

2015

(1st Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA-104

(New Course)

(Digital Computer Fundamentals)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—I

(Marks : 15)

I. Tick (✓) the correct answer in the brackets provided :

1×10=10

1. In information transfer from one register to another, the statement $A \leftarrow B$ denotes
 - (a) the transfer of the contents of register B into register A ()
 - (b) a replacement of the contents of register A by the contents of register B ()
 - (c) the contents of the source register B do not change after the transfer ()
 - (d) All of the above ()

2. To implement arithmetic microoperation of the statement $F \leftarrow A + B$, we require

- (a) one register ()
- (b) two registers ()
- (c) three registers ()
- (d) four registers ()

3. A group of flip-flops sensitive to pulse duration is usually called

- (a) a clock pulse ()
- (b) a latch ()
- (c) programmable logic array ()
- (d) encoder ()

4. The T flip-flop is a single version of

- (a) JK flip-flop ()
- (b) RS flip-flop ()
- (c) D flip-flop ()
- (d) None of the above ()

5. A decoder converts binary information from n input lines to a maximum of
- (a) 2^n output lines ()
 - (b) 2^n unique output lines ()
 - (c) $2^n + 1$ unique output lines ()
 - (d) $2^n - 1$ unique output lines ()
6. The circuit that checks the parity in the receiver is called
- (a) a parity checker ()
 - (b) a parity generator ()
 - (c) a parity bit ()
 - (d) an error-detection code ()
7. If the dual of an algebraic expression is desired, we simply
- (a) interchange OR operator and AND operator ()
 - (b) replace 1's by 0's and 0's by 1's ()
 - (c) Both (a) and (b) ()
 - (d) None of the above ()

8. Boolean functions expressed as a sum of minterms or product of maxterms are called

- (a) standard products ()
- (b) standard sums ()
- (c) Both (a) and (b) ()
- (d) canonical form ()

9. What is the minimum number of two-input NAND gates used to perform the function of two input OR gate?

- (a) One NAND gate ()
- (b) Two NAND gates ()
- (c) Three NAND gates ()
- (d) Four NAND gates ()

10. The code which changes by only one bit as it proceeds from one number to the next is

- (a) decimal code ()
- (b) reflected code ()
- (c) alphanumeric code ()
- (d) error-detection code ()

(5)

II. Tick (✓) whether the following statements are
True (T) or False (F) : 1×5=5

1. A buffer circuit is used merely for power amplification.

(T / F)

2. Each combination of the variables in a truth table is called a maxterm.

(T / F)

3. The operations performed on the data stored in registers are called macrooperations.

(T / F)

4. The size of multiplexer is specified by the number of 2^n of its data inputs and the single output.

(T / F)

5. A binary counter with a reverse count is called a binary-down counter.

(T / F)

(6)

SECTION—II

(Marks : 10)

III. Answer the following questions :

2×5=10

1. What is an instruction code? Write the three instruction code formats.

(7)

2. What do you mean by overflow?

3. Explain a demultiplexer.

(8)

4. What are the universal gates? Why are they called so?

(9)

5. Explain a half adder in detail.

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Paper No. : BCA-104

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Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 50)

*The figures in the margin indicate full marks
for the questions*

1. (a) Describe the digital computer with a block diagram. 4
- (b) Convert the following numbers from the given base to the bases indicated : 6
 - (i) $(71.6875)_{10}$ to binary, octal, and hexadecimal
 - (ii) $(254.87)_8$ to decimal, binary, and hexadecimal

G16/175a

(Turn Over)

Or

- (c) Explain any five digital logic gates with names, graphic symbols and truth tables. 5
- (d) Perform the subtraction of the following numbers using r 's complement : 5
- (i) $(23750 - 768921)_{10}$
- (ii) $(10111 - 110001)_2$
2. (a) Simplify the Boolean function $F = xy + x'z + yz$ to a minimum number of literals. 4
- (b) Express the Boolean function $F = x + y'z$ in a sum of minterms form. 6
- Or
- (c) Find the complements of $F = A(B'C' + BC)$. 4
- (d) Express the Boolean function $F = AB + A'C$ to a product of maxterms form. 6
3. (a) Simplify the Boolean function $F(w, x, y, z) = \Sigma(0, 1, 2, 5, 8, 9, 10)$ in (i) sum of products, and (ii) product of sums. Draw the logical diagram for each function. 5
- (b) Explain full subtractor by showing its truth table and implementing using logic gates. 5

Or

- (c) Explain full adder by showing its truth table and implementing using logic gates. 5
- (d) What is a decoder? Design a 3-to-8 line decoder showing its truth table. 5
- 4. (a) Explain the working of clock RS flip-flop with logical diagram and characteristic table. 6
- (b) Explain a shift register with block diagram. 4

Or

- (c) Explain the working of clock T flip-flop with logical diagram and characteristic table. 4
- (d) Describe a master-slave JK flip-flop with logic diagram. 6
- 5. (a) Explain briefly the basic symbols for register-transfer logic. 5
- (b) Explain macrooperations and microoperations with an example each. 5

Or

- (c) Explain briefly the basic arithmetic microoperations in detail. 5
- (d) Explain logic microoperations and shift microoperations with an example each. 5
