2016

(1st Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA–104

(Digital Computer Fundamentals)

Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

1. *(a)* Explain any five digital logic gates with names, graphic symbols and truth tables. 5

(b) Convert $(10110001101011)_2$ to decimal, octal and hexadecimal. 5

Or

(c) Define binary logic. Also explain the three basic operators of binary logic. 5

(d) Convert $(45)_{10}$ to binary, octal and hexadecimal. 5

2. (a) Simplify the Boolean function $F = x \cdot y + x' \cdot z + y \cdot z$ to a minimum number of literals. 4

(b) Express the Boolean function $F = xy + x'z$ in a product of maxterm form. 6

Or

(c) Using Karnaugh's three-variable mapping, simplify the Boolean function

$$F = x'yz + x'yz' + xy'z' + xy'z$$ 5

(d) Express the Boolean function $F = x + y'z$ in a sum of minterm form. 5

3. (a) What is multiplexer? Write the logic and block diagram of a 4-to-1 line multiplexer. 5

(b) Explain full adder by showing its truth table and implementation using logic gates. 5

Or

(c) What is decoder? Design a 3-to-8 lines decoder showing its truth table. 5

(d) Explain full subtractor by showing its truth table and implementing using logic gates. 5

4. *(a)* Explain the working of JK flip-flop giving its logic diagram and its characteristics table. 6

(b) Explain shift register with block diagram. 4

Or

(c) Explain the working of RS flip-flop with logical diagram and its characteristic table. 5

(d) What is ripple counter? Explain how it works showing suitable diagram. 5

5. *(a)* Explain macrooperations and micro-operations with an example. 6

(b) Explain arithmetic shift operation with a suitable example. 4

Or

(c) Differentiate between logic microopeation and shift microoperation by giving suitable example. 5

(d) Explain briefly the basic arithmatic microoperations in detail. 5

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BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA-104

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(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. The binary form of $(27)_{10}$ is

   (a) 10110 ( )

   (b) 11011 ( )

   (c) 11100 ( )

   (d) 10101 ( )

2. A combinational circuit that performs the addition of two bits is called

   (a) half adder ( )

   (b) full adder ( )

   (c) half subtractor ( )

   (d) full subtractor ( )

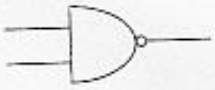
3. A flif-flop circuit that can be constructed from two NAND gates and two NOR gates is called

   (a) JK flip-flop ( )

   (b) D flip-flop ( )

   (c) RS flip-flop ( )

   (d) J flip-flop ( )

4.  is a symbol for

   (a) .AND ( )

   (b) OR ( )

   (c) .NOR ( )

   (d) NAND ( )

5. A combinational circuit that selects binary information from one of many input lines and directs it to a single output line is called

   (a) multiplexer ( )

   (b) demultiplexer ( )

   (c) decoder ( )

   (d) encoder ( )

6. The 2's complement of $(101100)_2$ is

   (a) 010011 ( )

   (b) 010100 ( )

   (c) 110011 ( )

   (d) 001101 ( )

7. MBR stands for

   (a) main buffer register ( )

   (b) multi buffer register ( )

   (c) memory buffer register ( )

   (d) None of the above ( )

8. The D flip-flop is a modification of the

(a) JK flip-flop ( )

(b) RS flip-flop ( )

(c) clocked JK flip-flop ( )

(d) clocked RS flip-flop ( )

9. Ripple counters are sometimes called

(a) asynchronous counters ( )

(b) synchronous counters ( )

(c) program counters ( )

(d) registers ( )

10. $(1)_{10} + (1)_{10}$ equals to

(a) 0 ( )

(b) 1 ( )

(c) 2 ( )

(d) 10 ( )

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

1. A register is a group of binary storage cells suitable for holding binary informations.

(T / F)

2. An encoder is a combinational circuit that connects binary information from n input lines to a maximum of 2^n unique output lines.

(T / F)

3. Demultiplexer means one-to-many.

(T / F)

4. The maximum number of bits required to code 2^n distinct quantities is n.

(T / F)

5. The T flip-flop is a single input version of the RS flip-flop.

(T / F)

SECTION—II

(*Marks* : 10)

III. Answer the following questions : 2×5=10

1. What do you mean by overflow?

2. Explain half adder in detail.

3. From the given expression, draw the gate symbol and truth table :

Exp. = $A + B + \overline{C}$

4. What is flip-flop?

5. What is register?

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