BRAINWARE UNIVERSITY

Course – BCA

Digital Electronics (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 Question) 1 x 10 = 10

1. Answer **any ten** from the following questions

i. How many bits are needed to represent a digit in hexadecimal notation?
a) 8 b) 16 c) 4 d) 2

ii. Conversion of $(FAFAFA)_{16}$ into octal form is
a) 76575372 b) 76575370 c) 7675374 d) 72727272

iii. 1 byte is equal to
a) 2 bits b) 8 bits c) 4 bits d) 16 bits

iv. Which of the following input combinations is not allowed in SR Flip-Flop?
a) S=0, R=0 b) S=1, R=1 c) S=0, R=1 d) S=1, R=0

v. Gray code for binary 1011
a) 1101 b) 1110 c) 1001 d) 0111

vi. A full subtractor can be designed with a full adder by
a) Only changing the circuit. b) Adding a NOT with the SUM input
c) Adding a NOT with CARRY input d) none of these

vii. 2's Complement of 100000 is
a) 011111 b) 100000 c) 11111 d) 111111

viii. A+AB=?
a) A b) A+B c) 1 d) 0

ix. 8:1 Multiplexer has____ number of selection lines
a)1 b)2 c)3 4)4

x. Number of J-K flip-flops required to construct a 4 bit UP counter are
a) 2 b) 3 c) 4 d) 5

xi. In T flip-flop what will be the output if both input and & previous output are 1
a) 0 b) 1 c) 00 d) None of these.

Group – B

(Short Answer Type Question) 3 x 5 = 15

Answer **any three**

2. With truth table and Boolean function, design a full adder circuit using basic gates. 5

3. Write short notes on *any one* of the following:
a) Encoder b) Decoder 5

4. a) What is the disadvantage of R-S flip-flop?
b) How this problem is overcomed?
c) Describe J-K flip-flop with proper diagram 1+1+3

5. a) Add +30 and -22 using 2's complement method.
b) What is the 2's complement of $(1000\ 1111\ 0001\ 1110)_2$?
4 + 1

Group – C

(Long Answer Type Question) 3 x 15 = 45

Answer **any three**

6. a) Verify the De-Morgan's theorem by means of truth table.
b) Express the Boolean function F= $\overline{A}B + AC$ in POS form?
c) Express the Boolean function F= $X + \overline{Y}Z$ in SOP form?
d) Design the circuit $ABC + \overline{A}B + \overline{A}CB$ 6+ 3+3+3

7.

a) Convert $(1100011111100.110)_2$ into decimal number.

b) Obtain the minimal sum of product of the function given below

$$F(A,B,C,D) = \sum 1,4,5,9,13,14$$

c) Simplify the following boolean expression using boolean rules

i) $\overline{A + A\overline{B}C + ABC + \overline{ABC}}$

ii) $A + AB + ABC + ABCD$

d) Add -9 and 4 using 1's complement. 3+5+5+2

8.

a) Prove NAND gate as a universal gate using proper diagram.

b) With truth table and Boolean function, design a full subtractor circuit using basic gates.

c) Describe composite Adder-Subtractor with proper diagram. 3+5+7

9.

a) Describe the working principle of D-flip-flop.

b) What is register?

c) Design a 4 bit Serial-in Parallel-out & Serial-in Serial-out register using D flip-flop. 5+2+8

10.

a) What is counter?

b) What is the difference between combination circuit and sequential circuit?

c) Describe the working principle of Asynchronous Up counter with suitable diagram. 2+ 3+10