

(FOR THE CANDIDATES ADMITTED

25UCS102

DURING THE ACADEMIC YEAR 2025

ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER-2025

BSC COMPUTER SCIENCE-AIDED & SF

MAXIMUM MARKS: 75

SEMESTER: I

TIME : 3 HOURS

PART - III

25UCS102 – DIGITAL FUNDAMENTALS AND ORGANIZATION

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

(K1)

1. Which of the following is the binary equivalent of decimal number 25?
(a) 11001 (b) 10101 (c) 00110 (d) 10101
2. Which law is described by the equation $A + AB = A$?
(a) Distributive Law (b) Absorption Law (c) DeMorgan's Theorem (d) Associative Law
3. Which Flip-Flop toggles its output on every clock pulse when $J = K = 1$?
(a) SR Flip-Flop (b) T Flip-Flop (c) JK Flip-Flop (d) D Flip-Flop
4. Which technology by passes by CPU of the following is used to transfer data directly between memory and peripherals?
(a) Handshaking (b) Memory-mapped I/O (c) Direct Memory Access (d) Isolated I/O
5. Which of the following cache mapping techniques allows a block of main memory to be placed in multiple cache locations?
(a) Direct Mapping (b) Fully Associative Mapping
(c) Set-Associative Mapping (d) Associative Mapping

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. Define BCD
7. Write DeMorgan's Law.
8. Expand PIPO
9. List the advantages of I/O bus.
10. What is the role of Match Logic in Associative memory?

SECTION – B

(5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Convert the decimal numbers to binary: (i) $(13)_{10}$ (ii) $(12.75)_{10}$
(OR)
b) Define 1's complement and explain 1's complement subtraction with an example.
12. a) Simplify the Boolean expression using Karnaugh Map: $F(A,B,C) = \Sigma(0,2,4,5,6)$.
(OR)
b) Construct a NAND gate using basic logic gates and interpret its truth table.

(CONT...2)

13. a) Design a half subtractor circuit and explain its working principle using a logic diagram and truth table.
(OR)
b) Compare SR and JK Flip-Flops in terms of functionality, timing, and input conditions.
14. a) Demonstrate the operation of PIPO and SISO shift registers with appropriate timing diagrams and block representations.
(OR)
b) Distinguish between Isolated I/O and Memory-mapped I/O by applying their differences in system level data flow.
15. a) Illustrate the communication process between CPU and Input–Output Processor using a block diagram.
(OR)
b) Define Cache Memory and apply the concept of direct mapping to describe how cache memory is organized and accessed.

SECTION – C**(5 X 8 = 40 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K4 (Or) K5)**

16. a) Convert the following binary number 110110101 to Octal, Decimal and Hexadecimal.
(OR)
b) Compare and contrast 9's and 10's complement methods with examples, and evaluate their use in binary arithmetic.
17. a) Analyze any three basic laws of Boolean algebra and demonstrate how they simplify logical expressions with examples.
(OR)
b) Construct the SOP and POS expressions for the Boolean function $F = A'B + AB'$, and justify your derivation using Boolean identities.
18. a) Design a 4-to-1 multiplexer and analyze its logic diagram to explain its selection mechanism.
(OR)
b) Examine the structure of a Full Adder and evaluate how it performs bit-wise binary addition with carry logic.
19. a) Evaluate the working of Direct Memory Access (DMA) and assess its role in improving I/O efficiency.
(OR)
b) Analyze asynchronous data transfer using the handshaking method and explain its significance in reliable data communication.
20. a) Illustrate the memory hierarchy in computer architecture with suitable diagram.
(OR)
b) Analyze the organization of Associative memory with a neat sketch.

Ethical paper