

Total number of printed pages-8

41 (1) DILG 1-3 (IT-03)

2016

(August)

PGDCA

(1st Semester)

Paper : IT-03

DIGITAL LOGIC

Full Marks : 100

Time : Three hours

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

1. Choose the correct option among the following : 10×1=10
 - a) Digital computer process data in :
 - i) Discrete form
 - ii) Binary form
 - iii) Alphanumeric form
 - iv) Logical form

Contd.

- b) Laptop computers are also called :
- i) Mainframe computer
 - ii) Microcomputers
 - iii) Minicomputers
 - iv) Supercomputers
- c) MIPS stands for :
- i) Million inputs per storage
 - ii) Million instructions per sequence
 - iii) Million instructions per set
 - iv) Million instructions per second
- d) Canonical is a word used to describe a condition of a :
- i) Switching equation
 - ii) Mathematical equation
 - iii) Logical expression
 - iv) Boolean expression
- e) SOP stands for :
- i) Sum on product
 - ii) Sum output product
 - iii) Sum of all product
 - iv) Sum of product

- f) Propagation delay is measured in :
- i) Microseconds
 - ii) Nanoseconds
 - iii) Seconds
 - iv) All of the above
- g) Number of cells in K-map depends on the number of variables of :
- i) Logical expression
 - ii) Boolean expression
 - iii) Mathematical expression
 - iv) Binary expression
- h) NAND gate like a NOR gate, is universal and :
- i) Functionally complete
 - ii) Functionally incomplete
 - iii) Logically complete
 - iv) Logically incomplete
- i) A register is used to store or manipulate data or both and is termed as a group of :
- i) Decoders
 - ii) Circuits
 - iii) Processors
 - iv) Flip-flops

- j) Demultiplexer performs the reverse operation of :
- i) Decoder
 - ii) Multiplexer
 - iii) Combinational circuit
 - iv) Encoder

2. State true **or** false : 10×1=10

- a) A digital computer operates by counting digits in the numeric form.
- b) The decimal number has a base or radix of 10.
- c) Weighted binary codes are those which obey the non positional weighing principle.
- d) A truth table is a mathematical table that gives output of all combinations of inputs.
- e) NOR gate is a combination of OR and AND gates.
- f) The logical AND operation between two Boolean variables, A and B is written as $Y = A + B$.

- g) The logical sum of several variables on which a function depends is considered to be a product term.
- h) Any gate can be constructed using NOR gates in various combinations.
- i) A code converter is a logic circuit that changes data presented in one type of binary code to another type of binary code.
- j) All the binary representation of the bits that are 1's in the BCD are added.

3. Fill in the blanks : 10×1=10

- a) A full adder is a combinational circuit that performs the arithmetic sum of three input bits and produces a _____ and a _____.
- b) An electronic combinational circuit in which addition of two bits is made is called a _____.
- c) K-map can be used for any number of _____.
- d) The truth table defines the relation between _____ and _____.
- e) Tabulation method is also called _____.
- f) The NAND gate is quite _____ in it's use.

- g) _____ are used to compute the functional values of logical expressions.
- h) The most successful bipolar logic family is _____.
- i) A computer performs the given task using set of _____.
- j) Double-dabble method is also termed as _____.

4. Match the following : 10×1=10

Column-A

Column-B

- | | |
|---|-------------------------|
| a) A computer is an | i) logic circuits |
| b) Computer programs are written using | ii) nibble |
| c) Digital computers are used for | iii) notebook computers |
| d) A large mainframe computer can process more than | iv) byte |
| e) Laptop computers also called | v) Hamming distance |
| f) Microcomputers work faster like | vi) 100 MIPS |
| g) A binary number with 4 bits is called a | vii) electronic device |
| h) A binary number with 8 bits is called a | viii) data processing |

Column-A**Column-B**

- | | |
|--|-------------------------|
| i) The distance between two code words is | ix) minicomputers |
| j) Boolean algebra can be used to simplify the design of languages | x) programming |
| | xi) mainframe computers |
| | xii) bit |
| | xiii) multiplexer |

5. Answer the following questions : $10 \times 3 = 30$

- a) Distinguish between 1's and 2's complement.
- b) Convert $(1010011.101101)_2$ to octal.
- c) Convert $(298)_{10}$ to octal.
- d) Convert $(1723)_8$ to binary.
- e) Convert $(FB17)_{16}$ to binary.
- f) Convert $(BC2)_{16}$ to decimal.
- g) Convert $(3643)_8$ to hexadecimal.
- h) Write 2's complement of 00111111.
- i) Perform addition of the following numbers using 2's complement method: -56 and -42.

j) Add the following binary numbers using binary addition : $11011 + 1001$.

6. Answer **any two** of the following questions :

a) i) What is full adder? Draw the truth table and logic circuit of a half adder. 5

ii) Convert $(A + BC)$ to minterms. 5

iii) Show that $Y = ABC + A\bar{B}C + A\bar{B}\bar{C}$ can be simplified to $Y = A(B + C)$ 5

b) i) What is multiplexer? Explain four input multiplexer with the help of truth table and suitable diagram. $2+8=10$

ii) Prove the Absorption laws :
 $A + AB = A$ and $A(A + B) = A$ 5

c) i) What is logic gate? Write the truth tables and block diagrams of the logic gates. 10

ii) Explain the function of a Master Slave D flip flop with logic circuit and truth table. 5