GAUHATI UNIVERSITY
CENTRE FOR DISTANCE AND ONLINE EDUCATION
HOME ASSIGNMENT
Master of Science in Information Technology (M.Sc.-IT)
Semester- II (Session: 2023-2024, July-August)

***Guidelines for Submission*:**

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

PAPER: INF 2016: (Data Communication and Computer Networks)

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

Q. No. 1. a) What are the best network topologies for different situations? How point-to-point networks differ from broadcast networks? **5 + 5 = 10**

Or

b) What are the different types of networks? Explain the difference between the connection oriented and connection-less networks. **5 + 5 = 10**

Q. No. 2. a) What are the different services provided by Data Link Layer? Explain the different phases of error control mechanism in Data Link Layer. **5 + 5 = 10**

Or

b) What are the different functions of Network Layer? Explain the Distance Vector Routing algorithm with a suitable example. **5 + 5 = 10**

PAPER: INF 2026: (Algorithms and Complexity Theory)

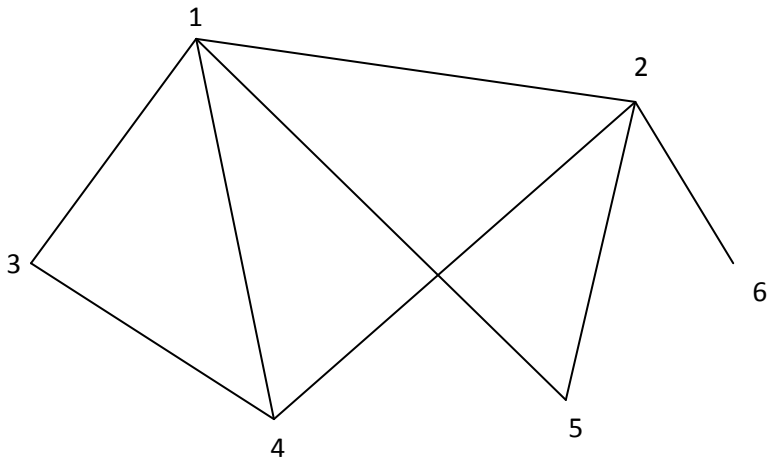
Q. No. 1. Write Short Note (**any one**): **10**

a) Prim's and Kruskal's Algorithms

b) Genetic Algorithm

c) Travelling Salesman Problem

Q. No. 2. Consider the following undirected graph. **10**



a. Write down the adjacency matrix and adjacency list representation of the graph

b. Write down the result of depth first search applied on the graph starting from vertex 3. Write down the discovery time, finishing time and π-values of the vertices.

c. Write down the result of BFS applied on the graph starting from vertex 3. Write down the d-values and π-values of the vertices.

OR

Draw the recursion tree for the following recurrence relation. **10**

$T(n) = 3\,T(\frac{n}{3}) + 2\,n$, $n > 1$

$T(1) = 2$

Find the height of the tree and the total number of nodes in the tree. Also solve the recurrence relation.

PAPER: INF 2036 (Software Engineering)

Answer any **two** questions: **2 x 10 = 20**

Q. No. 1. Explain the various different stages involved in each of the following Software Development Life Cycle Models (SDLC):

Classical Waterfall model, *Iterative Waterfall model*, *Prototyping model* and *Spiral model*.

Write at least two merits and demerits of each of the above mentioned models. **7 + 3 = 10**

Q. No. 2. a) Differentiate between *Organic, Semi-detached* and *Embedded* software types.
b) Explain the 15 cost drivers (i.e. cost multipliers) used in Intermediate COCOMO model.
c) Assume that the size of an organic type software product has been estimated to 52,500 lines of source code. Assume that the average salary of each of the software engineers be Rs. 50,000 per month. Determine the effort required to develop this software product and the nominal development time. Also find out the average staff size and productivity of the software. **2 + 5 + 3 = 10**

Q. No. 3. Consider a system for administering the borrowing of books at a university library. A person must be a member of the university's community and must not have any outstanding fines or overdue books – to borrow books. A book may be borrowed for up to two weeks at a time. A book

loan may be renewed if the book is returned before the loan's due date and if no other library member has expressed an interest in borrowing the book. If a book is returned after the loan's due date, the borrower will be a charged a fine of Rs. 5 for each late day. Fines are paid to the library staff at the circulation desk, where books are returned. Heavily used books may be put on reserve, meaning that members can read them only in the library and cannot borrow them.

Draw the DFD (Data Flow Diagram) for the above system (up to DFD level 1). **10**

PAPER: INF 2046 (Computer Graphics and Multimedia)

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

Q. No. 1. How does Bresenham's Line Drawing Work? Explain with an example. Also, explain the working of Scan Line Polygon Fill algorithm. **5 + 5 = 10**

OR

Write short notes on 2D animation and 3D animation. **5 + 5 = 10**

Q. No. 2. Explain extensively the basic transformations- translation, rotation and scaling with suitable examples. **10**

OR

Briefly explain about 2D viewing pipeline. Also, write short notes on RGB colour model and CMYK model. **5 + 5 = 10**

PAPER: INF 2056 (Advanced Data Structure)

Answer any **two** questions: **2 x 10 = 20**

Q. No. 1. What is link list? What are the advantages of link list over other static allocation? Write a C/C++ program to merge two sorted link list of integers into one. The resultant output must be in sorted order. Also write a function to delete nodes that have odd numbers. **10**

Q. No. 2. What is red-black tree? What are its properties? Create a red black tree for the following data

50, 40, 70, 60, 55, 45, 35, 25, 15, 10, 75, 85

Write the inorder, preorder and post order traversal of the above tree. **10**

Q. No. 3. What is order statistics. Give some solutions to improve the performance of order statistics. **10**

Q. No. 4. What is amortize analysis? Explain different types of amortize analysis with their applications. **10**

---x---

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:.....

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