1M1N21037 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2021

MCS1C01 – Discrete Mathematical Structures

(2019 Admission onwards)

Time: 3 hours Max. Weightage : 30

PART A

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

1. Show that $\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$
2. Explain different connectives using in propositional logic.
3. Explain equivalence relation with a suitable example.
4. Define a) sublattice. b) complemented lattice
5. Explain Permutation groups.
6. Define Eulerian Circuits and Hamiltonian Circuits.
7. What is a minimum spanning tree? Explain with example.

(4 x 2 = 8 weightage)

PART B

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

8. Show that $\neg (P \wedge Q) \rightarrow (\neg P \vee (\neg P \vee Q)) \Leftrightarrow (\neg P \vee Q)$
9. Let X={1,2,3} and f, g, h, and s be functions from X to X given by

   f = {(1,2), (2,3) ,(3,1)} g = {(1,2),(2,1),(3,3)}

   h={(1,1) , (2,2), (3,1)} s={(1,2),(2,2), (3,3)}

   find a) f.g; b) g.f ; c) s.g; d) s.s
10. Show that every chain is a distributive lattice.
11. Differentiate Homomorphism and Isomorphism with examples.
12. Prove that if G is a finite group of order n with H a subgroup of order m, then m divides n.
13. Let A be the set of factors of a particular positive integer m and let $\leq$ be the relation divides, ie., $\leq$ = {(x,y) such that $x \in A \wedge y \in A \wedge$ (x divides y)}

    Draw Hasse diagrams for a) m =2 ; b) m=6; c) m=30 d) m=120 e) m =12 f) m=45
14. Prove that tree with n vertices has n-1 edge.

(4 x 3 = 12 weightage)

PART C

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

15. Show that $(x)(p(x) \vee Q(x) \Rightarrow (x)\, p(x) \vee (\exists x)\, Q(x)$

16. Explain Kruskal's algorithm with example.

17. a) Explain rings and fields b)State and prove pigeon hole principle.

18. Show that the following Boolean expressions are equivalent to one another .

    a) $(x \oplus y) * (x' \oplus z) * (y \oplus z)$

    b) $(x * z) \oplus (x' * y) \oplus (y * z)$

    c) $(x \oplus y) * (x' \oplus z)$

    d) $(x * z) \oplus (x' * y)$

(2 x 5= 10 weightage)

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Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2021

MCS1C02 – Advanced Data Structures

(2019 Admission onwards)

Time: 3 hours Max. Weightage : 30

PART A

Answer any *four* questions. Each question carries *two* weightage

1. What are the properties of a good algorithm? Explain.
2. Explain time and space complexity. How are they related?
3. How is *stack* different from *queue* operationally?
4. Compare and contrast array and linked list?
5. Define recursion. Give a recursive algorithm to find the sum of n numbers.
6. Compare computational complexities of leftist heap and skew heap.
7. Give an example for Splay trees.

(4 x 2 = 8 weightage)

PART B

Answer any *four* questions. Each question carries *three* weightage

8. Define BST. What is its importance?
9. Give and explain an algorithm to insert a node in a linked list.
10. Explain algorithms for inorder and postorder traversals.
11. Explain merge operation in leftist heap. Give its computational complexity.
12. Explain properties of Red-Black trees.
13. With the help of a suitable example, explain a B-Tree.
14. What is rehashing? Explain.

(4 x 3 = 12 weightage)

PART C

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

15. Explain the implementation of a stack and queue using arrays.
16. What are collisions? Explain various methods for handling Collision in hashing.
17. With a suitable example, explain Prim's algorithm to find the minimal spanning of a graph.
18. Explain the algorithm for Evaluation of a postfix expression. Give an example.

(2 x 5 = 10 weightage)

1M1N21039 (Pages : 1) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2021

MCS1C03 – Theory of Computation

(2019 Admission onwards)

Time: 3 hours Max. Weightage : 30

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

1. Explain the working model of a finite automata.
2. Define Alphabet, string and Languages.
3. Give applications of Finite Automata with examples.
4. Distinguish between DFA and NFA with the help of examples.
5. Give regular expression for odd length strings of 'b' s, where $\Sigma = \{b\}$.
6. Whether the languages accepted by a DPDA and NPDA are same? Justify your answer.
7. What do you mean by recursively enumerable language?

(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 two 'a' s; $\Sigma = \{a, b\}$ }.
9. State and prove the equivalence of DFA and NFA.
10. Explain the pumping lemma for context free language.
11. What is an ambiguous grammar? Give an example.
12. Describe CNF and the steps involved to convert a grammar to CNF using suitable example.
13. Briefly explain the PCP problem.
14. Explain multi head Turing machines.

(4 x 3 = 12 weightage)

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

15. What is a regular expression? Draw the NFA with epsilon moves for the regular expression **aba*(a+b)*.**
16. Construct a PDA for the language $\mathbf{L = \{ a^n b^n \mid n \geq 1\}}$
17. Explain Turing machine. Design a TM to accept the language $\mathbf{L = \{ a^n b^n a^n \mid n \geq 1\}}$
18. Explain the Halting problem. Show that it is undecidable.

(2 x 5 = 10 weightage)

1M1N21040 (Pages :2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2021

MCS1C04 – The Art of Programming Methodology

(2019 Admission onwards)

Time: 3 hours Max. Weightage : 30

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

1. Describe procedural and non-procedural programing language.
2. Draw flow chart to find largest and second largest among any three numbers.
3. Write a C program to swap two numbers A and B without using any other variables.
4. Compare interpreter and compiler.
5. Write a note on preprocessor directive.
6. Explain procedure to develop and execute a C program.
7. Explain different type of errors in programing.

(4 x 2 = 8 weightage)

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

8. Describe function definition and function prototype.
9. Explain entry control and exit control loop with suitable program.
10. Write a C program to accept several number from keyboard and count the even and odd numbers.
11. Describe type modifiers in C.
12. Write and explain any five string operation in C.
13. Compare if else ladder and switch.
14. Write and explain precedence and order of evaluation with example.

(4 x 3 = 12 weightage)

Part C

Answer any 2 questions. Each question carries 5 weightage

15. Explain recursive function and its advantages with a suitable program.
16. Describe general structure of C program with a suitable program.
17. Explain for loop and all options with the help of program statement.
18. Design a flowchart to convert decimal to equivalent binary numbers and write C program.

(2 x 5= 10 weightage)

1M1N21041 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2021

MCS1C05 – Computer Organization and Architecture

(2019 Admission onwards)

Time: 3 hours Max. Weightage : 30

PART A

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

1. Why Ripple counters are called so?
2. Briefly explain the different segment registers in 8086 processor.
3. Draw and explain SR flip flop.
4. What is hardwired control?
5. Explain SP and AX registers in 8086.
6. What is Interrupt Nesting?
7. What is the concept behind fast adder? Does it increase hardware requirement?

(4 x 2 = 8 weightage)

PART B

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

8. Explain restoring and non-restoring division algorithms.
9. What is an instruction cycle? Explain the elementary operations in an instruction cycle.
10. Implement a full adder.
11. Briefly explain the software architecture of 8086.
12. Explain how data transfer takes place between processor and I/O device in program controlled I/O technique.
13. Implement a 2-bit fast adder.
14. What is n-way set associative cache?

(4 x 3 = 12 weightage)