

**2024/FYUG/ODD/SEM/
CSCDSC-101T/134**

FYUG Odd Semester Exam., 2024

COMPUTER SCIENCE

(1st Semester)

Course No. : CSCDSC-101T

(Digital Computer Fundamentals)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

UNIT—I

1. Answer any *two* from the following : $2 \times 2 = 4$

(a) Write down the characteristics of computer.

(b) Write down the limitations of 2nd generation computer.

(c) What are the advantages of mainframe computer?

(2)

2. Answer any *one* from the following : 10
- (a) Explain the difference between primary memory and secondary memory with examples.
 - (b) Explain different input and output devices used in computer system.

UNIT—II

3. Answer any *two* from the following : $2 \times 2 = 4$
- (a) Convert $(5A67C)_{16} = (?)_8$
 - (b) What do you mean by γ 's complement and $(\gamma - 1)$'s complement? Give example.
 - (c) What are minterm and maxterm? Give example.

4. Answer any *one* from the following : 10
- (a) (i) Represent the decimal number $(8620)_{10}$ to the following bases :
BCD, Excess-3, 2421 and Binary
 $2+2+2+2=8$
 - (ii) Find the 10's complement of $(935)_{11}$. 2
 - (b) (i) Simplify the Boolean function using K-map : 3
 $F = A'B'C' + B'CD' + A'BCD' + AB'C'$

(3)

- (ii) What is don't care condition? Simplify the F in sum of products using don't care condition $d : 1+2=3$
 $F = Y' + X'Z'$
 $d = YZ + XY$
- (iii) Prove that NAND and NOR are universal gates. 4

UNIT—III

5. Answer any *two* from the following : $2 \times 2 = 4$
- (a) What is combinational circuit? What are uses of combinational circuit?
 - (b) What do you mean by code conversion in digital logic? Give example.
 - (c) Write down the functions of encoder.
6. Answer any *one* from the following : 10
- (a) Design a combinational circuit whose input is 4 bit number and output is 2's complement of the input number.
 - (b) (i) Implement full adder with 4×1 MUX. 5
 - (ii) Design a combinational circuit with a 4×2 ROM that implements following two Boolean functions : 5
 $F_1(A_1, A_0) = \Sigma(1, 2, 3)$
 $F_2(A_1, A_0) = \Sigma(0, 2)$

UNIT—IV

7. Answer any two from the following : $2 \times 2 = 4$

- Write down the difference between combinational circuit and sequential circuit.
- What is master-slave flip-flop? Give example.
- What do you mean by state table and state diagram of a sequential circuit?

8. Answer any one from the following : 10

- A sequential circuit has two flip-flops (A and B), one input x , it is described by the following input function :

$$T_A = Bx$$

$$T_B = X$$

$$Y = AB$$

- Draw the logic diagram.
 - Derive the state table.
 - Draw the state diagram.
 - Derive next state equation for A and B. $2\frac{1}{2} \times 4 = 10$
- Explain the design of a counter. 6
 - Briefly explain flip-flop excitation table. 4

UNIT—V

9. Answer any two from the following : $2 \times 2 = 4$

- What do you mean by serial transfer in shift register?
- Write down the difference between synchronous and asynchronous counter.
- Define MAR and MBR.

10. Answer any one from the following : 10

- Design a BCD counter with $J-K$ flip-flop.
- Write down the properties of RAM cells. 3
 - Explain 4-bit register with parallel load. 4
 - Design 4×3 IC RAM cell. 3
