

Department of Computer Science  
Gujarat University  
MCA theory examination  
Semester I

Subject: Data Structures

Total Marks: 30

Time: 1.5 hours

Q1.

Give difference between :

- ~~i.~~ Linear vs Non-Linear data structures
- ~~ii.~~ Static and dynamic memory allocation
- ~~iii.~~ Array and structures
- ~~iv.~~ Linear and circular queue
- ~~v.~~ Tree and graph

[10]

Q2.

Explain the process through diagram and write algorithms for the following (ANY FOUR)

[10]

- ~~i.~~ Insertion before a given node in singly linked list
- ~~ii.~~ Insertion after a given node in doubly linked list
- ~~iii.~~ Deletion of last node in singly linked list
- ~~iv.~~ Deletion of given node in doubly linked list
- ~~v.~~ Bubble sort

Q3.

~~Why~~ Stack behaves as LIFO whereas Queue as FIFO? Give applications of stack and queue in operating system. Explain advantage of circular queue over linear queue

[05]

Q4.

~~Write~~ overflow and underflow conditions for linear and circular queue. With respect to tree, what is : root node, leaf node, ancestor, descendant and levels of a tree

[05]

DEPARTMENT OF COMPUTER SCIENCE  
GUJARAT UNIVERSITY

MCA I

Subject: Introduction to Python Programming  
Sessional Examination – I

Date: 08/11/2023

Time : 1 hr 30 min  
Max. Marks: 25

**Q1. Explain following terms: (Any Three)**

- (1) What is Python? Explain its features.
- (2) Explain Bitwise Operators. Where they are used?
- (3) Mention the difference between 'pass', 'break' and 'continue' statements.
- (4) List and explain any 4 in-built functions.
- (5) How "=" and "==" are different. If a=10; a==90; What is the value of a and why?

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**Q2. Attempt the following Questions. (Any Three)**

- (1) What is a difference between Pass by value and Pass by reference? Python follows which from that and why?
- (2) Write the difference between List, Tuple and Set.
- (3) Explain the difference between Assignment and Arithmetic Operators.
- (4) Is 'elif' keyword used for nested 'if' statements? If not, then how it is different? Explain with example.

09

**Q3. Write a note on followings: (Any Two)**

- (1) What are loops? How for and while loops are different in python? Explain both with proper examples.
- (2) Explain Scope and Lifetime of Variables. What are local variables and global variables. Explain each with proper example.
- (3) Write a Python program which accepts a sequence of comma separated 4-digit binary numbers as its input and print the numbers that are divisible by 5 in a comma separated sequence. (Write code in a proper way or can write pseudo code but need to explain the pseudo code)  
Sample Data: 0100,0011,1010,1001,1100,1001  
Expected Output: 1010

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DEPARTMENT OF COMPUTER SCIENCE  
GUJARAT UNIVERSITY  
MCA SEM I

Subject: Object Oriented Concept and Programming  
Sessional Examination - I

4<sup>th</sup> November, 2023

Time: 90 mins  
Max. Marks: 25

Q1.

**Answer in Short.**

- (1) List the operators that cannot be overloaded.
- (2) What is inline function?
- (3) Define the significance of public and private members of the class?
- (4) Can we have multiple destructors in class? Give reason for your answer.
- (5) What do you mean by default argument in function?

05

Q2.

**Attempt the following Questions. (Any Four)**

- (1) What is the advantage of object oriented programming over procedure oriented programming?
- (2) What is polymorphism? Briefly explain compile time polymorphism.
- (3) What is MLL? How we can initialize the object using MLL? Also mention the advantage of MLL.
- (4) How template class store internally for different datatypes?
- (5) Why we require to overload the operator using friend? Also write an example for the same.

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Q3. **Attempt the following Questions. (Any Two)**

- (1) How operator can be overload? How to overload ++ and -- operators?
- (2) How static data members works?
- (3) What is constructor and destructor? Demonstrate the use of both.

08



Subject: DBMS

Date: 06/11/2023

Q: 1 Define the following (Any 5)

- System Catalog
- BCNF
- Functional Dependency
- Degree of a Relationship
- Anomalies
- Relation
- Multivalued dependency

[10]

Q: 2 Attempt the following (Any 2)

- Explain DBMS architecture in detail with diagram
- List Record based data models and discuss any one in detail
- Explain basic operators of relational algebra in detail
- Discuss Armstrong's axioms
- Explain all the stages of Normalization with example

[10]

Q: 3 Attempt any two from the following

A. ER Diagram

Draw an ER Diagram for the following.  
Consider that you would like to develop a system like Exam net which allows taking online exams wherein all the records of students, teachers and courses and exams are recorded. Additionally, the system also maintains the log of student records like start time of exam, active time, end time etc. Assume any other attributes relevant to the system.

[5]

Construct an E-R diagram for the Exam system. Document all assumptions that you make about the mapping constraints.

B

Relational Algebra

Write Relational Algebra queries for the following  
Books (ISBN, Author, Title, Publisher, Date, Pages, Notes)  
Store (Store Id, StoreName, Street, State, City, Zip)  
Stock (ISBN, Store Id, Price, Quantity)

- Display all students who have issued books of "McGraw" Publisher
- Display all the books where Price is less than 1000
- Display all the Author details whose books are out of stock
- Find identifier of all stores that carry a non-zero quantity of every book in the "BOOKS" relation

C Normalization

Normalize the following structure

Normalize the following schema, with given constraints to 3NF.

books/authorship, isbn, title, author, publisher  
stores/storename, street, state, city, zip  
stock/isbn, store\_id, price, quantity  
isbn --> title  
isbn --> publisher