Write the following information in the first page of Answer Script before starting answer

ODD SEMESTER EXAMINATION: 2020-21

Exam ID Number_____

Course_____ Semester_____

Paper Code_____Paper Title_____

Type of Exam: _____ (Regular/Back/Improvement)

Important Instruction for students:

1. Student should write objective and descriptive answer on plain white paper.
2. Give page number in each page starting from 1st page.
3. After completion of examination, Scan all pages, convert into a single PDF, rename the file with Class Roll No. (2019MBA15) and upload to the Google classroom as attachment.
4. Exam timing from 10am – 1pm (for morning shift).
5. Question Paper will be uploaded before 10 mins from the schedule time.
6. Additional 20 mins time will be given for scanning and uploading the single PDF file.
7. Student will be marked as ABSENT if failed to upload the PDF answer script due to any reason.

BACHELOR of COMPUTER APPLICATION
FIRST SEMESTER
DIGITAL LOGIC & DESIGN
BCA - 103

Duration : 3 hrs. **Full Marks : 70**

〔 PART-A: Objective 〕

Time : 20 min. **Marks : 20**

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

1. What is the addition of the binary numbers 11011011010 and 010100101?
- **a.** 0111001000
- **b.** 1100110110
- **c.** 11101111111
- **d.** None of the above

2. The decimal equivalent of the octal number $(645)_8$ is _____
- **a.** $(450)_{10}$
- **b.** $(451)_{10}$
- **c.** $(421)_{10}$
- **d.** $(501)_{10}$

3. On subtracting $(01010)_2$ from $(11110)_2$ using 1's complement, we get _____
- **a.** 01001
- **b.** 11010
- **c.** 10101
- **d.** 10100

4. The largest two digit hexadecimal number is _____
- **a.** $(FE)_{16}$
- **b.** $(FD)_{16}$
- **c.** $(FF)_{16}$
- **d.** $(EF)_{16}$

5. The minterm expansion of f(P, Q, R) = PQ + QR' + PR' is
- **a.** m2+m4+m6+m7
- **b.** m0+m1+m3+m5
- **c.** m2+m4+m6+m8
- **d.** None of the above

6. The simplified SOP (Sum Of Product) form of the boolean expression (P + Q' + R') .(P + Q' + R) . (P + Q + R') is
- **a.** PQ'+R
- **b.** P+QR
- **c.** P+Q'R'
- **d.** None of the avobe

7. (A + B)(A' * B') = ?
- **a.** 1
- **b.** 0
- **c.** AB
- **d.** AB'

8. The expression Y=AB+BC+AC shows the _____ operation.
- **a.** EX-OR
- **b.** SOP
- **c.** POS
- **d.** NOR

9. A K-map is a systematic way of reducing which type of expression ?
- **a.** Product of sums
- **b.** Exclusive NOR
- **c.** Sum of products
- **d.** None of the above

10. When A′,B′ are the inputs to a NAND gate, according to De- Morgan's theorem, the output expression could be

a. X= A+B
b. X=(AB)′
c. X=(A)(B)
d. None of the above

11. How many AND gates are required to realize Y = CD + EF + G?

a. 4
b. 5
c. 3
d. 2

12. The number of min-terms after minimizing the following Boolean expression is _____.

[D′ + AB′ + A′C + AC′D + A′C′D]′

a. 1
b. 2
c. 3
d. 4

13. A decoder converts N inputs to ____ outputs

a. N
b. N^2
c. 2^N
d. N^N

14. How many truth table entries are necessary for a four-input circuit?

a. 4
b. 8
c. 12
d. 16

15. A full adder can be made out of _____

a. Two half adders
b. Two half adders and OR gate
c. Two half adders and NOT gate
d. Three half adders

16. Which device has one input and many outputs ?

a. De multiplexer
b. Multiplexer
c. Counter
d. Flip-flop

17. In a sequential circuit, the output at any time depends only on the input values at that time.

a. Past output values
b. Intermediate values
c. Both past output and present input
d. Present input values

18. A ripple counter is a (n):

a. Asynchronous Counter
b. Synchronous Counter
c. Parallel Counter
d. None of the above

19. The D flip-flop has ___ inputs

a. 1
b. 3
c. 2
d. 4

20. The function *AB′C* + *A′BC* + *ABC′* + *A′B′C* + *AB′C′* is equivalent to

a. A′B+AC′+AC
b. A′B′+A′C′+AC
c. AB′+AC′+A′C
d. None of the above

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PART-B : Descriptive

Time: 2 hrs. 40min. **Marks:50**

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

1. Write truth table and logic diagram for five very important gates in digital system. **10**

2. Minimize the following with the help of K-map and draw the logic circuit for the minimized expression. **5+5=10**

a. $F=\Sigma(2,3,4,5,6,7,9,12,13,14,15)$

b. $F= ac' + a'b'c' + a'b + ab$

3. How many types of shift registers are available? Explain each of them with diagram. **10**

4. **a.** How we create a Master- Slave flip flop using two JK flip flop? **4+6=10**

b. Explain mod-14 negative edge asynchronous up counter with diagram.

5. **a.** Write the truth table and draw logic circuit diagram for full adder which consist of two half adders and one OR gate. **5+5=10**

b. Explain octal to binary encoder.

6. **a.** Perform the following subtractions using 1's and 2's complement methods: **4+4+2= 10**

i. $1101_{(2)} - 1010_{(2)}$

ii. $10101_{(2)} - 10111_{(2)}$

b. Convert $4AB_{16}$ to binary.

7. Simplify the following expression **4+6=10**

a. $X=[AB'(C+BD)+A'B']C$

b. $X=A'+AB+AC'+AB'C'$

8. Write short notes on any two: **5+5=10**

a. SR Flip Flop with NAND gate

b. Synchronous Down counter

c. 16:1 Multiplexer

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