



ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER - 2007

DIGITAL ELECTRONICS & LOGIC DESIGN

SEMESTER - 3

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) Convert (444.456)₁₀ into its octal equivalent

- a) 673.5136 b) 674.35136
 c) 674.735 d) none of these.

ii) $(A + \bar{B} + \bar{A}B) C =$

- a) 1 b) 0
 c) C d) \bar{C} .

iii) How many 1's are present in the binary representation of decimal number
 $(3 \times 512 + 7 \times 64 + 5 \times 8 + 3) ?$

- a) 8 b) 9
 c) 10 d) 11.

iv) An example of reflected code is

- a) BCD b) ASCII
 c) GRAY d) Hamming.



v) The value of 2^5 in octal system is

- a) 40 b) 20

- c) 400 d) none of these.

vi) The minimum number of NAND gates required to design one XOR gate is

- a) 4 b) 5

- c) 6 d) 3.

vii) The operation which is commutative but not associative is

- a) AND b) XOR

- c) NAND d) NOT.

viii) A decoder with enable i/p can used as

- a) Encoder b) Parity generator

- c) Multiplexer d) DeMultiplexer.

ix) The resolution of an 8 bit A/D converter is

- a) 0.62% b) 0.38%

- c) 0.39% d) 1.25%.

x) A 10 MHz square wave clocks have a 5 bit ripple counter. The frequency of the 3rd flip-flop's output is

- a) 2 MHz b) 1.25 MHz

- c) 50 kHz d) 25 kHz.



xii) If $(212)_x = (23)_{10}$, where x is base (+ ve integer), then the value of x is

- | | |
|------|-------|
| a) 2 | b) 3 |
| c) 5 | d) 4. |

xiii) Calculator keyboard is an example of

- | | |
|------------|--------------------|
| a) decoder | b) multiplexer |
| c) encoder | d) de Multiplexer. |

xiv) The carry output of a full adder is three input

- | | |
|-------------------|-------------------|
| a) majority logic | b) minority logic |
| c) XOR logic | d) NAND logic. |

xv) Flip-flop that makes output equals to input after clock is

- | | |
|------------------|-------------------|
| a) J-K flip-flop | b) D flip-flop |
| c) T flip-flop | d) None of these. |

xvi) One-bit even parity error detection code fails to detect

- | | |
|-----------------------------|----------------------------|
| a) any even number of error | b) any odd number of error |
| c) both (a) and (b) | d) none of these. |

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.

$3 \times 5 = 15$

2. Simplify the Boolean function using K-map

$$F(W, X, Y, Z) = \sum m(0, 4, 5, 6, 8, 9) + \sum d(10, 11, 12, 13, 14, 15).$$



3. Implement the following function using all 4 : 1 multiplexers

$$F = \sum m (0, 2, 3, 6, 8, 9, 12, 14)$$

4. Implement a full-adder circuit using a 3 to 8 decoder with all active-low outputs and one additional logic gate if required.

5. Define the following terms in relation with logic families : 5 × 1

- a) propagation delay
- b) fan-in
- c) fan-out
- d) power dissipation
- e) floating inputs.

6. Find out the 7's complement of (- 756)₈.

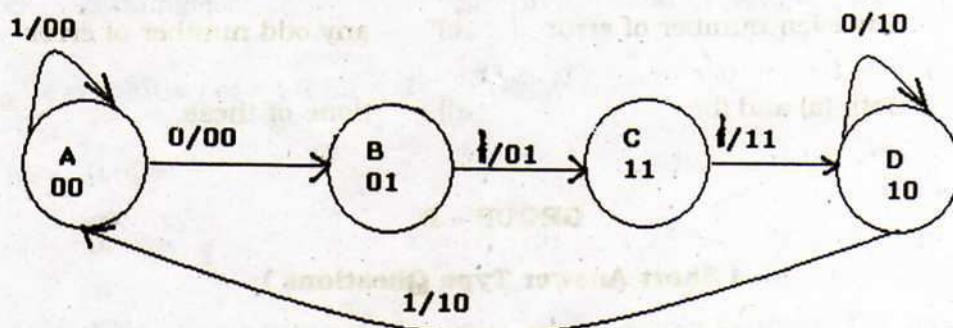
GROUP - C

(Long Answer Type Questions)

Answer any three questions.

3 × 15 = 45

7. a) Design an asynchronous 4-bit up-down counter and it will count up when a signal line $M = 0$ and count down when a signal line $M = 1$.
 b) Design a circuit that will function as prescribed by the state diagram shown below. Use S-R flip-flops for implementation.



State Diagram

6 + 9



8. a) With the help of necessary circuit diagram explain the operation dual slop ADC.
- b) A 4-bit binary ladder D/A converter with $R = 10 \text{ k}\Omega$ uses a reference of 5 V.
Find
- the ideal scale factor in V/step
 - the analog o/p corresponding to the binary i/p 0110
 - resolution in %
 - full scale o/p
 - the maximum deviation in volts from the best straight line in order to meet standard linearity.

$$5 + 5 \times 2 = 15$$

9. a) Design a BCD to 7-segment common anode display code converter using PROM type PLD.
- b) Implement the following functions using a $3 \times 4 \times 2$ PLA :

$$F_1(A, B, C) = \Sigma(3, 5, 6, 7)$$

$$F_2(A, B, C) = \Sigma(0, 2, 4, 7).$$

$$7 + 8$$

10. a) Simplify the following function by means of tabulation method :

$$F = \sum m(0, 1, 4, 7, 9, 11, 13, 15) + \sum d(3, 5).$$

- b) Simplify the following function using K-map.

$$\text{i) } F = \prod m(0, 1, 3, 8, 10, 15) \cdot \prod d(11, 13, 14)$$

$$\text{ii) } F = \sum m(0, 4, 7, 9, 13, 15) + \sum d(10, 14)$$

$$5 + 5 + 5$$

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

- EPROM
- PLD
- A/D converter
- Johnson counter.

END