Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90151

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Third Semester
Computer Science and Engineering
CS 8351 – DIGITAL PRINCIPLES AND SYSTEM DESIGN
(Common to Electronics and Telecommunication Engineering/Information Technology)
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is the main difference between canonical and standard form ?
2. Given two binary numbers A = 1010010 and B = 1000011, find A – B and B – A using 2's complements.
3. What is multiplexer ? Show the block diagram of 4 × 1 multiplexer.
4. What is magnitude comparator ?
5. Why is the stimulus signals in a test bench be synchronized to the inactive edge of the clock of the sequential circuit that is to be tested ?
6. Differentiate between synchronous and asynchronous sequential circuit.
7. What is hazard and what is the cause of hazard in combinational and sequential circuits ?
8. What are the needs for asynchronous circuits ?
9. How many 32K × 8 RAM chips are needed to provide a memory capacity of 512K bytes ?
10. Compare SRAM and DRAM.

PART – B (5×13=65 Marks)

11. a) Simplify the following Boolean function into (i) sum-of-products form and (ii) product-of-sums form and implement the simplified functions using AND, OR gates $F(A, B, C, D) = \Sigma(0, 1, 2, 5, 8, 9, 10)$. (13)

(OR)

b) What are universal gates ? Construct any four basic gates using only NOR gates and using only NAND. (13)

12. a) What is BCD adder ? Design an adder to perform arithmetic addition of two decimal digits in BCD. (13)

(OR)

b) i) Design a 4-bit adder/subtractor circuit and explain. (8)

ii) Implement Boolean function $F(x, y, z) = \Sigma(1, 2, 6, 7)$ using multiplexer. (5)

13. a) Design a 3-bit binary counter using T flip flops. (13)

(OR)

b) i) What are registers ? Construct a 4-bit register using D flip-flops and explain the operations on the register. (7)

ii) With diagram explain how two binary numbers are added serially using shift registers. (6)

14. a) Draw the block diagram of a typical asynchronous sequential circuit and explain. Also write the procedure for obtaining transition table from circuit diagram of an asynchronous sequential circuit. (13)

(OR)

b) An asynchronous sequential circuit is described by the following excitation and output functions :

$Y \equiv x_1x'_2 + (x_1 + x'_2)y$

$Z \equiv y$

i) Draw the logic diagram of the circuit. (6)

ii) Derive the transition table and output map. (7)

15. a) What is PLA ? Draw a PLA circuit to implement the Boolean functions : (13)

$F1 \equiv AB' + AC + A'BC'$

$F2 \equiv (AC + BC)'$

(OR)

b) What is ROM and why is it necessary to use ROM in a computer ? Explain various types of ROM in detail. (13)

PART – C (1×15=15 Marks)

16. a) A sequential circuit with two D flip-flops A and B, two inputs x and y; and one output z is specified by the following next-state and output equations :

$A(t+1) = xy' + xB$

$B(t+1) = xA + xB'$

$z = A$

i) Draw the logic diagram of the circuit. (8)

ii) List the state table for the sequential circuit. (4)

iii) Draw the corresponding state diagram. (3)

(OR)

b) Design a combinational circuit that converts a four-bit Gray code to a four-bit binary number using exclusive-OR gates.