## D 13243

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## Reg. No.

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

M.C.A.<br>MCA 20 101—DESIGN AND ANALYSIS OF ALGORITHMS<br>(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

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(10+10=20 \text { 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.

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(10+10=20 \text { marks })
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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.

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(10+10=20 \text { marks })
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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?

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(10+10=20 \text { marks })
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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 ?

Turn over
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 \text { marks })
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7. (A) Compare and contrast the conventional matrix multiplication methed and Strassen's matrix multiplication.
(B) Solve the following recurrence relations using the Master Theorem.
(a) $\mathrm{T}(n)=4 \mathrm{~T}(n / 2)+c n$; and (b) $\mathrm{T}(n)=16 \mathrm{~T}(n / 4)+n!$
$(10+10=20$ marks $)$
