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Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2023

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. State the rules for producing well formed formula. Give one example of it.

2. Explain the principle of duality with suitable example.

3. Define closure of a relation.

4. State and explain pigeon hole principle.

5. Discuss semigroup with an example.

6. Explain integral domain with an example.

7. Define Bipartite graph. Give example.

(4x2=8 weightage)

PART B

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

8. Explain theory of inference for the statement calculus with suitable example.

9. Define Boolean algebra, Boolean function, and Boolean expression. Give example.

10. Show that every chain is a distributed lattice.

11. Write a note on permutation group and cyclic group.

12. Explain Hamiltonian path and circuit.

13. Discuss basic properties of Algebraic system defined by Lattices

14. Illustrate Dijkstra's algorithm with example.

(4x3=12 weightage)

PART C

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

15. (a) Given $h(x) = (1 + 2x)/(7 + x)$ then find $h^{-1}(x)$.

    (b) Let say S is the set of all the people in the world and r is the relation defined on a set Such that $(a,b) \in R$, where a and b are people if a is taller than b then find whether (S,R) is a poset or not ?

16. Demonstrate Homomorphism, Ring and Field with examples.

17. Prove the following:

    I) For any a, b, c and d in a lattice $(A, \leq)$, if $a \leq b$ and $c \leq d$ them $a \vee c \leq b \vee d, a \wedge c \leq b \wedge d$

    II) For any a and b in Boolean algebra prove that: $\overline{a \vee b} = \bar{a} \wedge \bar{b}, \overline{a \wedge b} = \bar{a} \vee \bar{b}$

18. Explain about Kruskal's Algorithm with suitable example

                                                                    (2x5=10 weightages)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2023

MCS1C02 – Advanced Data 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 Skip Lists.

2. Define Big Oh.

3. Differentiate direct recursion and indirect recursion.

4. What is B-Tree? Explain.

5. What are applications of heaps?.

6. What do you understand about a *minimal spanning tree*?

7. What is meant by hash-table? What is its importance?

                                                     (4x2=8 weightage)

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

8. What is the trade off between time and space complexity?

9. Write a note on triplet representation of Sparse matrix.

10. Perform heap sort on the data : 26, 10, 51, 1, 65, 11, 29, 50, 12, 70.

11. What is m-search tree? Give examples.

12. Explain Haffman's algorithm

13. What are leftist heap trees? Explain insertion operation on leftist heap.

14. What is a Splay Tree? Give properties.

                                                     (4x3=12 weightage)

PART C

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

15. Explain algorithm for conversion of infix expression to postfix expression.

16. Explain algorithms for linear search and binary search. Compare their complexities.

17. Explain various collision handling methods in hashing.

18. Explain bubble sort and quicksort algorithms with the help of suitable examples. Analyze complexities of both algorithms.

                                                     (2x5=10 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2023

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 epsilon NFA?

2. Give applications of Finite Automata with examples.

3. Define regular grammar.

4. What do you mean by closure properties of a language?

5. Define Type 0 grammar.

6. Whether languages accepted by DTM and NDTM are the same?

7. Write note on different variants of Turing Machines?

(4 x 2 = 8 weightage)

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

8. Give DFA for the language. L = {all strings with NOT more than three 'b' s; Σ = {a, b} }.

9. Explain the pumping lemma for regular language.

10. State equivalence of CFG and PDA (no proof is needed).

11. Define Normal forms CNF and GNF with one example each.

12. Give the difference between Turing acceptable and Turing decidable class of languages.

13. Explain LBA with a suitable example.

14. What do you mean by saying that a problem is NP complete.

(4 x 3 = 12 weightage)

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

15. How to convert a given NFA to DFA? Give the steps and procedure, by taking a suitable example.

16. Construct a DPDA for the language L = { $0^n 1^n$ | n ≥ 1}

17. Explain PCP problem with suitable examples.

18. Explain Chomsky hierarchy of languages, with giving examples for each.

(2 x 5 = 10 weightage)

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2023

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. What is format specifier?

2. Describe the steps involved in executing a program written in C.

3. Explain conditional operator with example.

4. Explain the role of C pre-processor.

5. What is string? How they are declared?

6. Draw a Flow chart to display the Fibonacci series up to n.

7. Mention the difference between character array and integer array.

(4 x 2 = 8 weightage)

Part B
Answer any 4 questions. Each question carries 3 weightages

8. Explain Union with Suitable example.

9. Write a program to insert a new integer into a sorted integer array.

10. Write a C program to sort n strings in ascending order using pointers.

11. Explain different looping structures in C with examples.

12. What do you mean by command line arguments? Write a program to find the sum and average of n numbers using command line arguments.

13. Write a note on Macros.

14. Illustrate with suitable examples "Syntax error", "Run time error", and "Logical error"

(4 x 3 = 12 weightage)

Part C
Answer any 2 questions. Each question carries 5 weightages

15. Explain different storage class specifies with example.

16. What is dynamic memory allocation? Explain the different dynamic memory allocation function in C.

17. Write a program to accept a few lines of text, convert it to lowercase and store it in a file called lowertxt.dat

18. Design a flow chart to convert a decimal number into an equivalent Hexadecimal number and write C program

(2 x 5= 10 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2023

MCS1C05 – Computer Organization and Architecture

(2022 Admission onwards)

Time: 3 hours　　　　　　　　　　　　　　　　　　　Max. Weightage : 30

PART A

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

1. Draw and explain SR flip flop.

2. Outline the working of 4:1 multiplexer.

3. Differentiate between cash memory and virtual memory.

4. Explain virtual interrupt.

5. Explain working of DMA.

6. With example explain timing diagram.

7. Outline 8086 register organisation.

(4x2=8 weightage)

PART B

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

8. Design 2-bit asynchronous binary counter using JK flip flops.

9. Describe the register organisation of CPU.

10. Explain hardwire control unit.

11. Identify the steps in execution of branch instruction.

12. Explain memory interleaving.

13. Explain shift register with suitable example.

14. Explain the addressing mode of 8085.

(4x3=12 weightage)

PART C

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

15. Explain in detail about the organisation and working of virtual memory system.

16. With a suitable example explain working of binary counters. Write a note on binary codes.

17. Give a detailed account of micro programmed and hardwired control unit.

18. Explain steps in non-restoring division algorithm. Illustrate the algorithm with a suitable example.

(2x5=10 weightages)