**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, April 2023**

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|  | **2BC4140** | Roll No. | Total Printed Pages: 2 |
| **2BC4140** |  |
| BCA II Year IV- Semester (Back) End Semester Examination, April 2023  **(AIPA)** | |
| **BAP04103 : Analysis and Design of Algorithms** | | | |

# Max. Time: **3** Hours. Max. 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.----------------------------------------------** **2.-----------------------------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Puneet has one bag and wants to fill that bag with the item which gives him maximum profit. There are some items which listed below along with their rates and weights. What is the optimum solution fills his bag with those items which gave him good profit. He may take fraction of any item.  Bag Capacity :20  Number of items:6  Weights (4, 10, 5, 6, 8, 3)  Rates (20,15, 30, 18, 16, 21) | **(6)** | Creating |
|  |  |  |  |  |
|  | **(b)** | Computational time for matrix multiplication process was so high. So is there is any method which minimize the number of computations. If yes than explain that method and show calculation of its time complexity using master’s theorem. | **(6)** | Analysing |
|  |  | **OR** |  |  |
| **Q.2** | **(a)** | How to calculate the time complexity of recursive programs. What is the recurrence relation of recursive binary search and recursive merge sort? Solve that recurrence relation with the help of iterative method. | **(6)** | Creating |
|  |  |  |  |  |
|  | **(b)** | Ridit wants to merge some instances all together with the help of optimal merge pattern using greedy approach. What steps he should follow explain that with neat diagram of every step.  Instances- 10, 8, 2, 5, 1, 4, 7, 3, 9, 6. | **(6)** | Creating |
|  |  | **UNIT-II (CO2)** |  |  |
| **Q.3** | **(a)** | One puzzle consists of 4 queens. Rohit needs to arrange all the 4 queen onto 4\*4 chess board by using following constraints:  One queen in row.  No two queens in same column and also on same diagonal.  Provide the solution using back tracking approach. | **(6)** | Creating |
|  |  |  |  |  |
|  | **(b)** | Given two sequence-  X= ABCBDAB  Y= BDCABA  Find the longest common subsequence from that. | **(6)** | Creating |
|  |  | **OR** |  |  |
| **Q.4** |  | Find out the shortest path between all pair of vertices. Using Dynamic programming. | **(12)** | Creating |
|  |  | **UNIT-III (CO3)** |  |  |
| **Q.5** | **(a)** | Rani wants to complete some task in an appropriate way. She has 4 different tasks and she required four persons to complete that task with minimum cost. Help her to solve the that assignment problem using branch and bound method for which cost matrix is given below:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  | Task1 | Task2 | Task3 | Task4 |  | |  | P1 | 11 | 12 | 18 | 40 |  | |  | P2 | 14 | 15 | 13 | 22 |  | | c= | P3 | 11 | 17 | 19 | 23 |  | |  | P4 | 17 | 14 | 20 | 28 |  | |  |  |  |  |  |  |  |   Solution [Without reduced matrix] | **(6)** | Creating |
|  |  |  |  |  |
|  | **(b)** | Explain Rabin-Karp matching algorithm with proper example. | **(6)** | Knowing  And  remembering |
|  |  | **OR** |  |  |
| **Q.6** | **(a)** | Rupesh needs to find a string from a document. Suggest him an appropriate solution. Which will take less time and do searching effectively? Take following example to generate the solution.  Document: Welcome to Poornima University Jaipur.  String: Poornima | **(6)** | Evaluating |
|  |  |  |  |  |
|  | **(b)**  Cost matrix c= a  b  c | Consider three jobs to be assigned to three persons. The cost of assigning a job to different persons are given by the matrix  1 2 3 | **(6)** | Evaluating |
|  |  | Find the least cost assignment.  **UNIT-IV (CO4)** |  |  |
| **Q.7** | **(a)** | How you will solve min-cut problem using a randomized method? Illustrate with an example. | **(8)** | Knowing  And  remembering |
|  |  |  |  |  |
|  | **(b)** | Randomize quick sort improve the worst case time complexity of deterministic quick sort, what will be the running time randomize quick sort.(In worst case scenario) | **(4)** | Knowing  And  remembering |
|  |  | **OR** |  |  |
| **Q.8** | **(a)** | What is Birthday Paradox problem? Explain its significance. | **(4)** | Knowing  And  remembering |
|  |  |  |  |  |
|  | **(b)** | Find the maximum flow in following graph using Ford Fulkerson Algorithm: | **(8)** | Creating |
|  |  | **UNIT V (CO5)** |  |  |
| **Q.9** | **(a)** | Prove that CDP (Clique decision problem) is NP Hard problem. | **(8)** | Evaluating |
|  |  |  |  |  |
|  | **(b)** | Explain satisfiability problem with example. | **(4)** | Analysing |
|  |  | **OR** |  |  |
| **Q.10** |  | Write short note on following:  (a) NP Hard (b) NP Complete (c) P Class Problem (d) NP Class Problem | **(12)** | Knowing  And  remembering |