

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (E and EE/Inst.) I Semester (Main) Examination, December 2011**  
**DIGITAL ELECTRONICS AND LOGIC DESIGN**

Time: 3 Hours]

[Max. Marks: 75

**Note : Answer all questions from Part A. Answer any five questions from Part B.**

PART – A

(25 Marks)



1. Perform the following operations

a)  $567_{(8)} = (?)_2$

b)  $63DE_{(16)} = (?)_{(2)}$

2

2. Simplify the following by using k-maps

$f(A, B, C) = \sum (0, 2, 4, 6).$

3

3. Define FANIN, FANOUT of digital system.

2

4. Distinguish between an encoder and a decoder.

3

5. Realize the EX-OR operation using only NOR gates.

3

6. Is a magnitude comparator a combinational circuit or a sequential circuit? Explain.

2

7. Distinguish between a synchronous counter and an asynchronous counter.

3

8. What is a race-around condition? How is it avoided?

2

9. What is a Register? Give some applications of a Register.

2

10. Draw a CMOS inverter and explain its operation.

3

PART – B

(50 Marks)

11. Using Karnaugh maps, find minimal SOP expressions for the following logic functions.

a)  $F = \sum_{w,x,y,z} (0, 1, 2, 3, 7, 8, 10, 11, 15)$

3

b)  $F = \sum_{w,x,y,z} (4, 5, 9, 13, 15) + d(0, 1, 7, 11, 12)$

4

c)  $F = \sum_{A,B,C,D} (1, 5, 12, 13, 14, 15) + d(7, 9).$

3

12. Obtain the prime-implicant chart for the following logic function and obtain the minimal expression  $F(A, B, C, D, E) = \sum (0, 1, 2, 3, 4, 5, 10, 14, 15, 20, 21, 24, 25, 26, 27, 28, 29, 30)$ . 10
13. a) What is multiplexer ? Write a short notes on  $8 \times 1$  multiplexer. 5  
b)  $F(n) = \sum m(5, 7, 13, 15, 16, 20, 25, 27, 29, 31)$  realize using  $2^{n-1} \times 1$  multiplex. 5
14. a) Design 8 to 3 line encoder with its design considerations. 5  
b) Design a BCD to Excess-3 code convertor. 5
15. a) Write the truth table of JK flipflop and explain the principle of operation of clocked JK flipflop with output waveform. 5  
b) Convert a D flipflop into T flipflop and explain its operation. 5
16. Draw the block diagrams of programmable logic devices ROM, PLA, PAL and explain their structural differences. 10
17. a) Design a asynchronous modulo-10 counters. 5  
b) Draw the circuit of serial adder ? Obtain its state diagram and state table. 5