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| **UNITED COLLEGE OF ENGINEERING & RESEARCH, PRAYAGRAJ (010)** | | | | **Department of Computer Science and Engineering** | | | | |
| Special Sessional Examination (Even Semester 2022-23) | | | | SEMESTER: Vth | | | | Date:- 10-12-2022 |
| TIME: 2 hours. | | | SUBJECT : Design and Analysis of Algorithm | Paper code: KCS-503 | | | | MM. 30 |
| **READ ALL INSTRUCTIONS AND QUESTIONS VERY CAREFULLY** | | | | | | | | |
| **SECTION A (Attempt ALL questions) Very short answer** | | | | | **[5]** | **CO** | **Bloom’s Taxonomy Level** | |
| 1 | a | Which of the following sorting algorithms are stable: insertion sort, merge sort, heap sort, and quick sort? | | | [1] | 1 | L2 (Understand) | |
| 1 | b | Prove or disprove each of the followings:-  f(n) = O(g(n)) implies g(n) = Ω(f(n)). | | | [1] | 1 | L2 (Understand) | |
| 1 | c | Define Red-Black Tree. | | | [1] | 2 | L1 (Remember) | |
| 1 | d | Define Binomial Heap with example. | | | [1] | 2 | L1 (Remember) | |
| 1 | e | Describe the properties of Greedy algorithm. | | | [1] | 3 | L1 (Remember) | |
| **SECTION B (Attempt any two questions) Long answer** | | | | | **[10]** |  |  | |
| 2 |  | Sort the following elements using bucket sort:  0.25, 0.34, 0.45, 0.12, 0.23, 0.05, 0.78, 0.5, 0.67, 0.38, 0.27, 0.47, 0.31. | | | [5] | 1 | L3(Apply) | |
| 3 |  | T(n) = 5T(n/5) + n/lgn. | | | [5] | 1 | L3(Apply) | |
| 4 |  | Write the Heap sort algorithm using min-heap. | | | [5] | 1 | L4 (Analyze) | |
| **SECTION C (Attempt any two question) Long answer** | | | | | **[10]** |  |  | |
| 5 |  | Design the RED-BLACK tree for the following element 25, 35, 10, 12, 90, 56, 80, 20, 40, 82, 65, 78, 50  Initially the RED-BLACK Tree is empty. | | | [5] | 2 | L3(Apply) | |
| 6 |  | Insert the following Information 86, 23, 91, 4, 67, 18, 32, 54, 46, 96, 45 into an empty B-Tree with degree t = 2 and delete 18, 23 from it. | | | [5] | 2 | L3(Apply) | |
| 7 |  | Write an algorithm to perform uniting two Binomial Heaps. | | | [5] | 2 | L4 (Analyze) | |
| **SECTION D (Attempt any one question) Long answer** | | | | | **[5]** |  |  | |
| 8 |  | What do you mean by convex hull? Describe an algorithm that solves the convex hull problem. Find the time complexity of the algorithm. | | | [5] | 3 | L4 (Analyze) | |
| 9 |  | Apply the greedy single source shortest path algorithm on the following graph: | | | [5] | 3 | L3(Apply) | |
| **#### END OF PAPER ####** | | | | | |  |  | |

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| **Course Outcome Wise Marks Distribution** | CO1 | CO2 | CO3 | CO4 | CO5 |
| 12 | 12 | 6 | - | - |

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| **Bloom’s Taxonomy Wise Marks Distribution** | L1 | L2 | L3 | L4 | L5 | L6 |
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