

**FACULTY OF ENGINEERING**  
**B.E. 2/4 (CSE) I Semester (Old) Examination, December 2011**  
**LOGIC AND SWITCHING THEORY**

Time: 3 Hours]

[Max. Marks: 75

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

## PART – A

(25 Marks)

Answer **all** questions.

1. Describe with the help of a suitable example why a NOR gate is called a universal gate. What is a universal gate ?
2. What is the purpose served by a parity bit ? Give a mechanism to generate an odd parity bit for a four digit binary number.
3. Distinguish between canonical forms and standard forms of Boolean equations.
4. What are the advantages (or disadvantages) of Karnaugh map method over algebraic method ?
5. Design a half adder circuit using any one of the universal gates and draw the circuit.
6. Distinguish between a decoder and demultiplexer.
7. A synchronous sequential circuit using D flip flop has input X and output Y. The excitation equation is  $D_0 = Q_0 \bar{X} + \bar{Q}_0 X$ . Draw the circuit  $Y = Q_0 \cdot X$ .
8. Draw the logic diagram of a RS master slave flip flop and explain its operation.
9. Distinguish between a synchronous and asynchronous binary counter.
10. State the conditions for a function to be symmetric.

## PART – B

(50 Marks)

11. a) State and prove DE Morgan's theorem.  
 b) Distinguish between min term and max term with an example. (6+4)
12. Using Karnaugh map method simplify  $f(P, Q, R, S) = \sum m(2, 3, 12, 13, 14, 15)$  and express it as a product of sum.



13. Design a full adder circuit using carry look ahead adder and draw the circuit. 10
14. a) Distinguish between a latch and flip flop.  
 b) Design a BCD counter using JK flip flops. (2+8)
15. Identify whether the following function is symmetric or not and find the number and variables of symmetry :  
 $f(x_1, x_2, x_3) = \sum (0, 2, 3, 4, 5, 7)$ . 10
16. a) Distinguish between different types of shift registers.  
 b) What are the conditions to be satisfied to call a function symmetric ?  
 c) Is the function of  $(x, y, z) = \sum (0, 1, 3, 5, 6)$  symmetric. (3+3+4)
17. Write brief notes on : (3+3+4)
- a) Equivalence function  
 b) Parity checking  
 c) Encoders.