Roll No.	
Invigilate	or's Signature :
	CS/BCA/SEM-1/BCA-101/2010-11 2010-11
	DIGITAL ELECTRONICS
Time All	otted: 3 Hours Full Marks: 70
	The figures in the margin indicate full marks.
Candid	lates are required to give their answers in their own words as far as practicable.
	GROUP – A
	( Multiple Choice Type Questions )
1. Cho	pose the correct alternatives for any ten of the
follo	owing: $10 \times 1 = 10$
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 /

1064.

[ Turn over

d)

1024

c)

1004

- 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)  $A + \overline{A}B = A + B$
- b) A + 1 = A
- c)  $A + \overline{A} = A$
- d)  $\overline{A}/A = A$
- viii) Decimal digits can be converted to binary code using
  - a) Decoder

b) Encoder

c) Mux

d) DeMux.

ix)	Ca	rry of a full adder is a				
	a)	dual function				
	b)	self dual function				
	c)	non-symmetric funct	ion			
	d)	none of these.				
x)	Eve	ery flip-flop is defined b	y			
	a) ်	characteristic equation	on			
	b)	excitation table				
	c)	both of these				
	d)	none of these.				
xi)	Immediate Access Storage Device is the name of					
	a)	primary memory	<b>b</b> )	secondary memory		
	c)	hard disk	d)	pen drive.		
xii)	i) Control unit does not process data.					
	a)	False	<b>b</b> )	True		
	c)	Unpredictable	d)	None of these.		
xiii)	If t	here are three inputs	ther	the number of input		
	<b>a</b> ):	four	b)	eight		
	c)	six	d)	two.		
xiv)	Excess-3 Code representation of decimal 59 is					
		01100110	b)	10001100		
	<b>c</b> )	01011001	d)	11000110.		
xv)	Hexadecimal equivalent of (26.25) <sub>10</sub> is					
	a)	A6.4	<b>b</b> )	1A.4		
	c)	FA.4	<b>d</b> )	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:

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

b) Simplify the following Boolean expression

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

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:

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

#### GROUP - C

# (Long Answer Type Questions)

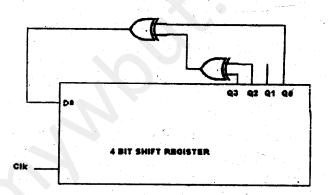
Answer any three of the following.  $3 \times 15 = 45$ 

- 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.
  - b) Use a Karnaugh map to find the minimum sum of products for the expression  $X = A^{l}B^{l}C + AB^{l}C + A^{l}BC + ABC^{l}$  5
  - c) Simplify the following expressions using Boolean algebra:
    - 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.
  - 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  $F = (A, B, C, D) = \sum_{i=0}^{\infty} (0, 1, 3, 4, 8, 9, 15)$  using  $8 \times 1$  multiplexer with A, B and D connected to select lines  $s_2, s_1, s_0$  respectively.

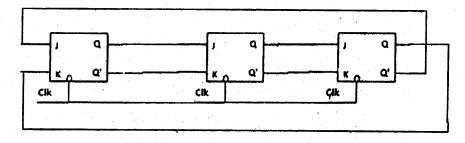
9. a) Define flip-flop and its propagation delay.

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- b) Using the logic diagram convert a J-K flip-flop to a D flip-flop and T flip-flop.
- c) Design a J-K master-slave flip-flop with circuit diagram and give the truth table.
- 10. a) What is the usefulness of excitation table of the flip-flop?
  - b) The 4-bit shift register is initialised to 001. After how many clock pulses is the register re-initialied to same value?



c) Determine the modulus of the following counter. 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.