

Scheme of Valuation/Answer Key

(Scheme of evaluation (marks in brackets) and answers of problems/key)

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CS302

Course Name: DESIGN AND ANALYSIS OF ALGORITHMS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|---|--|-----|
| 1 | Best Case – 1 Mark, Worst Case – 1 Mark, Average Case – 1 Mark | (3) |
| 2 | Minimum value of $n=15$ – 1 Mark. Steps – 2 Marks | (3) |
| 3 | Master Theorem - all three cases – 1 mark each | (3) |
| 4 | Union Operation - 1 Mark, FIND-SET – 1 Mark, complexity – 1 mark | (3) |

PART B

Answer any two full questions, each carries 9 marks.

- | | | |
|---|--|-----|
| 5 | a) Fun1 – $O(n)$ - 1 Mark
Fun2 – $O(2^n)$ – 1 Mark | (2) |
| | b) Solution : $(3^{k+1} - 1) / 2$ - 1 Mark
Steps – 2 marks. | (3) |
| | c) Solution : $O(n^2)$ -1 Mark.
Recursion Tree with Minimum 3 levels – 3 Marks | (4) |
| 6 | a) Best case Expression – 1.5 Marks
Worst case expression – 1.5 Marks, Both $O(n)$ | (3) |
| | b) Reason – 2 Marks.
2 marks for specifying the rotations or explain any two rotations. | (4) |
| | c) Minimum Height:3 – 1 Mark, Maximum Height : 4 – 1 Mark | (2) |
| 7 | a) Any two Properties – 2 Marks | (2) |
| | b) 3 marks can be given for the correct construction of b-tree with at least 6 nodes. 4 marks for complete construction | (4) |
| | c) 2 marks for correct deletion of atleast 2 keys . 3 marks for deletion of all the 5 keys | (3) |

PART C

Answer all questions, each carries 3 marks.

- 8 False – 1 Mark, (3)
Full marks (2) can be given for justifying the statement without providing an example.
- 9 1.5 marks each. (3)
- 10 **2.5 marks can be given for writing the algorithm alone. 0.5 marks for mentioning the complexity.(Detailed analysis not expected)** (3)
- 11 Definition – 1 mark, steps – 0.5 mark each.(2 marks) (3)

PART D

Answer any two full questions, each carries 9 marks.

- 12 a) **Full marks for stating shortest path problem or optimal substructure property** (2)
- b) **3 marks can be given for writing the algorithm alone. 1 marks for mentioning the complexity.(Detailed analysis not expected)** (4)
- c) **Full(3) marks can be given for finding the shortest path from s to atleast 4 nodes.** (3)
- 13 a) **3 marks can be given for writing the algorithm alone. 1 marks for mentioning the complexity.(Detailed analysis not expected)** (4)
- b) Algorithm steps – 5 marks. (5)
- 14 a) Statement – 1 mark, **Explanation of the procedure/algorithm using dynamic programming-3 marks** (4)
- b) **Those who have attempted the question and obtained 4 correct paranthesization positions can be given full marks(5). For incorrect values , steps can be considered for grading** (5)

PART E

Answer any four full questions, each carries 10 marks.

- 15 a) Definition – 1 Mark, algorithm – 2 marks. (3)
- b) Statement – 1 mark, algorithm – 3 marks (4)
- c) Solution – 3 marks.; **proportional marks for partial solutions** (3)
- 16 a) Algorithm – 4 marks, Complexity – 2 marks. (6)
- b) **Computation of spanning tree - 4 marks. Steps need not be considered if tree is computed correctly. For incorrect computation, steps can be considered for giving proper weightage.** (4)
- 17 a) Solution : $n^2 - n + 1$ (3 marks) : with steps – 4 Marks ; **For incorrect final** (4)

answer, proportional marks can be given for steps.

- b) Solution : 10 (4 marks) with steps – 6 marks; **For incorrect final answer, (6) proportional marks can be given for steps.**
- 18 a) Statement – 1 mark (5)
Algorithm – 4 marks
- b) **State space tree –(4marks) : with Steps-5 marks ; For incorrect final state (5) space tree, proportional marks can be given for intermediate tree construction**
- 19 a) Algorithm – 5 marks (5)
b) **Full marks(5) can be given for partial solutions (5)**
- 20 a) Definition – 1 mark each (2)
b) Steps – 4 marks. (4)
c) Reducibility – 2 marks, examples – 2 marks. (2)

