

B.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2024.

Third Semester

Computer Science

Skill Based Subject – DIGITAL DESIGN

(For those who joined in July 2021-2022)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- What is the binary equivalent of  $(0.8125)_{10}$ ?  
(a)  $(0.0111)_2$  (b)  $(0.1101)_2$   
(c)  $(0.0101)_2$  (d)  $(0.0011)_2$
- Which of the following is equivalent to  $AB + \bar{A}C$ ?  
(a)  $AB + \bar{A}C + BC$  (b)  $(A + B)(\bar{A} + C)$   
(c)  $AB + BC$  (d)  $\bar{A}C + BC$

- Which code allows manufacturers to standardize computer hardware?  
(a) BCD (b) Gray code  
(c) ASCII (d) EBCDIC
- How many fundamental products are there for two variables?  
(a) 2 (b) 3  
(c) 4 (d) 8
- Which of the following is called data selector  
(a) Multiplexer (b) Demultiplexer  
(c) Flip Flop (d) Encoder
- 2's complement of  $(-68)_{10}$  is \_\_\_\_\_  
(a) 0011 1100 (b) 1011 0011  
(c) 1100 0011 (d) 1011 1100
- Which of the following is a bistable electronic circuit?  
(a) Multiplexer (b) Demultiplexer  
(c) Flip Flop (d) Encoder

- The functional description of a sequential circuit is \_\_\_\_\_  
(a) Finite State Machine  
(b) Loop  
(c) Mealy Model  
(d) Moore Model
- If one leg of NOR gate is ground, what will be the output if the other leg has data X?  
(a) 1 (b) 0  
(c) x (d)  $\bar{X}$
- What happens when shift/load is low?  
(a) Serial input (b) Parallel input  
(c) Serial output (d) Parallel output

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).  
Each answer should not exceed 250 words.

- (a) Convert  
(i)  $(3574)_8$  to binary  
(ii)  $(9AF)_{16}$  to decimal  
Or  
(b) Write a note on NAND gate as a universal logic gate.

- (a) Simplify  
 $Y = (A + B)(A^1(B^1 + C^1))^1 + A^1(B + C)$   
 $Y = (A + B)(\overline{A(B + C)}) + \bar{A}(B + C)$   
Or  
(b) Give the simplest logic circuit for the following logic equation.  
 $F(A, B, C, D) = \sum m(7) + d(10, 11, 12, 13, 14, 15)$
- (a) Write a note on half adder.  
Or  
(b) Add  $(37)_{10}$  and  $(-115)_{10}$  in binary.
- (a) Write a note on flip flops.  
Or  
(b) Write a note on D flip flop.
- (a) Write a note on registers.  
Or  
(b) Give the sketch of a parallel in serial out register.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Convert

(i)  $(175)_{10}$  to octal

(ii)  $(23.6)_{10}$  to binary

Or

(b) Explain gray code.

17. (a) (i) Prove that

$$A(A^1 + C) (A^1B + C) (A^1BC + C^1) = 0$$

(ii) A truth table has low output for the first three input conditions: 000, 001 and 010. If all other inputs are high, what is the Product of Sums circuit?

Or

(b) Simplify using Karnaugh map and draw the Sum of Products circuit

$$F(A,B,C,D) = \sum m(3,4,5,7,9,13,14,15)$$

18. (a) Explain 7 segment decoder

Or

(b) Perform binary subtraction.

(i)  $(83)_{10} - (16)_{10}$

(ii)  $(68)_{10} - (-27)_{10}$

19. (a) Explain edge triggered RS flip flop.

Or

(b) Explain JK Master – Slave flop flop.

20. (a) Explain serial in-serial out register.

Or

(b) Explain the universal shift register.