30-11-20

AMRITSAR COLLEGE OF ENGINEERING AND TECHNOLOGY, AMRITSAR
(An Autonomous College)

5.

Roll No. .....

Total No. of Questions: 09 **Total No. of Pages: 02**

B.Tech. (C.S.E) – 5th Semester
Subject Name: Design and Analysis of Algorithms
Subject Code: BTCS-503

Time: 03 Hours **Maximum Marks: 60**

Instructions to Candidate:

2017

1) Section - A is **compulsory**.
2) Attempt any **four** questions from Section – B.
3) Attempt any **two** questions from Section – C.

Section - A

(10 × 2 = 20)

Q1)

i) Write the applications of algorithms.
ii) What is meant by best and worst case in algorithm analysis?
iii) What are differences between a Binary Tree and a Binary Search Tree?
iv) Explain the application of B-Trees.
v) What is meant by divide and conquer approach for algorithm design?
vi) What is meant by Dynamic programming?
vii) What is a minimum spanning tree?
viii) Explain matrix chain multiplication problem.
ix) Explain N-queens problem.
x) Explain the greedy approach to problem solving.

Section – B

(4 × 5 = 20)

) Write the algorithm for insertion sort with analysis of its worst case running time?
) Explain the concept of asymptotic notations in detail.
) Solve the following fractional knapsack problem using greedy strategy W=15

Item	Weight	Value
1.	5	15
2.	7	28
3.	4	20
4.	6	24
5.	8	32

6.

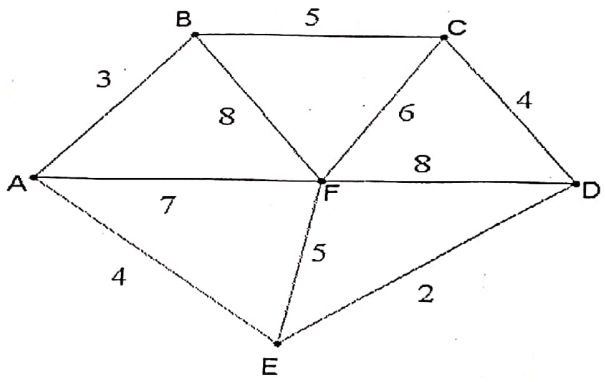
Q5) Find the LCS between **S1**=abccbd and **S2**= accadb using dynamic programming.

Q6) Explain hashing. Explain different types of hash functions. What do you understand by collision resolution in hashing?

Section – C

(2 × 10 = 20)

Q7) Construct a minimum spanning tree for the following using Kruskal's algorithm. Also write the algorithm for Kruskal's technique.



Q8) What are P, NP, NP-Complete and NP-Hard? Explain by taking suitable examples of each class.

Q9) (a) What is N Queens problem? Solve the 4 queens problem using backtracking.

(b) Write an algorithm for binary search technique

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[Total No. of Pages : 02

B. Tech. (Sem. - 5th)

DESIGN AND ANALYSIS OF ALGORITHMS

SUBJECT CODE : CS - 307

Paper ID : [A0467]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1)

(10 × 2 = 20)

a) What is asymptotic time complexity?

b) What is the difference between Dynamic Programming and Greedy Method?

c) Discuss post - order traversal technique.

d) Compare KMP & Boyer - Moore string processing algorithm.

e) What is modular arithmetic?

f) What is LC - search?

g) What is Cook's theorem?

h) What is the difference between RAM and RASP models?

i) What is Turing machine?

j) What are Combinatorial Algorithms?

Section - B

(4 × 5 = 20)

Q2) Compare various sorting and searching techniques.

Q3) Discuss the use of D & C in Quicksort algorithm.

Q4) Solve single - source shortest path problem by using dynamic programming.

Q5) What are Prim's and Kruskal's algorithms for Minimum cost spanning Tree?

Q6) Explain branch & bound for 4 - queen's problem.

Section - C

(2 × 10 = 20)

Q7) Explain Quick - Union and Quick - Find Set algorithms. Give suitable examples.

Q8) What is the importance of Approximation Algorithms? Also explain the various types of Approximation Algorithms.

Q9) Discuss the theory of NP - completeness in detail.

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B. Tech. (Sem. - 5th)

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SUBJECT CODE : CS - 307

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Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

(10 × 2 = 20)

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i) What is Turing machine?

j) What are Combinatorial Algorithms?

Section - B

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2017

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B.Tech. (CSE) - 5th Sem.
Design and Analysis of Algorithms
BTCS 503

Time: 3 Hours

Maximum Marks: 60

Instructions to Candidates:

1) Section-A is **Compulsory**.
2) Attempt any **Four** questions from Section-B.
3) Attempt any **Two** questions from Section-C.

Section-A

Q1) **(10 × 2 = 20)**

i. What is the time complexity of linear search?
ii. Define algorithm.
iii. What is Fast Fourier Transform (FFT)?
iv. Explain divide and conquer technique.
v. Differentiate between exponential versus polynomial running time.
vi. Differentiate between graph and a tree.
vii. What are the average and worst case time complexities of mergesort and quicksort algorithms?
viii. What do you mean by NP-complete problems?
ix. What is Big 'Oh' notation?
x. What are the features of dynamic programming?

Section– B

(4 × 5 = 20)

2. What are asymptotic notations? Describe with the help of examples commonly used asymptotic notations.
3. Describe Bellman-Ford algorithm to solve single-source shortest path problem. What istime Complexity.
4. What is Merge sort? Is insertion sort better than the merge sort? Discuss.
5. Describe in detail Knuth-Morris-Pratt string matching algorithm.
6. How the dynamic algorithms differ from greedy algorithm? Explain.

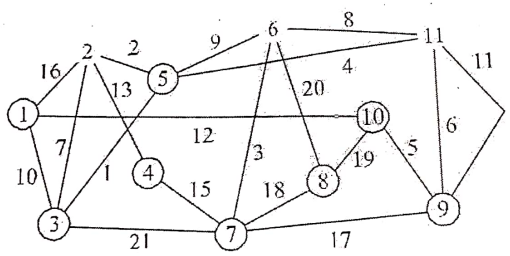
Section– C

(2 × 10 = 20)

7. Explain the algorithm of merge sort. Compute the time complexity of merge sort.
   Also sort the list 415, 213, 700, 515, 712, 715 using merge sort.

8. Write a short note on the following :
   i) Greedy algorithm.
   ii) Randomization.

9. Define spanning tree. Write Kruskal's algorithm for finding minimum spanning tree. Using Kruskal's algorithm, find minimum spanning tree for the graph given below :



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B.Tech. (CSE) – 5th Sem
Design and Analysis of Algorithm
BTCS-503

Time: 03 Hours

Maximum Marks: 60

Instructions to Candidates:

1) Section-A contains ten questions. All questions are compulsory.
2) Section-B contains five questions. Attempt any four questions.
3) Section-C contains three questions. Attempt any two questions.

Section - A

Q1) **(10 × 2 = 20)**

i) What is asymptotic efficiency of algorithm?
ii) State valid shift with reference to string matching.
iii) Define DFS for graphs.
iv) Give complexity of heap sort.
v) What is Space Time complexity?
vi) Define randomization
vii) Differentiate between dynamic programming and greedy strategy.
viii) What are the applications of divide and conquer technique?
ix) Where the largest element in a max heap does resides?
x) What are growth functions?

Section – B

(4 × 5 = 20)

Q2) Write an algorithm to insert an element in a BST.

Q3) Explain Floyd Warshall Algorithm in detail.

Q4) Sort the following series using bubble sort and insertion sort:

45, 60, 40, 95, 75, 35, 25, 65

Q5) Write a short note on greedy strategy to solve a problem.

Q6) Differentiate between NP hard and NP complete problems.

Section – C

$(2 \times 10 = 20)$

Q7) Explain heap sort algorithm with example and discuss its analysis also.

Q8) Compute the optimal cost and find an optimal parenthesization of matrix chain product whose sequence of dimensions is :

[30, 35, 15, 5, 10, 20, 25]

Q9) Write Dijkstra's algorithm for single source shortest path problem on weighted Directed graph.

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Design and Analysis of Algorithms
BTCS - 503

Time: 03 Hours

Maximum Marks: 60

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1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
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Section - A

Q1) **(10 × 2 = 20)**

i) Define Randomization.
ii) Define NP Hard and NP complete Problem.
iii) Which Searching algorithm Works on Divide and Conquer Algorithm ?
iv) Define Big – O - Notation.
v) What is Complexity of Merge Sort Algorithm?
vi) Define Convex Hull.
vii) Define Pattern Matching.
viii) Define Topological Sort.
ix) Name the applications of FFT.
x) Why Radix sort is also known as Bucket Sort ?

Section – B

Q2) Explain Merge Sort Method technique with its algorithm. **(4 × 5 = 20)**

Q3) Explain Knuth Morris – Pratt Algorithm.

Q4) Explain Binary Search Method to search any location out of an array.

Q5) Explain BFS method under Graphs

Q6) Explain Strassen Multiplication Methodology .

Section – C

Q7) Sort 20, 10, 30, 40, 26, 44, 08, 12 using Bubble Sort Method Also Write its Algorithm. (10 × 2

Q8) Explain Prim's Algorithm with example.

Q9) Write Down the Algorithm for Quick Sort taking any example.

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Design and Analysis of Algorithm
BTCS-503

Time: 03 Hours

Maximum Marks: 60

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