

Please check that this question paper contains _____ questions and _____ printed pages within first ten minutes.

[Total No. of Questions: 09]

[Total No. of Pages: 02]

Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 4th

Name of Subject: Data Structures

Subject Code: PCCS-106

Paper ID: 16216

Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) What is need for garbage collection?
- b) Compare the complexities of bubble sort, selection sort, quick sort and merge sort in worst case.
- c) Explain the concept of min heap and max heap with the help of suitable example.
- d) Distinguish between a linear and nonlinear data structure.
- e) What is the significance of Big-Oh notation? Evaluate the complexity of $y = 8\log n + 5n^4 + 6.2^n$
- f) Distinguish between AVL tree and binary search tree.

Part – B

[Marks: 04 each]

Q2. Outline the procedure of warshall's algorithm. Explain with example.

Q3. Why are parentheses needed to specify the order of operations in infix expressions but not in postfix operations? Convert following infix to postfix expression:

$$((A+B)/D) \wedge ((E-F)*G)$$

Q4. How open addressing and chaining help to resolve collision resolution in hashing?

Q5. Draw Binary tree by considering the following traversals:

Preorder: G,B,Q,A,C,K,F,P,D,E,R,H

Inorder: Q,B,K,C,F,A,G,P,E,D,H,R

Q6. Discuss the procedure of Binary search and analyze the complexity of its algorithm.

Q7. Consider the 25×4 matrix array SCORE. Suppose Base (SCORE) = 200 and there are $w = 4$ words per memory cell. Furthermore, suppose the programming language stores two-dimensional arrays using row-major order. Then evaluate the address of SCORE[11,4].

Part – C

[Marks: 12 each]

Q8. Explain the various types of queues with examples and discuss the advantages and limitations of circular queue over ordinary queues.

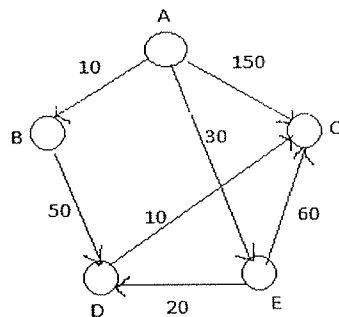
OR

An initial array is given as 25,57,48,37,12,92,86,33 Perform quick sort procedure and produce the array in an ordered form and write the quick sort algorithm and its efficiency

Q9. Write a procedure which adds a given ITEM of information at the K th position in a circular header list and also write a procedure which deletes the last element in a circular header list.

OR

Apply Dijkstra's algorithm to the following graph to find shortest path from source A.



Note: Out of Q8 and Q9, one should be from part-A and other should be from Part-B of the syllabus.

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