

1M1N25182

(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2025

MCS1C01 - Discrete Mathematical Structures

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

PART – A

Questions 1 to 7. Answer any four. Each questions carries two weightage.

1. Define four connectives with truth table.
2. Simplify the Boolean expression $(A + B)(A + B')$ using Boolean laws.
3. Show that $P \rightarrow Q$ and $\neg P \vee Q$ are logically equivalent.
4. What is a coset? Differentiate between left cosets and right cosets with examples.
5. Give an example of two rings that are isomorphic.
6. Show that number of odd vertices in a graph is even.
7. Compare Euler Graph and Hamiltonian Graph.

(4 x 2 = 8 Weightage)

PART – B

Questions 8 to 14. Answer any four. Each questions carries three weightage

8. Show that $\neg P \wedge (\neg Q \wedge R) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$.
9. The set A precedes B, if A is a subset of B. The what is $(A \cup B)$ and $(A \cap B)$.
10. Is the “divides” relation a partial ordering on the set of non-zero integers? Explain.
11. Explain the term
 - a. Walk
 - b. Path.
 - c. Cycle.
 - d. Circuit.
 - e. Tree.
 - f. Spanning Tree.
12. Explain Dijkstra’s Algorithm.
13. Explain cut-sets with examples.
14. Explain the principle of duality in lattices and Boolean algebra. Illustrate with suitable examples.

(4 x 3 = 12 Weightage)

PART - C

Questions 15 to 18. Answer any two. Each questions carries five weightage

15. Explain Kruskal's Algorithm with an example.
16. Define a group. Prove that the set of integers $(\mathbb{Z}, +)$ forms a group under addition.
17. Define composition of relations. If $R = \{(1,2), (2,3)\}$ and $S = \{(2,1), (3,2)\}$, find $R \circ S$ and $S \circ R$.
18. State and prove the Pigeonhole Principle. Use it to prove that in any group of 13 people, at least two will have birthdays in the same month.

(2 x 5 = 10 Weightage)

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2025

MCS1C02 - Advanced Data Structures

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

Part AAnswer any *four* questions. Each carries 2 weightage.

1. Define Data Structure and explain its types.
2. What is an Abstract Data Type (ADT)? Give one example.
3. Write the difference between linear search and binary search.
4. List any two applications of a stack.
5. What is recursion? Mention two of its characteristics.
6. Define binary tree and threaded binary tree.
7. What is hashing? Explain the purpose of hash functions.

(2 x 4 = 8 weightage)

Part BAnswer any *four* questions. Each carries 3 weightage.

8. Explain time and space complexity of an algorithm with examples.
9. What is the frequency count? Explain its relevance.
10. Discuss the implementation of a queue using an array.
11. Compare singly linked list and doubly linked list.
12. Explain binary search tree and its traversal techniques.
13. Describe heap structures and their basic operations.
14. Write a note on linear probing and quadratic probing in hashing.

(3 x 4 = 12 weightage)

Part C

Answer any *two* questions. Each carries 5 weightage.

15. Explain sorting algorithms: bubble sort, insertion sort, and quick sort with their complexities.
16. Describe stack operations and explain its applications in expression evaluation with an example.
17. Explain AVL-Trees and B Trees with operations and applications
18. Discuss rehashing and separate chaining with advantages and disadvantages.

(5 x 2 = 10 weightage)

1MIN25184

(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2025

MCS1C03 - Theory of Computation

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

PART A (Answer any four. Each question carries *Two* weightage.)

1. What is the use of NFA with epsilon moves?
2. Explain the working model of a finite automata.
3. Distinguish between DFA and NFA with the help of examples.
4. Briefly explain regular languages.
5. Whether the languages accepted by a DPDA and NPDA are same? Justify your answer?
6. Give DFA for the language $L = \{ \text{all strings with not more than two 'a' s; } \Sigma = \{a, b\} \}$.
7. Write note on different variants of Turing Machines.

(4 x 2 = 8)

PART B (Answer any four. Each question carries *Three* weightage.)

8. Briefly explain the PCP problem.
9. Explain homomorphism and substitution with suitable examples.
10. Explain the pumping lemma for context free sets.
11. Distinguish between P and NP class of problems.
12. Convert the grammar in to CNF.

$$S \rightarrow aS \mid aS \mid aBB \mid ab$$

$$B \rightarrow Bd \mid cd$$

13. Construct a PDA for the language $L = \{ b^n a^n \mid n \geq 1 \}$
14. Explain Linear Bounded Automata.

(4 x 3 = 12)

PART C (Answer any two. Each question carries *Five* weightage)

15. State and prove equivalence of deterministic and non-deterministic finite automata.
16. Compare closure properties of CFL's and DCFL's.
17. Explain Turing machine. Design a TM to accept the language $L = \{ 0^n 1^n 2^n \mid n \geq 0 \}$.
18. Explain the Halting problem. Show that it is undecidable.

(2 x 5 = 10)

1M1N25185

(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2025

MCS1C04 - The Art of Programming Methodology

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

Part A**Answer any 4 questions. Each question carries 2 weightage**

1. Define structured programming and list its advantages.
2. Draw four basic flowchart symbols and describe their functions.
3. What is an algorithm? Mention two characteristics of a good algorithm.
4. Differentiate between compiler and interpreter.
5. Explain the importance of modular programming.
6. What is recursion? Give a simple example.
7. List any four data types available in C.

(4x2 = 8 weightage)**Part B****Answer any 4 questions. Each question carries 3 weightage**

8. Explain the top-down design approach with a suitable example.
9. Write a C program to find the factorial of a number using a function.
10. Compare and contrast while, do-while, and for loops.
11. Describe the development cycle of a C program from writing to execution.
12. Write a C program to read and print n numbers using arrays.
13. Explain different types of program errors with examples.
14. Write a recursive function in C to compute the nth Fibonacci number.

(4 x 3 = 12 weightage)

Part C

Answer any 2 questions. Each question carries 5 weightage

15. Design a modular C program to read an array, sort it in ascending order, and print the result.
 16. Draw a flowchart and write a C program to convert a decimal number to binary using iteration.
 17. Write a menu-driven C program to perform insertion, deletion, and searching in an array.
 18. Develop a flowchart and write a C program to find the GCD of two numbers.
- (2 x 5= 10 weightage)**

1M1N25186

(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2025

MCS1C05 - Computer organization and Architecture

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

PART AQuestions 1 to 7. Answer any *four*. Each question carries *two* weightage.

1. Explain different Logic Gates with Truth Table.
2. What is Decoder?
3. Explain multiplexer.
4. Draw the labelled block diagram and excitation table for JK flip-flops.
5. What are different addressing modes of 8086 micro-processors.
6. What is memory interleaving?
7. Explain micro-instructions with an example.

(4x2 = 8 weightage)

PART BQuestions 8 to 14. Answer any *four*. Each question carries *three* weightage.

8. Explain the working universal shift register.
9. Differentiate H/W control and Micro-programmed control Unit.
10. Illustrate signed binary addition.
11. Explain direct mapping with example.
12. Differentiate programmed I/O and interrupt I/O.
13. Distinguish between ROM and RAM.
14. Discuss the principles behind the Booth's.

(4 x 3 = 12 weightage)

PART C

Questions 15 to 18. Answer any *two*. Each question carries *five* weightage.

15. Describe function of Asynchronous counter.
16. Draw and explain Arithmetic unit.
17. Illustrate memory hierarchy in detail.
18. What is DMA ? With the Block diagram Explain the Function of DMA controller and different operating modes of DMA.

(2x5=10weightage)