Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ]

Total No. of Pages : 02

Total No. of Questions : 09

MCA (Sem.–1)
ADVANCED DATABASE MANAGEMENT SYSTEM
Subject Code : PGCA-1953
M.Code : 79038
Date of Examination : 19-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write short notes on :

    i.   Define Data

    ii.   Data Independence

    iii. Cardinality of Relation

    iv.   Referential Integrity Constraints

    v.   Relational Calculus

    vi.   Cartesian Product

    vii. Distributed Database Storage

    viii. NoSQL Databases

    ix.   Concurrency

    x.   Distributed DBMS Commit Protocols.

SECTION-B

2. What is the need of DBMS also compare with traditional file-based system?

3. What is ER data model? Explain ER diagram with suitable example and their terminology.

4. What is the process of normalization? Explain type of normal forms and dependencies

5. What is Concurrency? Discuss different concurrency control techniques.

SECTION-C

6. What are the types of parallel database? What are intra vs inter parallelism?

7. What are the concepts of distributed databases? How queries are processed in DDBMS?

8. What is Big data and its types? Discuss open source NOSQL databases.

9. What are the types of XML databases? What is an XML schema type?

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Total No. of Pages : 02

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MCA (Sem.–1)

ADVANCED DATA STRUCTURES

Subject Code : PGCA-1952

M.Code : 79037

Date of Examination : 15-06-2024

Time : 3 Hrs.   Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

I. Write short notes on :

   (i)   How is the time complexity measured?

   (ii)   What is a recurrence relation?

   (iii)   What are hash Tables?

   (iv)   What is a Hash Function?

   (v)   What are disjoint sets?

   (vi)   What is Heap Property? Explain.

   (vii)   What is the importance of red black trees?

   (viii) What are the applications of Minimum Spanning Trees?

   (ix)   Enlist various string operations.

   (x)   What is Maximum flow problem?

SECTION-B

2. What are data structures? What is Abstract data type? What are the operations that may be performed on a typical data structure?

3. "*Queues can be implemented using two stacks*"-Support this statement with suitable programming example.

4. Let A = <7,2,4,17,1,11,6,8,15,10,20>

   (i)   Draw binomial heap whose keys are elements of A.

   (ii)   Insert a new element with key 5 into the heap.

   (iii)   To a binomial heap obtained this way, apply the operation of extracting the node with minimum key two times. After each change in the structure of the heap draw its current diagram.

5. In a B-tree after inserting D, G, M, R and W into a B-tree with minimum degree 3 and 2 to 5 values per node perform the following insertions one-by-one:

   J, B, H, S, U, X, A, T.

SECTION-C

6. What is a minimum spanning tree? What are its applications? Explain the Kruskal and Prim's algorithms for finding the minimum spanning tree? Compare the growth of the tree in the two cases.

7. Modify Dijkastra's algorithm to solve all-pairs-shortest-path problem.

8. Compare the adjacency list and matrix representation of graph.

9. Discuss any string matching algorithm with illustrative example.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student

May June - 2024

MCA (Sem.–1)
PROGRAMMING IN PYTHON
Subject Code : PGCA/1951
M. Code : 79036
Date of Examination : 13-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION-B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION-B & C.

SECTION-A

1. Write Briefly :

   (i) Write an algorithm that accepts two numbers adds them and prints the result.

   (ii) Define an iterative statement.

   (iii) List four built-in tuples in Python.

   (iv) How do you assign a value to a tuple in Python?

   (v) What are the purposes if Pass statement in Python?

   (vi) What is slicing operator in Python? Give an illustrative example.

   (vii) Write a simple function to multiply two numbers in Python.

   (viii) In Python, how the values stored in Lists are accessed? Are these values need to be of the same type?

   (ix) How do you delete a file in Python?

   (x) What is the purpose of dictionary in Python?

SECTION-B

2. What are the data types supported by Python? Explain with examples.

3. What are the important features and limitations of Python? What are the applications of this language? Explain.

4. Write a Python program that sorts a dictionary by its values.

5. Explain expressions in Python with order of evaluation with an example.

SECTION-C

6. (i) Differentiate between global and local variables.

   (ii) Narrate scope of a variable in a function.

7. Using datetime module, write a Python program to print 56th day after today. Also, print which day of the week and year that day is. (Eg. 14 Nov 2017, Tuesday the 318th day of 2017).

8. How to create, raise and handle user defined exceptions in Python.

9. What is a class? How classes and objects are created in Python? Explain

MCA (Sem.–1)

DISCRETE STRUCTURES & OPTIMIZATION

Subject Code : PGCA/1917

M.Code : 79035

Date of Examination : 11-06-2024

: 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION - B & C. have FOUR questions each.

Attempt any FIVE questions from SECTION B & C carrying TEN marks each.

Select atleast TWO questions from SECTION - B & C.

SECTION-A

Write short notes on :

a. How are ordered pairs used to represent relations?

b. Define two sets A = {a, b, c} and B = {1,2} and find the Cartesian product A × B.

c. Define a hashing function and explain its purpose.

d. Define rings and discuss their properties.

e. Let S be a set having 3 elements. How many binary operations can be defined on S?

f. What are the elements of a dihedral group?

g. What is the defining property of a cyclic semigraph?

h. Define a congruence relation on a semigroup.

i. What is the key difference between directed and undirected graphs?

j. Define graph isomorphism and graph homomorphism.

SECTION-B

2. Discuss the concept of rings and their properties, including subrings and morphisms. Provide examples.

3. a. Prove that a set containing n distinct elements has 2^n subsets.

   b. If A, B, C be any three sets, then show that $A - (B \cap C) = (A - B) \cup (A - C)$

4. What is Boolean Algebra? Explain in detail different applications of Boolean Algebra.

5. Explain the pigeonhole principle and provide a detailed example of its application in combinatorial mathematics.

SECTION-C

6. Compare and contrast a semigroup, monoid, and group, highlighting their similarities and differences.

7. Explain the concept of cosets and how they relate to subgroups in group theory. Provide an example to illustrate your explanation.

8. **Explain the difference between an :**

   a. Eulerian circuit and a Hamiltonian cycle.

   b. Eulerian trail and a Hamiltonian path.

9. a. Explain the concept of graph coloring and its applications.

   b. Discuss the properties of plane and connected graphs, and their importance in graph theory.

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