

BTS 118 (F)

B.TECH. DEGREE III SEMESTER (SUPPLEMENTARY) EXAMINATION IN
INFORMATION TECHNOLOGY/COMPUTER SCIENCE AND ENGINEERING
JUNE 2001

IT/CS 304 DIGITAL CIRCUITS AND LOGIC DESIGN
(1995 Admissions)

Time: 3 Hours

Maximum Marks: 100

1. Answer all questions.
2. All Questions carry equal marks.

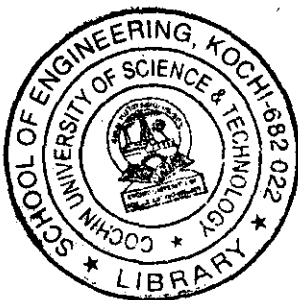
- I. a. State and prove the Distributive laws of Boolean Algebra 10
- b. Prove the following: 10
- (i) $A + AB = A$, (ii) $A + A'B = A + B$ (iii) $AB + AB' = A$

OR

- II. a. (i) Find the decimal number whose binary representation is 10011 3
(ii) Convert the decimal number 1.8125 to binary 3
(iii) Represent the decimal numbers 0, 1, 2, and 3 in the Grey Reflected binary code 4
- b. Given the logical function of five variables, $f(a,b,c,d,e) = [a+(bc)'](d+be)'$ express the function as a sum of products. 10
- III. a. Use Karnaugh map to reduce the following function 8
- $$f = ABC'D' + AB'C'D' + (AB)'CD + A'B'CD' + AB'CD'$$
- b. Minimize the following expression using Karnaugh map method: 6
- (i) $\sum m(0, 1, 2, 3, 4, 5, 9, 10, 12, 13, 14, 15)$ 6
- (ii) $BC' + A'B + A'B'D' + BCD + AB'C'D'$ 6

OR

- IV. a. Using a minimum number of two-input NAND gates, design a logic circuit to realize the logic function $Y = \sum m(0, 1, 2, 3, 8, 9, 10, 11)$ 10
- b. With the help of input-output characteristics of an inverter, discuss what is meant by noise-margin 10



(Turn over)

- V. a. Explain tristate logic 10
 b. How is TTL logic interfaced to CMOS logic? 10

OR

- VI. a. Draw the circuit of a TTL NAND gate with active pull-up, and discuss the operation of the circuit. How is the circuit modified to have a tristate output? 10
 b. Design a CMOS circuit to realize the logic function $Y = (AB + C)'$ 10
- VII. a. Design a circuit with JK F/Fs and two input NAND gates that count the sequence 000, 001, 100, 101, 111, 000, 10
 b. Draw the circuit of a 4-bit shift register with a mode control input, M. When $M = 0$, 4 – bits of data are loaded into the shift register and when $M = 1$, data is shifted to the right, with “1” being loaded in the leftmost bit. 10

OR

- VIII. a. Draw the circuit of a binary up/down converter and explain its operation 10
 b. Compare the features of TTL and ECL logic families. 10
- IX. a. Explain the basic structure and operation of an EPROM 10
 b. Write short notes on the following: 10
 (i) VLSI (ii) MOSFET

OR

- X. a. Explain the advantages and disadvantages of programmed logic. 10
 b. Write short notes on the following: 10
 (i) BJT RAM cell (ii) LSI (iii) data transmission
