



GAUHATI UNIVERSITY
CENTRE FOR DISTANCE AND ONLINE EDUCATION

HOME ASSIGNMENT

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

Semester - II (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 : 20th February, 2025.**

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

Answer the following questions

2 x 10 = 20

Q. No. 1. a) What is computer network? Explain different categories of network topologies.

3 + 7 = 10

OR

b) What is TCP/IP reference model? Explain the role of internet layer in TCP/IP reference model.

5 + 5 = 10

Q. No. 1. a) What are transmission media? Explain the different categories of transmission media.

3 + 7 = 10

OR

b) Define Media Access Control (MAC) Sublayer. Explain the various functions of MAC Sub Layer.

5 + 5 = 10

PAPER: INF 2026: (Algorithms and Complexity Theory)

Write Short note on any following two questions:

2 x 10 = 20

(1) Prim's and Kruskal's Algorithms

(ii) Genetic Algorithm

(iii) Travelling Salesman Problem

PAPER: INF 2036 (Software Engineering)

Answer any two questions

2 x 10 = 20

Q. No. 1. Write the comparison of different software development life cycle models. 10

Q. No. 2. Explain Agile Software development model. States two merits and demerits of this model. 6 + 4 = 10

Q. No. 3. Show the decision table representation for the following wash-machine problem: 10

Description of the problem:

The machine waits for the **start** switch to be pressed. After the user presses the **start** switch, the machine fills the wash tub with either hot or cold water depending upon the setting of the **HotWash** switch. The water filling continues until the high level is sensed. The machine starts the agitation motor and continues agitating the wash tub until either the preset timer expires or the user presses the **stop** switch. After the agitation stops, the machine waits for the user to press the **startDrying** switch. After the user presses the **startDrying** switch, the machine starts the hot air blower and continues blowing hot air into the drying chamber until either the user presses the stop switch or the **preset timer** expires.

Q. No. 4. Write short notes on the following topics 2 x 5 = 10

- (a) COCOMO model
- (b) Reverse Engineering

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 the Scan Line Polygon Fill algorithm. 10

OR

List the operating characteristics for the following display technologies: raster refresh systems, vector refresh systems, plasma panels, and LCDs. 10

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

OR

Implement Bresenham's line drawing algorithm to draw a line from (35, 40) to (43, 45). 10

PAPER: INF 2056 (Advanced Data Structure)

Answer any two questions from the following

2 x 10 = 20

Q. No. 1. Choose the correct answer/ Answer in one word 10

- (i) The worst case run time to delete a node from a doubly link list with n element is
(a) O(1) (b) O(n log n) (c) O(n) (d) O(2ⁿ-1)
- (ii) The worst case time complexity to insert an element into hash table.
(a) O(log n) (b) O(n log n) (c) O(n) (d) O(1)
- (iii) The maximum number of nodes in a binary tree of height h is
(a) 2h (b) 2^h+1 (c) 2^h-1 (d) 2h+1
- (iv) In C language malloc() allocate
(a) infinite number of space (b) finite number of space
(c) space in secondary memory (d) both (b) and (c)

- (v) A 2D array of size A[30][40] is defined, each element occupies 2 bytes memory, if the base address is 1000 then what will be the address of location A[15][20] if it is stored in column major.
- (vi) In a singly link list which one of the following is correct to insert a node after a particular node.(where, node is the pointer to point the newly created node and ptr is the pointer to traverse the list)
- (a) $\text{ptr} \rightarrow \text{next} = \text{node}; \text{node} \rightarrow \text{next} = \text{ptr} \rightarrow \text{next};$ (b) $\text{node} \rightarrow \text{next} = \text{ptr} \rightarrow \text{next}; \text{ptr} \rightarrow \text{next} = \text{node};$
(c) $\text{ptr} \rightarrow \text{next} = \text{node} \rightarrow \text{next}; \text{ptr} \rightarrow \text{next} = \text{node};$ (d) $\text{node} \rightarrow \text{next} = \text{ptr}; \text{ptr} \rightarrow \text{next} = \text{node};$
- (vii) The inorder traversal of a binary tree is given below, choose the correct postorder traversal.
Inorder : XPYQBA
- (a) XPQYAB
(b) ABXYPQ
(c) PXQYBA
(d) XPQYBA
- (viii) Sequential representation of a binary tree is usually efficient when the binary tree is
- (a) complete (b) almost complete (c) threaded tree (d) balanced
- (ix) The worst case time complexity of quick sort is
- (a) $O(n \log n)$ (b) $O(n)$ (c) $O(n^2)$ (d) both (a) and (b)
- (x) In a red black tree if a node is black then both its children are
- (a) red (b) one black other red (c) either red or black (d) both (b) and (c)

Q. No. 2.

- a. What is AVL tree? Considering the following list of elements, construct an AVL tree. **1 + 4 = 5**
- 10 20 30 40 50 47 49 68 75 6 10
- b. Write a function in C/C++ for right rotation. **5**

Q. No. 3.

- a. Sort the following list of elements using counting sort algorithm(show each step clearly). **5**
- 2 5 3 0 2 3 0 5 3
- b. Write a function in C/C++ for counting sort **5**

Q. No. 4. What is Red black tree? What are its properties? Create red-black tree for the following data. **1 + 4 + 5 = 10**

26 5 77 1 61 11 59 15 48 19 25 35

---x---



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Gauhati University
দূৰ আৰু অনলাইন 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 answer script will not be evaluated.)



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