Date: 27-08-2025

GAUHATI UNIVERSITY
CENTRE FOR DISTANCE AND ONLINE EDUCATION
HOME ASSIGNMENT

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

Semester - I (Session: 2024-2025, January)

***Guidelines for Submission*:**

1. Learners who have been admitted in the Academic Session (2024-25, 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 : 22nd September, 2025.**

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

Q. No. 1. How Polymorphism is a useful property of Object Oriented Programming (OOP)? Explain with suitable examples.

10

OR

What is Exception Handling? Explain the uses of Exception Handling Mechanism with suitable examples.

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Q. No. 2. Explain the concepts of Generalization and Specialization in OOP with suitable examples.

10

OR

Explain Class diagram and Object diagram. Draw a Class diagram and an Object diagram for a Hospital Management System.

10

PAPER: INF 1026 (ADVANCED COMPUTER ORGANIZATION AND ARCHITECTURE)

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

Q. No. 1. Explain the different types of addressing modes and their working. Why is immediate addressing mode not suitable for accessing large data structures? **10**

OR

Construct the basic gates using two universal gates NAND and NOR.

Q. No. 2. What is the memory hierarchy and why is it necessary?

OR

Explain the different techniques used for DMA (Direct Memory Access) transfer. **10**

PAPER: INF 1036 (OPERATING SYSTEM)

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

Q. No. 1. Explain the concept behind multiprogramming and time sharing operating Systems. **10**

OR

Explain the Linux architecture. Why is Linux considered a stable operating system? **10**

Q. No. 2. Consider the set of 6 processes whose arrival time and burst time are given below:

Process No	Arrival Time	Burst Time
P1	3	4
P2	5	3
P3	0	2
P4	5	1
P5	4	3
P6	7	5

If the CPU scheduling policy is SRTF (Shortest Remaining Time First), calculate the average waiting time and average turnaround time. **10**

OR

Consider the reference string 0, 3, 0, 4, 5, 3, 2, 0, 5, 4, 6, 7, 3, 4. Find the number of Page faults in each of the following cases assuming that memory can accommodate 4 pages/frames at a time.

(i) FIFO Page Replacement
(ii) LRU Page Replacement
(iii) Optimal Page Replacement **10**

PAPER: INF 1046 (MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE)

Q. No. 1. Using identities of Boolean algebra check the following statement is true or not.

$(x \wedge y') \vee (y \wedge z') \vee (x' \wedge z) = (x' \wedge y) \vee (y' \wedge z) \vee (x \wedge z')$ **10**

OR

Explain perfect matching with a suitable example. Prove that perfect matching is not possible in a bipartite graph having different number of vertices in the bipartition**.** **10**

Q. No. 2. Construct DFAs which accepts set of all strings over {a, b}, in which **4+3+3=10**

a) The number of a's and number of b's are both evens
b) The starting and ending symbol are same.
c) The starting symbol is 'a' and ending symbol is 'b'.

OR

a) Convert NFA to DFA for "all strings in which second symbol from RHS is a" over {a,b}.
b) Construct NFA which accepts all strings over {a, b}
i) containing ab b) ending with ab. **6+2+2 =10**

PAPER: INF 1056 (ADVANCED DATABASE MANAGEMENT SYSTEM)

Q. No. 1. What is minimal cover? Find the minimal cover of the set of functional dependencies given;

{A → C, AB → C, C → DI, CD → I, EC → AB, EI → C} **3+7 =10**

OR

What do you mean by closure of a functional dependency? Determine the closer of the following set of functional dependencies for a relation scheme R(A,B,C,D,E,F,G,H), F={ AB→C, BD→EF, AD→G, A→H} List the candidate keys of R. **3+4+3=10**

Q. No. 2. What is functional dependency? Normalize the following table into 3NF. **2 + 8=10**

Student_id	Course_id	S_Name	C_name	Grade	Faculty	Faculty_Phone
1	CS001	Akash	Database	A	R.Patnaik	25647812
1	CS002	Akash	Programming	B	S.Reddy	88923105
2	CS001	Jaydeep	Database	A	R.Patnaik	25647812
3	CS001	Shekhar	Database	B	R.Patnaik	25647812
4	CS002	Vineet	Programming	A	T.Karki	88923105
4	CS001	Vineet	Database	B	R.Patnaik	25647812

OR

Consider the following relational database schema consisting of the four relation schemas.

passenger (pid, pname, pgender, pcity)

agency (aid, aname, acity)

bus (bid, bdate, time, src, dest)

booking (pid, aid, bid, bdate)

Answer the following question using relational algebra queries:

a. Give the details of all buses from Dibrugarh to Guwahati.
b. Find the name of passengers who booked at least one bus.
c. Find the bus number for the passenger with pid p04 for bus to Sibsagar before 20/07/2025.
d. Find the name of passenger who has not booked any bus.
e. Find the details of all male passengers associated with Ugratara Agency.

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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.)