Professional Course Examination, January 2021
(1st Semester)
BACHELOR OF COMPUTER APPLICATIONS
(Digital Computer Fundamentals)
(Revised)
***Full Marks* : 75**
***Time* : 3 hours**
(PART : A—OBJECTIVE)
(*Marks*: 25)

The figures in the margin indicate full marks for the questions

SECTION—A
(*Marks*: 15)

I. Tick (√) the correct answer in the brackets provided : **(1×10=10)**

1. 4 byte is equivalent to
(a) 8 bits
(b) 16 bits
(c) 32 bits
(d) 64 bits

2. The binary equivalent of the octal number 36 is
(a) 011110
(b)110110
(c)010100
(d)010101

3. According to distributive law: (x+yz)=
(a) (x+y)
(b) (x+y)(x+z)
(c) (x+yz)'
(d) (y+z)

4. For a 3-variable boolean function, the number of boxes needed is
(a) 3
(b) 4
(c) 8
(d) 16

5. The output of AND gate is 1 when
(a) both the input is 0
(b) one input is 1 and the other is 0
(c) both the input is 1
(d) the input is different

6. The 2's complement of the binary number 1100100 is
(a) 0011011
(b) 1100101
(c) 1100001
(d) 0011100

7. Which of the following statement is false about combinational circuit?
(a) It can have more than one input

(b) It consists of logic gates
(c) It does not depend on the previous output
(d) It can store one bit of memory
8. A multiplexer does not have
(a) one input
(b) logic gate
(c) flipflops
(d) select input
9. The counters in which common clock pulses are applied to the CP inputs of all flip-flops are called
(a) asynchronous counter
(b) ripple counter
(c) synchronous count
(d) shift counter
10. Which one of the following flipflop has the ability to complement its states
(a) D flipflop
(b) JK flipflop
(c) T Flipflop
(d) edge triggered flipflop

II. Indicate whether the following statements are *True (T)* or *False (F)* by putting a Tick (√) mark in the brackets provided: 1×5=5
1. The hexadecimal number can represent a total of 15 numbers. (True/False)
2. Product of '0' and '1' in binary results in '1'. (True/False)
3. The 9's complement of 45 is 54. (True/False)
4.A programmable logic array (PLA) has a programmable AND array at the inputs and programmable OR array at the outputs.(True/False)
5. Every sequential circuit has a memory element. (True/False)

SECTION—B

(*Marks*: 10)

Answer the following questions : **(2×5=10)**

1. (a) What is Binary Coded Decimal? Give Example.

   Or

   (b) What is even parity code? Give Example.

2. (a) Simplify the Boolean expression using Boolean algebra: F=(x+y)'(x'+y')

   Or

   (b) State the principal of duality.

3. (a) Evaluate the binary numbers: 1101x101 and 111110 ÷ 10

   Or

   (b) Calculate using 2's complement subtraction: 11100 – 1101, 10111 - 1000

4. (a) What is decoder? Write its function.

   Or

(b) What is sequential circuit? Write its features.

5. (a) Write a logic circuit for master-slave flip-flop.

Or

(b) Write a logic circuit for 4-bit ripple counter.

(PART : B—DESCRIPTIVE)

(*Marks*: 50)

The figures in the margin indicate full marks for the questions

1. (a) Convert the given numbers to decimal: $(110110)_2$,$(371)_8$ **(5)**

(b) Convert the given number to hexadecimal: $(196)_{10}$, $(302)_8$ **(5)**

Or

(c) Convert the given number to binary: $(137)_{10}$, $(3A4)_{16}$ **(5)**

(d) Convert the given number to octal: $(11011001)_2$, $(27C)_{16}$ **(5)**

2. (a) Using Karnaugh mapping, obtain the simplified expression in sum of products for the following Boolean function: **(6)**

$F(w,x,y,z)=\sum(0,1,2,3,7,8,10)$

$d(w,x,y,z)=\sum(5,6,11,15)$

(b) Write the boolean expression, logic diagram and truth table for NAND and NOR gate. **(4)**

Or

(c) Using Karnaugh mapping obtain the simplified expression in product of sum for the following Boolean function: **(6)**

$F(A,B,C,D) = \Sigma(3,4,13,15)$

$d(A,B,C,D)= \Sigma(1,2,5,6,8,10,12,14)$

(d)Express the Boolean function in canonical min form: $F=x'y' + x'z + y'z$ **(4)**

3. (a) Draw a truth table and logic diagram of the Boolean function: $F=AB + A'B' + AC$ **(5)**

(b) Write the function, logic circuit and truth table of Half Adder. **(5)**

Or

(c) Evaluate $(53-24)_{10}$ using 9's complement and $(111001 - 11001)_2$ using 2's complement subtraction. **(5)**

(d) Write the function, logic circuit and truth table of Half Subtractor. **(5)**

4. (a) Draw and explain the circuit diagram and truth table of an 8:3 line encoder. **(5)**

(b) What is demultiplexer? Design1:4 demultiplexer by drawing its logic diagram and truth table. **(5)**

Or

(c) Draw and explain the circuit diagram and truth table of 3:8 decoder. **(5)**

(d) Explain Programmable Logic Array (PLA) using block diagram. **(5)**

5. (a) What is SR flip-flop? Write the logic diagram, characteristic table and graphic symbol of SR flip-flop. **(5)**

(b) What are counter? Explain the working of a 4-bit binary counter **(5)**

Or

(c) Explain the working of T flip-flop using logic diagram. **(4)**

(d) What is register? Explain the 4 types of shift register in details. **(6)**

***** BCA/1/CC/04*****