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Name.....

Reg. No.....

FIRST SEMESTER M.C.A. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2021

M.C.A.

MCA 20 101-DESIGN AND ANALYSIS OF ALGORITHMS

(2020 Syllabus Year)

Time : Three Hours

Maximum : 100 Marks

Answer any five full questions. Each question carries 20 marks.

- 1. (A) What are the different factors to be considered before designing an algorithm?
 - (B) Discuss any two applications of string-processing algorithms.

(10 + 10 = 20 marks)

- 2. (A) Discuss the importance of algorithm analysis. Give the asymptotic notations and their role in specifying the time complexities of algorithms.
 - (B) With the help of a suitable example, explain the recursion-tree method for solving recurrences.

(10 + 10 = 20 marks)

- 3. (A) Explain the various steps involved in the divide-and-conquer approach and substantiate it with the recursive merge sort algorithm.
 - (B) Explain the general characteristics of problems for which the Dynamic **Programming algorithm** design strategy provides efficient algorithms. Give an example.

(10 + 10 = 20 marks)

- 4. (A) Explain the relationship among P, NP, NP-Complete, and NP-Hard problems.
 - (B) Give an application of Travelling salesman problem. Why the Travelling salesman problem is NP-complete?

(10 + 10 = 20 marks)

- 5. (A) Discuss the importance of Parallel Algorithms. Give a brief note on PRAM computational models.
 - (B) What are the different measures to analyse parallel algorithms?

(10 + 10 = 20 marks)

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- 6. (A) Define the sum of subsets problem. Give the backtracking approach to solve this problem.
 - (B) Explain the type of problems for which the Greedy strategy provides efficient algorithms. Substantiate with an example.

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(10 + 10 = 20 marks)

- 7. (A) Compare and contrast the conventional matrix multiplication method and Strassen's matrix multiplication.
 - $(B) \quad Solve the following recurrence relations using the {\it Master Theorem}.$

(a) T (n) = 4T (n/2) + cn ; and (b) T (n) = 16T (n/4) + n!

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(10 + 10 = 20 marks)

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