GAUHATI UNIVERSITY
CENTRE FOR DISTANCE AND ONLINE EDUCATION
HOME ASSIGNMENT
Master of Science in Information Technology (M.Sc.-IT)

Semester - I (Session: 2024-2025, July-August)

*Guidelines for Submission***:**

1. Learners who have been admitted in the Academic Session (2024-25, July-August) will write the Home Assignment.
2. Learners should write their **Roll Number**, **GU Registration Number**, **Subject**, **Semester, Paper Title**, **Paper Code** and **Name of the Study Center** clearly on the first page of the answer script in the space provided.
3. The formats of the answer scripts are available at and can be downloaded from, the GUCDOE website (www.gucdoe.in).
4. There will be 2 (two) compulsory questions in each paper, and each question will have options (Total Marks: 2 questions × 10 marks= 20 marks).
5. **Typed/Computerized answers will not be accepted**. Learners will write the answers neatly in their own handwriting.
6. Learners should not submit any plagiarized answers as such a practice is deemed to be unfair.
7. Learners of different Study Centers under GUCDOE will mandatorily submit the answer scripts at their respective Study Centers.
8. Learners of GUCDOE center will submit their answer scripts at GUCDOE Office.
9. **Last Date of Submission : 20th February, 2025.**

PAPER: INF 1016 (ADVANCED CONCEPTS IN OBJECT ORIENTED PROGRAMMING)

Answer the following questions   **2 x 10 = 20**

Q. No. 1. Explain the importance of Inheritance with appropriate examples. Why multiple inheritance is not supported in JAVA?   **10**

OR

Why Exception handling mechanism is required? Explain the Exception handling mechanism provided in C++ programming.   **10**

Q. No. 2. Write a C++ program to overload % (modulus) operator using friend function and explain the program.   **10**

OR

Discuss different steps of Object-Oriented Analysis with appropriate examples.   **10**

PAPER: INF 1026 (ADVANCED COMPUTER ORGANIZATION AND ARCHITECTURE)

Answer the following questions (Any Two):   **2 x 10 = 20**

Q. No. 1. Explain various addressing modes in 8085 Microprocessor with suitable examples.
                                                                                      10
Q. No. 2. Explain various instruction sets with suitable examples.   **10**

Q. No. 3.   (a) Describe decimal to BDC encoder   **4**
                       (b) Explain Booth's multiplication algorithm   **6**

Q. No. 4. Write short notes on *any two* the following topics   **5 x 2 = 10**
          (a) Multiplexer
          (b) 3 to 8 line Decoder
          (c) Inequality

PAPER: INF 1036 (OPERATING SYSTEM)

Answer the following questions   **2 x 10 = 20**

Q. No. 1. a) What is Process Control Block (PCB). Explain the different states of process in operating system.   **3 + 7 = 10**

OR

      b) What is Linux file system? Explain the types of Linux file system.   **3 + 7 = 10**

Q. No. 2. a) What is preemptive and non-preemptive scheduling? Explain the Non-Preemptive Shortest Job First (SJF) and Preemptive SJF scheduling with examples.   **5 + 5 = 10**

OR

      b) Explain the different types of resources. Explain the conditions which must be satisfied to occur resource deadlock.   **5 + 5 = 10**

PAPER: INF 1046 (MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE)

Answer the following questions   **2 x 10 = 20**

Q. No. 1. (a) Let R be a binary relation on the set of all strings over $\{0,1\}$ such that   **4**

        (a, b) $\in$ R if and only if a and b have the same number of 0's.

Is the relation (i) Reflexive (ii) Symmetric (iii) Antisymmetric and (iii) Transitive? Justify your answer.

      (b) Let f, g, h be functions from N to N such that $f(n) = n+1$, $g(n) = 2n$ and $h(n) = n$ mod Find $f \circ f, g \circ g, f \circ g, g \circ f, g \circ h$ and $f \circ g \circ h$ **6**

Q. No. 2. (a) Following is the adjacency matrix of a directed graph with six vertices $\{1,2,3,4,5,6\}$.

                                                           1 + 1 + 2 = 4

	1	2	3	4	5	6
1	0	1	0	0	0	1
2	0	0	1	1	0	1
3	1	1	0	0	1	0
4	0	1	1	0	0	0
5	1	0	0	1	0	1
6	0	0	1	0	1	0

Draw the graph. Construct the adjacency list representation of the graph. Explain how the indegree and out degree of the vertices can be computed from the adjacency matrix.

      (b) Design Finite Automata for the following languages.   **2 x 2 = 4**

        (i) The language consisting of all strings in {a, b} having at least two b's.

        (ii) The language consisting of all strings in {0, 1} not having two consecutive 0's.

(c) Find Regular Expressions for the following two languages.

       (i) All strings in a,b,c that starts and ends with the same symbol.

       (ii) All strings in a,b,c having "abc" as a substring.   **1 + 1 = 2**

Q. No. 3. (a) Five boys and four girls are to be seated in a row. In how many ways can they be seated If   **2 x 2 = 4**

       (ii No two boys sit together.

       (ii) Hari and Jadu must be always seated together.

    (b) (i) Prove by Truth Table method.

       $(P \rightarrow Q) \leftrightarrow ((\neg Q) \rightarrow (\neg P)$ **2**

       (ii) Convert $(P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$ to an equivalent CNF formula.   **2**

    (c) Prove that the set of all n x n matrices over Z (set of Integers) form a group under addition. Is it a group under multiplication? Justify your answer.   **2**

PAPER: INF 1056 (ADVANCED DATABASE MANAGEMENT SYSTEM)

Answer the following questions   **2 x 10 = 20**

Q. No. 1. Explain the different normal forms (1NF, 2NF, 3NF, and BCNF) with suitable examples. How does normalization reduce data redundancy and improve database design?   **10**

OR

    Explain the concept of ACID properties in database transactions. Why are these properties crucial for maintaining the integrity and reliability of a database system? Provide examples to illustrate each property.   **10**

Q. No. 2. Discuss the role of integrity constraints in the relational model. Explain different types of constraints with examples.   **10**

OR

    Explain the key components of an Entity-Relationship (E-R) diagram, including entities, attributes, and relationships. How is the E-R model used in database design? Illustrate with a detailed example.   **10**

---×---

গুৱাহাটী বিশ্ববিদ্যালয়

Gauhati University

দূৰ আৰু অন্লাইন শিক্ষা কেন্দ্ৰ

Centre for Distance and Online Education

ASNWERSCRIPT FOR HOME ASSIGNMENT

Roll Number (8 digit): ....
(GUCDOE Enrollment No)

G.U. Registration No.: ....

Programme Name: ....

Semester: ....

Paper Title: ....

Paper Code: ....

Name of the Study Centre:...

Gauhati University Centre for Distance and Online Education