D 32684 (Pages : 2) Name.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2022

(CBCSS)

Computer Science

CSS 1C 01—DISCRETE MATHEMATICAL STRUCTURES

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Part A

Answer any **four** *questions.*
Each question carries 2 *weightage.*

1. In general, when are two sets D, E such that $D \cap E = D \cup E$?
2. Construct the truth table $(P \rightarrow Q) \wedge (Q \rightarrow P)$.
3. If $R = \{(x, y) : x + 2y = 8\}$ is a relation on N, then write the range of R.
4. Show that $(A + B)(A + C) = A + BC$.
5. Define cyclic group with an example.
6. Give an example of a ring which is not a field.
7. Write about complete bipartite graph with example.

(4 × 2 = 8 weightage)

Part B

Answer any **four** *questions*
Each question carries 3 *weightage.*

8. Show that $Q \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$ is a tautology
9. Write the rule of Modus tollens of predicates.
10. Define equivalence relation with the help of suitable example.
11. State and prove Lagrange's theorem on cosets.

12. Let G be a finite group and let H and K be sub-groups with relatively prime order. Then $H \cap K = \{1\}$.

13. Define the following with suitable example : (a) Closed Walk and Open walk ; and (b) Trail.

14. Proof that a simple graph with n vertices and k components can have at most $(n - k)(n - k + 1)/2$ edges.

(4 × 3 = 12 weightage)

Part C

Answer any **two** *questions.*

Each question carries 5 *weightage.*

15. Rewrite each proposition symbolically, given that the universe of discourse is a set of real numbers.

    (a) For each integer x, there exit an integer y such that $x + y = 0$.

    (b) There exist an integer x such that $x + y = y$ for every integer y.

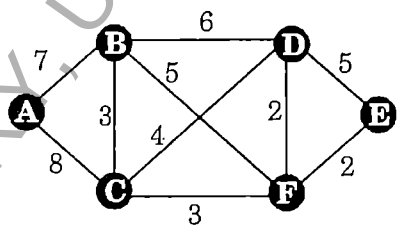
    (c) For all integers x and y, $x.y = y.x$.

    (d) There are integers x and y such that $x + y = 5$.

16. Discuss the difference between Injective, Surjective, and Bijective Functions with example.

17. Define homomorphism and isomorphism between two algebraic systems. Give example for both homomorphism and isomorphism of groups.

18. Explain Kruskal's algorithm and find the minimum spanning tree for the following graph :



(2 × 5 = 10 weightage)

D 32685 (Pages : 2) Name.....

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FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2022

(CBCSS)

Computer Science

CSS 1C 02—ADVANCED DATA STRUCTURES

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Part A

Answer any **four** *questions.*
Each question carries 2 *weightage.*

1. What are the main operations of linear data structure ?
2. Give a note on array ?
3. Define Tree.
4. What is graph traversal ? What are the two traversal strategies used in traversing a graph ?
5. Define Hashing.
6. Write about binominal queue.
7. What do you mean by a heap data structure ?

(4 × 2 = 8 weightage)

Part B

Answer any **four** *questions.*
Each question carries 3 *weightage.*

8. Explain about quality of algorithms in data structure.
9. Define Queue. Explain about operations of queue data structure.
10. Discuss insertion ad deletion operation on Stack.
11. Explain various operations on BST with an example.

Turn over

12. Describe about linear and quadratic probing strategies.

13. Briefly explain about types of heap data structure.

14. Write about skew heaps.

(4 × 3 = 12 weightage)

Part C

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

15. Explain how to analysis an algorithm with suitable example.

16. Write a detailed note on M-way trees.

17. Describe about double hashing algorithms and its implementations.

18. Consider the following Max heap

    50 ,30, 20, 15, 10, 8, 16.

    Insert a new node with value 60.

(2 × 5 = 10 weightage)

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FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2022

(CBCSS)

Computer Science

CSS 1C 03—THEORY OF COMPUTATION

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Part A

Answer any **four** *questions.*
Each question carries 2 *weightage.*

1. What is the inductive proof ?
2. What are the closure properties of regular languages ?
3. Brief about eliminating useless symbols.
4. Give a short note on basic model of the Turing machine.
5. What is Undecidability ?
6. Discuss about nondeterministic Turing machine.
7. Write about the parse tree.

(4 × 2 = 8 weightage)

Part B

Answer any **four** *questions.*
Each question carries 3 *weightage.*

8. Determine the central concepts of automata theory.
9. What are the closure properties of regular languages in TOC ?
10. Give two regular languages L1 and L2, how would you check if they have at least one string in common ?
11. Explain the formal definition of pushdown automata.

Turn over

12. Convert the grammar to a PDA that accepts the same language by empty stack :

$S \rightarrow aAA$

$A \rightarrow aS \mid bS \mid a$

13. Write a note on Chomsky hierarchy.

14. Write out the relationships between complexity classes.

(4 × 3 = 12 weightage)

Part C

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

15. Explain deterministic finite automata in detail.

16. Discuss finite automata with Epsilon transitions in detail.

17. Describe closure properties of recursive and recursively enumerable languages.

18. List out the types of complexity classes in detail.

(2 × 5 = 10 weightage)

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FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2022

(CBCSS)

Computer Science

CSS1C04—THE ART OF PROGRAMMING METHODOLOGY

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Section A

Answer any **four** *questions.*

Each question carries 2 *weightage.*

1. List out the basic symbols used in flowchart designs.
2. Define character constants and string constants.
3. Mention the types of arrays in C.
4. What are the advantages of using modular programming approach ?
5. How to use a pointer ?
6. Write the different methods of error handling in C.
7. Specify the classification of tokens in C.

(4 × 2 = 8 weightage)

Section B

Answer any **four** *questions.*

Each question carries 3 *weightage.*

8. Draw a flowchart to input two numbers from the user and display the largest of two numbers.
9. Write a short note on structure of C program.
10. How to create a program using nested for loop ?
11. Determine the call by value and call by reference in C Programming.
12. What is the procedure to assign values to pointers the unary 'and' operator ?

Turn over

13. Difference between Structure and Union definition in C.

14. Discuss about arithmetic operators with its examples.

(4 × 3 = 12 weightage)

Section C

Answer any **two** *questions.*

Each question carries 5 *weightage.*

15. Write a pseudo-code to find the sum of first n natural numbers, where n is any given integer, without using a formula.

16. Explain in detail about operators in C.

17. Discuss about function call, definition and declaration with its example.

18. Give a detailed note on variable type file, file pointers and the fopen function.

(2 × 5 = 10 weightage)

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FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2022

(CBCSS)

Computer Science

CSS1C05—COMPUTER ORGANIZATION AND ARCHITECTURE

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Section A

Answer any **four** *questions.*

Each question carries 2 *weightage.*

1. Define shift registers.
2. Give a note on straight line sequencing.
3. Draw a flowchart for Unsigned Binary Division.
4. What is virtual memory ?
5. List out the timers of 8051 and their associated registers.
6. What is meant by interrupts ?
7. What are the data types in computer organization ?

(4 × 2 = 8 weightage)

Section B

Answer any **four** *questions.*

Each question carries 3 *weightage.*

8. Describe the Register Transfer Language (RTL).
9. Write a short note on Micro- programmed control unit.
10. What is overflow rule and subtraction rule ?
11. How to use daisy chaining priority in computer architecture ?
12. Discuss about the instruction cycle in 8085 microprocessors.

13. Explain the I/O channels and its types.

14. Give a note on registers with, its types.

(4 × 3 = 12 weightage)

Section C

Answer any **two** *questions.*

Each question carries 5 *weightage.*

15. Explain the decoders with its example.

16. Demonstrate the hard-wired control unit with its diagram.

17. Discuss about the, restoring division algorithm for unsigned integer.

18. Demonstrate the architecture of 8051 microcontrollers.

(2 × 5 = 10 weightage)