BRAINWARE UNIVERSITY

Course – BCA

Digital Electronics (BCA102/BCAC103)

(Semester – 1)

Time allotted: 3 Hours **Full Marks : 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Questions) 10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) The 9's complement of $(52500)_{10}$ is

a. 47499 b. 46499

c. 58500 d. 58599

(ii) Minimum number of NAND gates required to implement XOR gate is

a. 1 b. 2

c. 3 d. 4

(iii) Signed 1's complement representation of the number $(-13)_{10}$ is

a. 10010 b. 11101

c. 10011 d. 11100

(iv) The octal equivalent of the number $(110010001)_2$ is

a. 631 b. 620

c. 600 d. 621

(v) The packed format in EBCDIC-8 bit format of the numeric value -345 is

a. F3F4F5 b. F345

c. D3D4D5 d. 345D

(vi) The hexadecimal coding of the word "BCA" represented in ASCII 7 bit is

a. 404142 b. 414243

c. 424344 d. 424341

(vii) 4 bit Parallel Adder can be implemented using

a. 3 Full Adders and 1 Half Adder b. 2 Full Adders and 2 Half Adders

c. 1 Full Adder and 3 Half Adders d. 4 Half Adders

(viii) The 6 bit sign magnitude representation of the decimal number (-18) is

a. 1 01101 b. 101111

c. 110010 d. 101010

(ix) Invalid state is observed in SR flip flop if

a. S=R=0 b. S=1 R=0

c. S=0 R=1 d. S=R=1

(x) Total number of Flip flops required to implement the sequence 4,0,10,2,16,3 is

a. 3 b. 4

c. 5 d. 6

Group – B

(Short Answer Type Questions) 3 x 5 = 15

Answer any *three* from the following

2. A combinational circuit is defined by the following three functions:
F1= $\bar{x}\bar{y} + xy\bar{z}$, F2= $\bar{x} + y$, F3= $xy + \bar{x}y$
Design the circuit with a decoder and external gates. [5]

3. Explain the Race around condition in JK flip flop. [5]

4. Construct an 8X1 Multiplexer implemented using basic gates. Estimate the total cost required to implement 2^n to 1 Multiplexer. [3+2]

5. Explain the working principle of 4 bit SISO shift register. [5]

6. Obtain the simplified expression in sum of product terms for the following Boolean function:
F(A,B,C)= $\bar{A}B + B\bar{C} + \bar{B}\bar{C}$ [5]

Group – C

(Long Answer Type Questions) 3 x 15 = 45

Answer any *three* from the following

7. (a) Explain the working principle of 1X8 Demultiplexer. [5]
   (b) Design a combinational circuit which accepts a three-bit number and output binary number equal to the square of the input number. [10]
8. (a) Explain the working principle of 3X8 decoder. [5]
   (b) A combinational circuit is defined by the following two functions:
   F1=$\sum(0,3)$
   F2= $\sum(0,2,3,7)$
   Implement the combinational circuit using decoder and external gates. [10]
9. (a) Explain the Full Subtractor operation with it's circuit diagram. [5]
   (b) Implement the Full Subtractor operation using Multiplexer. [5]
   (c) Design a circuit using Multiplexer and Counter to generate the following sequence: …..10010100 ….. [5]
10. (a) Design a synchronous Decade counter. [10]
    (b) Design D flip flop using SR flip flop. [5]
11. (a) Explain the working principle of clocked SR flip flop. [5]
    (b) Design a binary counter having the following repeated binary sequence.
    0,1,2,3,4,5,6.
    Use T flip flop. [10]