GAUHATI UNIVERSITY
CENTRE FOR DISTANCE AND ONLINE EDUCATION

HOME ASSIGNMENT

Master of Science in Information Technology (M.Sc.-IT)

Semester- I (Session: 2023-2024, January)

***Guidelines for Submission*:**

1. Learners who have been admitted in the Academic Session (2023-24, January) 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 : 2nd September, 2024.**

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

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

Q. No. 1. Explain any situation where Hybrid inheritance is required to be implemented. Write C++ program to show the implementation of Hybrid Inheritance. **10**

Or

Explain with examples different ways to access the private members of a class from outside the class in C++. Explain the difference between private members and protected members of a class. Give example. **10**

Q. No. 2. Why Object-Oriented programming language should be used to develop a computer software system? Give appropriate examples to justify the reasons. **10**

Or

Explain with appropriate examples different fundamental steps to design a system using Object-Oriented process. **10**

PAPER: INF 1026 (ADVANCED COMPUTER ORGANIZATION AND ARCHITECTURE)

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

Q. No. 1. Define addressing mode. Discuss the following modes with example: **10**

i) Register ii) Direct iii) Indirect iv) Index v) Immediate

Or

Discuss the 3 X 3 array multiplication method with diagram. Apply Booth's algorithm to multiply $(-11)_{10}$ and $(+13)_{10}$ using 5 bits registers. **10**

Q. No. 2. Explain different type of DMA Controller and how they differ in their functioning? How does polling work? **10**

Or

Explain with an example the different types of hazards that occur during pipelining. **10**

PAPER: INF 1036 (OPERATING SYSTEM)

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

Q. No. 1. a) What are the important aspects of an operating system? Explain the concept behind multiprogramming and time sharing operating systems. **5 + 5 = 10**

Or

b) Explain the basic elements of Linux operating system. Is Linux is better than Windows? Give your opinions. **5 + 5 = 10**

Q. No. 2. a) Explain the various key terms used in process scheduling? Explain how scheduling is done in real time system. **5 + 5 = 10**

Or

b) Explain the process how the CPU identifies an interrupt requesting device. Explain the computer operations where DMA transfer is required. **5 + 5 = 10**

PAPER: INF 1046 (MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE)

Q. No. 1. Answer any **two** of the following:

(a) (i) Consider the binary relation (I,R) on the set of positive integers I defined as **3 Marks**

(a, b) $\in$ R if and only if a + b = 5.

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

(ii) Let A= {1.2,3,4,5} and B = {a,b,c,d}. Let F and G be two relations from A to B defined as F = {(1,a), (2,b), (3,b), (4,c)} and G = {(1,b), (2,a), (3,a), (4,c), (5,d)}. Are F and G functions from A to B? Give reasons. **3 Marks**

(b) Five boys and five girls are to be seated in a row. In how many ways can they be seated if **2 x 3 = 6 Marks**

(i) All girls must be seated in the five leftmost seats.

(ii) No two boys can be seated together.

(iii) Hari and Jadu must be seated together.

(c) (i) Construct Truth Table for the following Boolean Expression.

$P(\neg P \vee Q) \wedge (P \wedge \neg Q) \wedge R$ **3 Marks**

(ii) Using Laws of Propositional Logic prove the following logical identity.

$[(Q \Rightarrow P) \wedge (\neg P \Rightarrow Q)] \Leftrightarrow P$ **3 Marks**

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

3 Marks

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

Draw the graph. Construct the adjacency list representation of the graph.

Q. No. 3. (a) Design Finite Automata for the following languages. **1.5 x 2 = 3 Marks**

(i) The language consisting of all strings in {a, b} not having more than two b.

(ii) The language consisting of all strings in {0, 1} starting and ending with the same symbol.

(b) Find Regular Expressions for the above two languages. **1 + 1= 2 Marks**

PAPER: INF 1056 (ADVANCED DATABASE MANAGEMENT SYSTEM)

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

Q. No. 1. Design an Entity Relation(ER) schema for a *Company* database with the following requirements given below: **10**

- The company is organized into departments. Each department has a unique name, a unique number and a particular employee who manages the department. We keep track of the start date when that employee began managing the department. A department may have several locations.
- A department controls a number of projects, each of which has a unique name, a unique number and a single location.
- The database will store each employee's name, Social Security number, address, salary, sex (gender), and birth date. An employee is assigned to one department but may work on several projects, which are not necessarily controlled by the same department. It is required to keep track of the current number of hours per week that an employee works on each project, as well as the direct supervisor of each employee (who is another employee).
- The database will keep track of the dependents of each employee for insurance purpose, including each dependent's first name, sex, birth date and relationship to the employee.

Use appropriate ER notations for each entity, relationship and attribute and provide cardinality ratios.

Or

Briefly explain normalization in Database Management System (DBMS) with its advantages and disadvantages. Describe each normal form in DBMS with proper examples and explanations. **10**

Q. No. 2. Briefly describe transaction processing in DBMS. Explain ACID (Atomicity, Consistency, Isolation, Durability) properties in DBMS with suitable examples. **10**

Or

State the need for concurrency control in DBMS. Discuss five concurrency control problems with appropriate examples. **10**

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Gauhati University

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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:.....

N.B.: Please note that the Name of the Candidate should not be mentioned anywhere. If found, the asnwer script will not be evaluated.)