

**ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2007****DIGITAL ELECTRONIC CIRCUITS****SEMESTER - 4**

Time : 3 Hours]

[Full Marks : 70

GROUP - A**(Multiple Choice Type Questions)**

1. Choose the correct alternatives of the following :

10 × 1 = 10

i) Which of the following is self-complementing code ?

- | | |
|------------------|----------------|
| a) Gray | b) Excess-3 |
| c) BCD | d) Parity code |
| e) Hamming code. | |

ii) Which one is known as reflected code ?

- | | |
|-----------------|-----------------|
| a) Gray | b) Excess-3 |
| c) BCD | d) Hamming code |
| e) Parity code. | |

iii) $(15)_{10} - (27)_{10}$ is equal to (using 2's complementing method) :

- | | |
|-----------|----------|
| a) 01100 | b) 10100 |
| c) 00100 | d) 11100 |
| e) 01010. | |

iv) 2's complement of which 5-bit binary number is the same number ?

- | | |
|-----------|----------|
| a) 11111 | b) 00001 |
| c) 01000 | d) 01111 |
| e) 10000. | |

24503-(II)-B

- 24503-(II)-B**

**GROUP - B****(Short Answer Type Questions)**

Answer any three of the following.

3 × 5 = 15

2. Check whether the Even parity Hamming code for 4-bit data, $(1001011)_2$ is correct or not. If not, correct the code. 4 + 1

3. Minimize the expression using K-Map technique ;

$$Y(A, B, C, D) = ABCD + \bar{B}CD + \bar{A} \cdot \bar{B} + A + BD.$$

4. Implement the function using only one 8×1 MUX and (connect only B,C,D with select lines to select the data inputs)

$$F(A, B, C, D) = \sum m(0, 1, 2, 5, 9, 11, 13, 15).$$

5. Draw neat diagram of 4-bit Bi-directional shift register using mode control (M). When M is logic zero then left shift and right shift for M is logic one.
6. Design Adder/Subtractor composite unit using 4-bit binary full adder and necessary logic gates.

GROUP - C**(Long Answer Type Questions)**

Answer any three questions of the following.

3 × 15 = 45

7. a) Minimize the following expression using K-map and realise the simplified function using NOR gates only

$$F(A, B, C, D) = \pi M(1, 2, 3, 8, 9, 10, 11, 14) d(7, 15) \quad 3 + 3$$

- b) Find the complement of $(735)_8$ 2
- c) Draw the logic circuit diagram for a 2-to-4 decoder with one active low enable line. Assume also that all the outputs of the decoders are active low. 4
- d) How do you cascade two 2-to-4 decoders to make one 3-to-8 decoder ? Draw the necessary circuit. 3



8. a) What is ROM and RAM ? What is the basic difference between EPROM and EEROM ? 5

b) A ROM is used to implement of the Boolean function :

$$F_1(A, B, C, D) = ABCD + \bar{A}\bar{B}\bar{C}\bar{D}$$

$$F_2(A, B, C, D) = (A + B)(\bar{A} + \bar{B} + \bar{C})$$

$$F_3(A, B, C, D) = \sum_m 13, 15$$

i) What is the minimum size of ROM required ?

ii) Determine the data in each location of the ROM. 5 + 5

9. a) Draw the state table of a JK flip-flop and write down its characteristic equation.

b) Draw the circuit of Master / Slave JK flip-flop and explain the operation of the circuit.

c) What do you mean by 0's catching and 1's catching phenomena in the master / slave JK flip-flop ? 5 + 6 + 4

10. a) Describe the operation of a Flash Type A/D converter with proper circuit. 6

b) What are the advantages and disadvantages of the Flash Type A/D converter ? 3

c) Discuss the following TTL parameters briefly : 3 × 2

i) Floating input

ii) Fan-out

iii) Switching speed.

11. a) Draw the timing diagram of a MOD-10 counter where the MOD-10 counter is designed by cascading MOD-2 followed by MOD-5 counter units.

b) Design a sequential circuit that implements the following state diagram. Use all D-type FF for the design. 7 + 8

