B. Sc. (Hons.) Semester - V Examination 2021-22
Computer Science
Paper No.: CS-202T - Data Structures and Algorithm

Time : Four Hours

Full Marks: 70

Instructions

1. The Question Paper contains 08 questions out of which you are required to answer any 04 questions. The question paper is of 70 marks with each question carrying 17.5 marks.

   प्रश्नपत्र में आठ प्रश्न पूछे गये हैं जिनमें से 4 प्रश्नों काउत्तर देना है। प्रश्नपत्र 70 अंकों का है, जिसमें प्रत्येक प्रश्न 17.5 अंक का है।

2. The total duration of the examination will be **4 hours** (Four hours), which includes the time for downloading the question paper from the Portal, writing the answers by hand and uploading the hand-writing answer sheets on the portal.

   परीक्षा का कुल समय 4 घंटेका है जिसमे प्रश्न पत्र को पोर्टल से डाउनलोड करके पुनः हस्तलिखितप्रश्नों का उत्तर पोर्टल पर अपलोड करना है।

3. For the students with benchmark disability as per Persons with Disability Act, the total duration of examination shall be **6 hours** (six hours) to complete the examination process, which includes the time for downloading the question paper from the Portal, writing the answers by hand and uploading the hand-written answer sheets on the portal.

   दिव्यांग छात्रों के लिये परीक्षा का समय 6 घंटे निर्धारित हैंजिसमें प्रश्नपत्र को पोर्टल से डाउनलोड करना एवं हस्तलिखित उत्तर कोपोर्टल पर अपलोड करना है।

4. Answers should be hand-written on a plain white A4 size paper using black or blue pen. Each question can be answered in upto 350 words on 3 (Three) plain A4 size paper (only one side is to be used).

   हस्तलिखितप्रश्नों का उत्तर सादे सफेद ।4 साइज के पन्ने पर काले अथवा नीले कलम सेलिखा होना चाहिये। प्रत्येक प्रश्न का उत्तर 350 शब्दों तक तीन सादे पृष्ठ।4 साइज में होना चाहिए। प्रश्नों के उत्तर के लिए केवल एक तरफ के पृष्ठ काही उपयोग किया जाना चाहिए।

5. 5. Answers to each question should start from a fresh page. All pages are required to be numbered. You should write your Course Name, Semester, Examination Roll Number, Paper Code, Paper Title, Date and Time of Examination on the First sheet used for answers.

   प्रत्येकप्रश्न का उत्तर नये पृष्ठ से शुरू करना है। सभी पृष्ठों को पृष्ठांकितकरना है। छात्र को प्रथम पृष्ठ पर प्रश्नपत्र का विषय, सेमेस्टर, परीक्षाअनुक्रमांक, प्रश्नपत्र कोड, प्रश्नपत्र का शीर्षक, दिनांक एवं समय लिखनाहै।

Questions

P.T.O.

1. What are the different applications of searching? Explain linear search and binary search techniques in detail. Also analyze their time complexities.

2. Analyze the time required for solving the search and insert problem using Hashing. What is the effect of collision on it? Explain the Chaining technique for collision resolution.

3. Explain the two different methods for evaluation of postfix expression? Write the algorithm for evaluation of a postfix expression using stack. Show the steps for evaluation of the following postfix expression using the above algorithm:
6 2 3 + - 3 8 2 / + * 2 % 3 +

4. Write an algorithm to check whether a given input string is palindrome or not with the help of a stack. Also show the working of algorithm on a sample input string.

5. Assume that the following keys are inserted in a binary search tree in the given order: 56 30 61 39 47 35 75 13 21 64 26 73 18
   a. Draw the tree obtained
   b. Write the post-order traversal of this tree
   c. Insert a new node with key 23 in this tree
   d. Draw the tree obtained after deleting the right child of the root node of this tree

6. What is a heap data structure? Explain. Show the step-by-step process for creating a **min-heap** from the keys given below:
   51 26 32 45 38 89 29 58 34 23 0
   Use the above heap to sort the given keys. Write the steps.

7. For the graph given below, do the following:
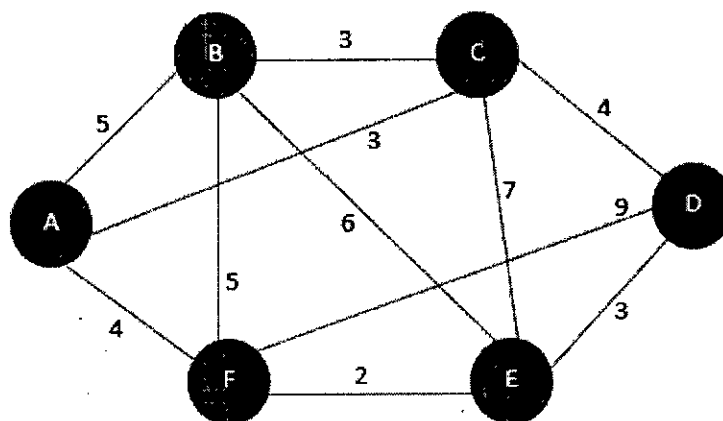
   a. Write the Depth First Traversal of the graph selecting nodes in alphabetical order.

   b. Calculate the shortest path to all the vertices from vertex D.

   c. Construct the minimum spanning tree using Kruskal's method.

8. Explain the procedure for doing the following:

   a. Insertion and Deletion in Doubly linked list

   b. Height balancing a Binary Search Tree

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