

BCA–01**Computer Fundamental and Introduction
to Digital Logic****Bachelor of Computer Application (BCA–11/16/17)****First Semester, Examination, 2017****Time : 3 Hours****Max. Marks : 80**

Note : This paper is of **eighty (80)** marks containing **three (03)** Sections A, B and C. Learners are required to attempt the questions contained in these Sections according to the detailed instructions given therein.

Section–A**(Long Answer Type Questions)**

Note : Section ‘A’ contains four (04) long answer type questions of nineteen (19) marks each. Learners are required to answer *two* (02) questions only.

1. Answer the following questions :

(a) Explain all the generations of computers with technology used. $9\frac{1}{2}$

(b) Create a logic diagram for $(A + B)'. (C. D)'$ using NAND Gates only. Also show the truth table for the diagram. $4\frac{1}{2}$

(c) Perform the following operations : 5

(i) Subtract $(AB18476)_{16}$ from $(CD983762)_{17}$.

- (ii) Convert $(188.04)_{10}$ to its binary equivalent.
 - (iii) Convert $(265)_8$ to its binary equivalent.
 - (iv) Convert $(ABC987)_{16}$ to its octal equivalent.
 - (v) Calculate 1's complement of $(101110110)_2$.
2. Answer the following questions :
- (a) Discuss the construction and working of half adder with logic diagram and truth table. 5
 - (b) Discuss the construction and working of full adder with logic diagram and truth table. 5
 - (c) Explain the construction and working of JK flip-flop with diagram. 5
 - (d) Discuss the various types of volatile and non-volatile memories with the help of example. 4
3. Answer the following questions :
- (a) Explain functions and types of RAM and ROM. 6
 - (b) Explain the components and functions of CPU. 5
 - (c) What are input and output devices ? Discuss the various types of input and output devices with *three* examples of each. 8
4. Answer the following questions :
- (a) Explain the following : 2 each
 - (i) Multiplexor
 - (ii) Demultiplexor
 - (iii) Encoder
 - (iv) Decoder
 - (v) Flip-Flop

- (b) Write short notes on the following : $1\frac{1}{2}$ each
- (i) Cache memory
 - (ii) Shift and Parallel registers
 - (iii) De-Morgan's theorem with example using truth table
 - (iv) Volatile memory and its various types
 - (v) Non-volatile memory and its various types
 - (vi) BCD

Section-B

(Short Answer Type Questions)

Note : Section 'B' contains eight (08) short answer type questions of eight (08) marks each. Learners are required to answer *four* (04) questions only.

1. Explain the following laws of Boolean algebra with example of each :
 - (i) Associative law
 - (ii) Commutative law
 - (iii) Identity element
 - (iv) Distributive law
2. Simplify the following Boolean functions to a minimum number of literals :
 - (i) $x + x'y$
 - (ii) $x (x' + y)$
 - (iii) $x'y'z + x'yz + xy'$
 - (iv) $xy + x'z + yz$

3. Obtain the truth table of the following functions and express each function in the sum of minterms and product of maxterms :
 - (i) $(xy + z)(y - xz)$
 - (ii) $(A' + B)(B' + C)$
 - (iii) $y'z + wxy' + wxz' + w'x'z$
 - (iv) $xy + yz + xz$
4. Simplify the Boolean function $F(w, x, y, z) = \Sigma (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ using Karnaugh Map.
5. Discuss Universal Gates. Create NAND gate using NOR Gates only and verify using truth table. Create NOR Gate using NAND Gates only and verify using truth table.
6. Explain the working of following gates with the truth table and diagram. Also the discuss the usefulness of these gates :
 - (i) AND
 - (ii) OR
 - (iii) NOT
 - (iv) XOR
 - (v) NAND
 - (vi) NOR
 - (vii) XNOR
 - (viii) Buffer
7. Draw the following logic circuit diagram. Explain the output using truth table :

$$A + B + (C.A)' + (A.B)' + (A.B.C)$$

8. What is Memory ? How is data stored in memory ? Explain the various types of primary and secondary memories with example.

Section-C

(Objective Type Questions)

Note : Section 'C' contains ten (10) objective type questions of one (1) mark each. All the questions of this Section are compulsory.

1. Which of the following expressions is in the sum-of-products (SOP) form ?
 - (a) $(A + B)(C + D)$
 - (b) $(A)B(CD)$
 - (c) $AB(CD)$
 - (d) $AB + CD$
2. Convert hexadecimal value 16 to decimal :
 - (a) 22_{10}
 - (b) 16_{10}
 - (c) 10_{10}
 - (d) 20_{10}
3. One of De-Morgan's theorems states that $\overline{X+Y} = \overline{X}.\overline{Y}$. Simply stated, this means that logically there is not difference between :
 - (a) a NOR and an AND gate with inverted inputs
 - (b) a NAND and an OR gate with inverted inputs
 - (c) an AND and a NOR gate with inverted inputs
 - (d) a NOR and a NAND gate with inverted inputs

4. The half adder performs :
 - (a) Decimal addition operation for 2 decimal inputs
 - (b) Binary addition operation for 2 binary inputs
 - (c) Decimal addition operation for 2 binary inputs
 - (d) Binary addition operation for 2 decimal inputs
5. What are the symbols used to present digits in the binary number system ?
 - (a) 0, 1
 - (b) 0, 1, 2
 - (c) 0 through 8
 - (d) 1, 2
6. What is the full form of RAM ?
 - (a) Readily Available Memory
 - (b) Random Access Memory
 - (c) Roundy Accessing the Memory
 - (d) Resettable Automatic Memory
7. How many inputs will a decimal-to-BCD encoder have ?
 - (a) 4
 - (b) 8
 - (c) 10
 - (d) 16
8. A 64-bit word consists of
 - (a) 4 bytes
 - (b) 8 bytes
 - (c) 10 bytes
 - (d) 12 bytes

9. Why are ROMs called non-volatile memory ?
- (a) They lose memory when power is removed.
 - (b) They do not lose memory when power is removed.
 - (c) They can be stored easily.
 - (d) They cannot be stored easily.
10. A DVD is :
- (a) Optical disk
 - (b) Output device
 - (c) Solid state storage device
 - (d) Hard disk

