2022

1st Semester Examination

MCA

Paper : MCA 103

(Data Structure and Algorithm)

Full Marks : 70 Time : Three Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

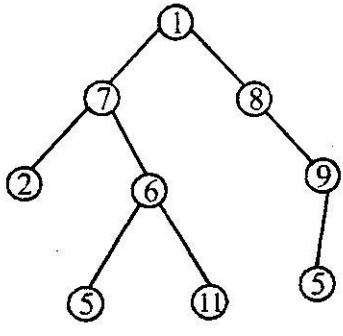
Group - A

Answer any ***five*** questions : 2×5=10

1. (i) Define complete binary tree with an example.

   (ii) What are the important features of an algorithm?

   (iii) Show the level order traversal of the following tree



P.T.O.

(iv) What do you mean by asymptotic analysis of an algorithm?

(v) How is a problem solved using branch and bound technique?

(vi) What is the necessity of approximation algorithm?

(vii) What do you mean by peep operation in a stack?

(viii) What are the advantages of linked list over array?

Group - B

Answer any ***four*** questions : 15×4=60

2. Convert the following infix expression into postfix expression. Show each step in detail.

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

Write down the algorithm of quicksort. Explain why worst case time complexity of quicksort is more than the average case. 5+8+2

3. Explain operations on doubly linked list in detail with function for add and delete from doubly linked list. Why a tail recursive function is preferred to its non-tail recursive equivalent? What is threaded binary tree? Explain how a binary tree is transform into a threaded binary tree with an example. 7+3+2+3

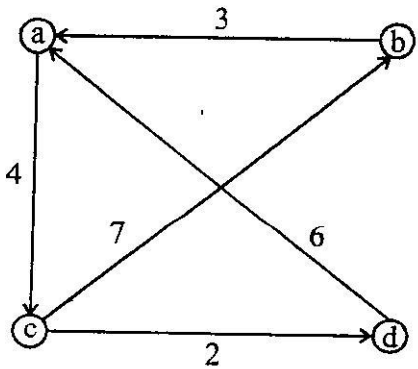
4. Write an algorithm to check wheather a given list is palindrome or not using stack. Explain dynamic programming approach using a suitable example. 8+7

5. Implement radix sort on the following numbers :

   23, 55, 29, 41, 36, 90 12 7+8

   Briefly explain how Kruskal's algorithm is used to find out the minimum spanning tree of a graph using a suitable example.

6. Derive the all-pair shortest path from the following graph by Floyd-Warshall algorithm using dynamic programming approach.



   Write short notes on : polynomial addition using array. 8+7

7. Derive the longest common subsequence from the string "BCDABC" and "CBADCA" using dynamic programming approach. What do you mean by sparse matrix? Why do we need different representation for sparse matrix. 10+3+2

P.T.O.

8. Explain greedy approach with a suitable example. What is the difference between performance analysis and performance measurement? How can we achieve performance analysis? 9+3+3

9. What do you mean by tractable problems? Define class P and class NP problems. What do you mean by reduction? When a problem is called a NP-complete problem? Define row-major and column-major representation of a matrix. 2+5+2+3+3

2022

1st Semester Examination

MCA

Paper : MCA 196

(ADBMS Lab)

(Practical)

Full Marks : 50 Time : Three Hours

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

Answer any ***one*** question : 35×1=35

1. Relation schema :

   Employee (Employee no, Employee_name, designation, Salary, Hiredate, Department_no, Manager_no)
   Department (Dnumber, Dname, Location)

   Write SQL query for the following :

   (a) Create the above database using SQL.

   (b) List all employees who have a salary more than Rs. 2000 and belong to department no 20.

   (c) List department numbers and names in department name order.

P.T.O.

(d) Display all the different job types.

(e) List the names of employees who get less salary than their managers. 15+5+5+5+5

2. Relation schema :

Student (s_id, s_name, total_marks)

Subject (sub_id, sub_name, s_id, sub_marks)

Write SQL query for the following :

(a) Create the above database using SQL.

(b) Find names of students who obtained more than average marks.

(c) Find the student who scored highest marks in "Mathematics".

(d) List the names of all subjects.

(e) Find the names of the students who failed in "Mathematics" ordered by their s_id.

15+5+5+5+5

3. Consider the following relational database :

Book(Acc_no, Title, Publisher, no_of_copy, Category)

Borrower(Card_no, B_Name, B_address)

Issue(Acc_no, Card_no, Date_of_issue, Date_of_return)

Write SQL query for the following :

(a) Create the above database using SQL.

(b) Find total number of "computer science" category book.

(c) How many students are currently taken the book namely "Fundamental of Database Systems"?

(d) Show the list of books of publisher "Pearson".

(e) Find the names of books having less than 5 copies.

15+5+5+5+5

4. Consider the following relational database :

Supplier (S#,Sname,city,status)

Parts (P#,Pname,colour,weight)

SP(S#,P#,quantity)

Write SQL query for the following :

(a) Create the above database using SQL.

(b) Find names of suppliers located at same place and supply same parts.

(c) Find names of suppliers who currently do not supplying any items.

(d) Find the total number of suppliers.

(e) Find total number of parts irrespective of its colour.

15+5+5+5+5

P.T.O.

5. Relation schema :

Employee (Employee_no, Employee_name, designation, Salary, Hiredate, Department_no, Manager_name)
Salgrade (Grade, Losal, Hisal)

Write SQL query for the following :

(a) Create the above database using SQL.

(b) List the details of the employees in departments 10 and 20 in alphabetical order of name.

(c) List names and jobs of all clerks in department 20.

(d) Display all employees names with their salary Grade.

(e) Find the names of employees who have joined this year. 15+5+5+5+5

6. Relation schema :

Project (p_no, p_name, p_location, manager_name)

Employee (e_no, e_name)

Assign_to(p_no, e_no)

Write SQL query for the following :

(a) Create the above database using SQL.

(b) Find total number of employees.

(c) Find employees along their manager located at "Kolkata".

(d) Display the number of employees projectwise.

(e) Find the names of employees who have not been assigned to any project. 15+5+5+5+5

7. Consider the following relational database : Hotel(H_no,H_name,H_address)

Room(R_no, H_no, Type, Charge)

Booking(H_no,G_no,R_no,Date_from,Date_to)

Guest(G_no,G_name,G_address)

Write SQL query for the following :

(a) Create the above database using SQL.

(b) Find numbers guests at "Hotel Taj";

(c) Find numbers of "Delux" type room at "Hotel Taj";

(d) Find names of Guests who were at room number 5 of "Hotel Taj" on 15th January, 2023.

(e) Find names of hotels having more than total 50 rooms. 15+5+5+5+5

8. Write a PL/SQL procedure/function for getting two numbers from keyboard and applying following one operation based on user's choice :

(a) Addition

(b) Subtraction

P.T.O.

(c) Multiplication

(d) Division 35

9. Write a PL/SQL Program to find average salary from the EMP table. If EMP table is not available; display appropriate messages else print the average salary of employees. 35

10. Write a PL/SQL program to find maximum salary from EMP table and save the value into a variable "sal" and display the value of "sal". 35

PNB - 05.

VIVA - 10.