# ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER – 2008

## DIGITAL ELECTRONICS

### SEMESTER – 1

Time : 3 Hours ] [ Full Marks : 70

### GROUP – A

### ( Multiple Choice Type Questions )

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

i) $(1100 \cdot 1011)_2 = (?)_{10}$

a) 10·6785 b) 11·6578

c) 12·6875 d) 13·6785.

ii) 2's complement of 10101100 is

a) 11001010 b) 01010011

c) 01010100 d) 01011001.

iii) $(247 \cdot 36)_8 = (?)_{16}$

a) A7·78 b) 1A7·36

c) B7·87 d) 1B7·36.

iv) MBR, in reference to memory management is

a) Memory Broad Register b) Memory Buffer Relay

c) Memory Buffer Register d) None of these.

v) Output of NAND gate is 1, if and only if

a) all inputs are 1 b) any input is 1

c) all inputs are 0 d) any input is 0.

vi) $A+\overline{A}=?$

a) 1 b) 0

c) A d) $\overline{A}$.

vii) If the no. of states of a counter is 8, then the no. of flip-flops is

a) 8 b) 3

c) 4 d) 6.

viii) $(A.B+\overline{A}.B+\overline{A}.\overline{B})$ is equal to

a) $A+\overline{B}$ b) $\overline{A}+B$

c) $A+B$ d) 1.

ix) Karnaugh Map is used to

a) simplify Boolean function

b) design Boolean function

c) evaluate Boolean function

d) none of these.

x) A multiplexer has

a) single input b) multiple output

c) no output d) single output.

xi) Output of R-S ( NAND ) flip-flop, for R = 1 & S = 1 is

a) set b) reset

c) race d) no change.

xii) Subtracting 1111 from 11000 will result to

a) 1000 b) 1100

c) 1001 d) 1011.

## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following. 3 × 5 = 15

2. Apply K-map to obtain the minimal form for the function :

   $F(A, B, C, D) = \Sigma (0, 4, 5, 7, 8, 9, 13, 15)$

   $d(A, B, C, D) = \Sigma (1, 2, 6, 10)$

3. Draw a half-adder circuit and describe its operations.

4. Design a 4-bit up-down counter.

5. Prove the following logical equation using Boolean algebra :

   $(A+BC) . (B+A\overline{C}) = BC + A\overline{C}$

6. i) Subtract $(7489)_{10} - (2485)_{10}$ using 10's complement method.

   ii) What is a Multiplexer ? Why is it called "Data selector" ?

## GROUP – C

### ( Long Answer Type Questions )

Answer any *three* of the following questions. 3 × 15 = 45

7. a) Represent the decimal number "27" in

      i) BCD code

      ii) Octal code

      iii) Gray code.

   b) Draw the block diagram of a digital multiplexer and explain its function.

   c) Give the functional truth table of a 4 : 1 multiplexer and realize it using basic gates AND, OR and NOT.

   d) Implement the expression using a multiplexer :

      $f(A, B, C, D) = \Sigma m (0, 2, 3, 6, 8, 9, 12, 14)$ 3 + 4 + 4 + 4

8. a) What do you mean by a sequential circuit ?

b) What are synchronous & asynchronous sequential circuits ?

c) Explain the functionality of D-flip-flop. Give the truth table, State diagram.

d) What do you mean by Edge-triggering & Level-triggering in flip-flops ?

2 + 3 + 5 + 5

9. a) What is a flip-flop ?

b) What are the uses of flip-flops ?

c) Give the circuit diagram of a J-K flip-flop.

d) Give the truth tables of S-R & J-K flip-flops. 2 + 3 + 4 + 6

10. a) Given the following truth table :

| Inputs | | | Outputs | |
|---|---|---|---|---|
| x | y | z | F1 | F2 |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |

i) Obtain the simplified functions in sum of products.

ii) Obtain the simplified functions in product of sums.

b) Design a BCD to Exess-3 Code converter. 8 + 7

11. a) Explain different types of RAM and ROM.

b) Write short notes on any *two* of the following :

i) Parity checker

ii) Ring counter

iii) Magnitude comparator. 7 + ( 2 × 4 )

END