

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/BCA/SEM-1/BCA-101/2010-11**

**2010-11**

**DIGITAL ELECTRONICS**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**GROUP - A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any ten of the following :  $10 \times 1 = 10$

i) In which of the following base systems is 789 not a valid number ?

- a) Base 5
- b) Base 16
- c) Base 8
- d) Base 3.

ii) Storage of 1 kB means the what number of bytes ?

- a) 1000
- b) 964
- c) 1024
- d) 1064.

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- iii) Pick out the correct statement :
- a) In a positional number system, each symbol represents the same value irrespective of its position
  - b) The highest symbol in a position number system is a value equal to the number of symbols in the system
  - c) It is not always possible to find the exact binary
  - d) Each hexadecimal digit can be represented as a sequence of three binary symbols.
- iv) The binary code of  $(21.125)_{10}$  is
- a) 10101.001                      b) 10100.001
  - c) 10101.010                      d) 10100.111
- v) Race condition is avoided by
- a) J-K flip-flop                      b) S-R flip-flop
  - c) master-slave flip-flop        d) none of these.
- vi) Which one is sequential circuit ?
- a) multiplexer                      b) decoder
  - c) priority encoder                d) counter.
- vii) Which is correct ?
- a)  $A + \bar{A}B = A + B$               b)  $A + 1 = A$
  - c)  $A + \bar{A} = A$                       d)  $\bar{A}/A = A$
- viii) Decimal digits can be converted to binary code using
- a) Decoder                          b) Encoder
  - c) Mux                                d) DeMux.

- ix) Carry of a full adder is a
- a) dual function
  - b) self dual function
  - c) non-symmetric function
  - d) none of these.
- x) Every flip-flop is defined by
- a) characteristic equation
  - b) excitation table
  - c) both of these
  - d) none of these.
- xi) Immediate Access Storage Device is the name of
- a) primary memory
  - b) secondary memory
  - c) hard disk
  - d) pen drive.
- xii) Control unit does not process data.
- a) False
  - b) True
  - c) Unpredictable
  - d) None of these.
- xiii) If there are three inputs then the number of input combinations will be
- a) four
  - b) eight
  - c) six
  - d) two.
- xiv) Excess-3 Code representation of decimal 59 is
- a) 01100110
  - b) 10001100
  - c) 01011001
  - d) 11000110.
- xv) Hexadecimal equivalent of  $(26.25)_{10}$  is
- a) A6.4
  - b) 1A.4
  - c) FA.4
  - d) 1A.25

**GROUP - B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Implement XOR operation using four 2-input NAND gates. Verify the output for different combinations of inputs.
3. Write down the BCD code of  $(9612)_{10}$ . Add two numbers  $(6952)_{10}$  and  $(1589)_{10}$  using BCD codes and obtain the result also in BCD.

4. a) Find out the dual and the complement of the following Boolean function :

$$F = ABC + \bar{A}\bar{B}C + \bar{A}BC + ABC\bar{C}$$

- b) Simplify the following Boolean expression

$$(X + Y)(\bar{X} + Y + Z)(\bar{X} + Y + \bar{Z})$$

to minimum number of literals using algebraic method.

5. a) Prove that the multiplexer is a universal logic module.  
b) Use 4-to-1 MUX and other necessary logic gate to design a full-subtractor.
6. a) What is the advantage of JK flip-flop over SR flip-flop ?  
b) Write the Maxterm form of the following function :

$$F = XY + \bar{X}Z$$

**GROUP - C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Draw the truth table for a three input adder. Explain clearly the meaning of the input and the output symbols in the truth table. Write the Boolean expressions for the sum and carry. 5
- b) Use a Karnaugh map to find the minimum sum of products for the expression  $X = A'B'C + AB'C + A'BC + ABC'$  5
- c) Simplify the following expressions using Boolean algebra : 5
- i)  $AB + A(B+C) + B(B+C)$
- ii)  $A'BC + B'CD + AC + A'B'CD'$
8. a) State the main differences between sequential and combinational circuits. 2
- b) Draw the truth table and logic circuit of a Full Subtractor. Using Karnaugh map find out the expression for difference (  $D$  ) and borrow (  $B$  ). 4 + 3
- c) Implement the Boolean function  $F(A, B, C, D) = \sum(0, 1, 3, 4, 8, 9, 15)$  using  $8 \times 1$  multiplexer with  $A, B$  and  $D$  connected to select lines  $s_2, s_1, s_0$  respectively. 6



11. Write short notes on any *three* of the following : 3 × 5

- a) Decoder
  - b) Shift register
  - c) PROM
  - d) Priority Checker
  - e) Ring counter.
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