     i.$127_{(10)}$ ii.$56_{(8)}$ iii.$1BC_{(16)}$
    (b) Perform 2's complement method to find the binary substraction:
     i.$10010 - 11001$ ii.$10011 - 10101$

8. (a) Why NAND and NOR gates are known as universal gates?   5+5=10
    (b) Convert the following expression into SOP: $f = a+bc$

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[PART-A : Objective]

I.Choose the correct answer from the following :   **1X20=20**

1. Which number system has a base of 16?
   a. decimal
   b. octal
   c. hexadecimal
   d. None of the above.

2. How many bits are required to store 1 BCD digit?
   a. 1
   b. 2
   c. 3
   d. 4

3. Which of this sets of logic gates are designated as universal gates?
   a. NOR, NAND
   b. XOR, NOR, NAND
   c. OR, NOT, AND
   d. NOR, NAND, XNOR

4. In the toggle mode, a JK flip-flop has:
   a. J=0, K=0
   b. J=1, K=1
   c. J=0, K=1
   d. J=1, K=0

5. A binary number system has how many digits?
   a. 0
   b. 1
   c. 2
   d. 10

6. In Boolean algebra, A.A is equal to
   a. A
   b. A^2
   c. 2A
   d. 1

7. $X+X.Y = ?$
   a. 1
   b. 0
   c. X
   d. Y

8. Complements of NOR and OR gate are _____ and _____ respectively.
   a. AND, NAND
   b. NAND, AND
   c. OR, NOR
   d. NOR, OR

9. 1's complement of 11001010 is:
   a. 11001011
   b. 11001001
   c. 00110101
   d. None of the above.

10. What are the requirements of full subtractor circuit?
    a. 3 inputs and 2 outputs
    b. 3 inputs and 1 outputs
    c. 2 inputs and 2 outputs
    d. 2 inputs and 3 outputs

11. Master-Slave flip-flop consists of _____ flip-flop(s)
    a. 1
    b. 2
    c. 3
    d. 4

12. A flip-flop is a _____ circuit.
    a. Combinational
    b. Sequential
    c. Both (a) and (b)
    d. None of the above.

13. A n variable K-map can have:
    a. n^2 cells
    b. 2^n cells
    c. n^n cells
    d. None of the above.

14. Each term in the standard SOP form is called a:
    a. minterm
    b. maxterm
    c. don't care
    d. None of the above.

15. One that is not a type of flip-flop is:
    a. JK
    b. D
    c. SR
    d. ST

16. One that is not a gate:
    a. NOT
    b. AND
    c. OR
    d. XNOT

17. If a hexadecimal number needs to convert to binary. For each hexadecimal digits, there will be how many bits?
    a. 1
    b. 2
    c. 4
    d. 8

18. The output of an OR gate is 0 when:
    a. All inputs are zero.
    b. Any input is zero.
    c. Any input is one.
    d. All inputs are one.

19. A multiplexer has _____
    a. 1 input and several outputs.
    b. 1 input and 1 output.
    c. Several inputs and several outputs.
    d. Several inputs and 1 output.

20. $(a+b+c)' =$
    a. a'b'c'
    b. a'+b'+c'
    c. abc
    d. None of the above.

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Course : ....

Semester : .... Roll No : ....

Enrollment No : .... Course code : ....

Course Title : ....

Session : .... **2017-18** .... Date : ....

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Instructions / Guidelines

➢ The paper contains twenty (20) / ten (10) questions.

➢ Students shall tick (✓) the correct answer.

➢ No marks shall be given for overwrite / erasing.

➢ Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Full Marks	Marks Obtained
20	

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Scrutinizer's Signature   *Examiner's Signature*   *Invigilator's Signature*