**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, APRIL 2023**

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|  | **3BT6102** | Roll No. | Total Printed Pages: 2 |
| **3BT6102** |  |
| B. Tech. III Year VI- Semester (Main/Back) End Semester Examination, April 2023  **(CE, CC, AI, DS)** | |
| **BCE06102 / BCE06101 / BCC06102 / BAI06108 / BDS06102 / BAI06102:**  **Design and Analysis of Algorithms** | | | |

# Time: **3** Hours. Total Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.--------------------------Nil--------------------** **2.------------------Nil-----------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Explain Master Theorem with all cases. Solve the following recurrence relation using master theorem  a) T(n) = 8T(n/2) + n 2 b) T(n) = 3T(n/4) + nlogn | **(6)** | **Application** |
|  |  |  |  |  |
|  | **(b)** | What do you mean by asymptotic notations? Enlist and explain in detail all the notations with relevant examples, condition and graph. | **(6)** | **Application** |
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|  |  | **OR** |  |  |
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| **Q.2** | **(a)** | Find the optimal solution to the knapsack instance n=7, w=15  (v1, v2…. v7) = (10, 5, 15, 7, 6, 18, 3)  (w1, w2…w7) = (2, 3, 5, 7, 1, 4, 1) | **(6)** | **Application** |
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|  | **(b)** | i) What do you mean by space complexity? What factors are considered while calculating the space complexity?  ii) Explain time complexity with example. | **(6)** | **Application** |
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|  |  | **UNIT-II (CO2)** |  |  |
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| **Q.3** | **(a)** | Find the longest common subsequence of ABCDBCDCDD and BCDCD using dynamic programming approach, showing all steps. | **(6)** | **Application** |
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|  | **(b)** | Solve the following 0-1 Knapsack problem: n= 5, m= 7  (p1, p2…. p5) = (15, 12, 16, 8, 10) and (w1, w2…. w5) = (5, 3, 4, 1, 2) | **(6)** | **Application** |
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| **Q.4** | **(a)** | Solve the TSP problem having the following cost matrix using branch &amp; bound technique: | **(6)** | **Application** |
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|  | **(b)** | What do you mean by backtracking? Find the possible solution for 4\*4 chess board and 8\*8 chess board. | **(6)** | **Application** |
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|  |  | **UNIT-III (CO3)** |  |  |
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| **Q.5** | **(a)** | For the given text T = <1, 3, 9, 9, 0, 2, 2, 1, 4, 1, 5, 2, 6, 7, 3, 9, 9, 2, 1> Search a pattern P = < 2, 1, 4, 1, 5 > in T using Rabin-Karp pattern matching algorithm? | **(6)** | **Application** |
|  |  |  |  |  |
|  | **(b)** | What do you mean by "pattern matching" and how do you distinguish between the Boyer Moore, Robin Karp, KMP, and naive algorithms? | **(6)** | **Knowledge** |
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| **Q.6** |  | Solve the assignment problem using Hungarian method for job assignment:  14 4 9 7  9 13 6 5  7 6 3 11  2 4 6 10 | **(12)** | **Application** |
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|  |  | **UNIT-IV (CO4)** |  |  |
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| **Q.7** |  | Applying the Ford-Fulkerson method to the provided network, what do you interpret by the maximum flow network to be? (Source-A, Sink-F) | **(12)** | **Application** |
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|  |  | **OR** |  |  |
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| **Q.8** | **(a)** | Explain the following terms with example-  a) Flow Network b) Augmented Path c) Bottleneck capacity | **(6)** | **Knowledge** |
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|  | **(b)** | Define 2-SAT problem with a suitable example? | **(6)** | **Application** |
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|  |  | **UNIT V (CO5)** |  |  |
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| **Q.9** | **(a)** | Define the terms P, NP, NP Complete and NP hard problems. Also give relationship between each of the class. | **(6)** | **Knowledge** |
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|  | **(b)** | Explain Set-cover problem and Vertex-cover problem. | **(6)** | **Knowledge** |
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|  |  | **OR** |  |  |
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| **Q.10** | **(a)** | Define deterministic and non-deterministic algorithm with suitable example. | **(6)** | **Knowledge** |
|  |  |  |  |  |
|  | **(b)** | What do you mean by Clique decision problem? Show that the clique decision problem is NP Complete. | **(6)** | **Knowledge** |