Sri Indu
College of Engineering & Technology
UGC Autonomous Institution
Recognized under 2(f) & 12(B) of UGC Act 1956,
NAAC, Approved by AICTE &
Permanently Affiliated to JNTUH
Estd.2001

NAAC
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL

Question Bank

Second Year AI&DS – Semester I

DEPARTMENT OF ARTIFICAL INTELLGENCE AND DATA SCIENCE

ACADEMIC YEAR 2025-26

DEPARTMENT OF ARTIFICAL INTELLGENCE AND DATA SCIENCE

HANDOUT - INDEX

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.TECH ARTIFICAL INTELLGENCE AND DATA SCIENCE

INSTITUTION VISION

To be a premier Institution in Engineering & Technology and Management with competency, values and social consciousness.

INSTITUTION MISSION

IM1 : Provide high quality academic programs, training activities and research facilities.

IM2 : Promote Continuous Industry – Institute interaction for employability, Entrepreneurship, Leadership and research aptitude among stakeholders.

IM3 : Contribute to the Economical and Technological development of the region, State and Nation.

DEPARTMENT VISION

To be a highly vying in nurturing collaborative, innovative, and rational data science professionals with high ethics towards societal uplift.

DEPARTMENT MISSION

DM_1 : To offer high quality student centric education in Information Technology.

DM_2 : To provide a conducive environment towards innovation and skills.

DM_3 : To involve in activities that provide social and professional solutions.

DM_4 : To impart training on emerging technologies namely cloud computing and IOT with involvement of stake holders.

Program Educational Objectives (PEOs)

PEO1:	**Higher Studies :** Graduates with an ability to apply knowledge of Basic Sciences and programming Skills in their career and higher education.
PEO2:	**Lifelong Learning :** Graduates with an ability to adopt new technologies for ever changing IT industry needs through Self-Study, Critical thinking and Problem solving skills.
PEO3:	**Professional Skills :** Graduates will be ready to work in projects related to complex problems involving multidisciplinary projects with effective analytical skills.
PEO4:	**Engineering citizenship :** Graduates with an ability to communicate well and exhibit social, technical and ethical responsibility in process or product.

Program Specific Outcomes (PSOs)

PSO1	**Software Development :** To apply the knowledge of Software Engineering, Data Communication, Web Technology and Operating Systems for building IOT and Cloud Computing applications.
PSO2	**Industrial Skills Ability :** Design, develop and test software systems for world-wide network of computers to provide solutions to real world problems.
PSO3	**Project Implementation :** Analyze and recommend the appropriate IT infrastructure required for the implementation of a project.

Program Outcomes(POs)

PO1:Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2:Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3:Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5:Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modeling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6:The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7:Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8:Individual and Collaborative Teamwork: Function effectively as an individual and as a member or leader in diverse/multi-disciplinary teams.
PO9:Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
PO10:Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11:Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R22CSE2112) DATA STRUCTURES

Course Objectives

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Course Outcomes

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations orcombinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations.

UNIT - II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing- linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/PearsonEducation.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan,Cengage Learning.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)
Recognized under 2(f) and 12(B) of UGC Act 1956
NBA & NAAC Accredited, Approved by AICTE and Permanently affiliated to JNTUH
Sheriguda (V), Ibrahimpatnam, R.R.Dist, Hyderabad - 501 510

D4

ANNEXURE -III

BR-22

Lr.No.SICET/AUTO/DAE/II B.Tech Academic Calendar/30/2025

B.TECH II-YEAR I-SEM & II-SEM ACADEMIC CALENDAR
(FOR ACADEMIC YEAR : 2025-26)

Academic Calendar for B.Tech – II[nd] Year Students (2024 - 25 Batch), BR-22 Regulation.

I – Semester

S.No.	EVENT	PERIOD	DURATION
1.	**Commencement of class work.**	**01.08.2025**	
2.	1[st] Spell of Instructions for covering First Two and a half Units.	01.08.2025 –07.10.2025	9 Weeks
3.	I Mid Term Examinations.	08.10.2025 –10.10.2025	3 Days
4.	Submission of I Mid Term Examination Marks.	16.10.2025	
5.	2[nd] Spell of Instructions for Remaining Two and a half Units.	13.10.2025 – 13.12.2025	9 Weeks
6.	II Mid Term Examinations.	15.12.2025 – 17.12.2025	3 Days
7.	Preparation Holidays and Practical Examinations	18.12.2025 – 27.12.2025	1 Week
8.	Submission of II Mid Term Examination Marks.	23.12.2025	
9.	I Semester End Examinations.	29.12.2025 – 10.01.2026	2 Weeks
Commencement of Class-Work for II B.Tech - II Semester 19.01.2026			

Note: No of Working/instructional days : 92

II – Semester

S.No.	EVENT	PERIOD	DURATION
1.	**Commencement of class work.**	**19.01.2026 (Monday)**	
2.	1[st] Spell of Instructions for covering First Two and a half Units.	19.01.2026 – 14.03.2026	8 Weeks
3.	I Mid Term Examinations.	16.03.2026 – 18.03.2026	3 Days
4.	Submission of I Mid Term Examination Marks.	24.03.2026	
5.	2[nd] Spell of Instructions for Remaining Two and a half Units.	20.03.2026 – 09.05.2026	7 Weeks
6.	Continuation of remaining 2[nd] Spell of Instructions	25.05.2026 – 10.06.2026	2 Weeks
7.	II Mid Term Examinations.	11.06.2026 –13.06.2026	3 Days
8.	Preparation Holidays and Project Evaluation.	15.06.2026 – 20.06.2026	1 Week
9.	Submission of II Mid Term Examination Marks.	18.06.2026	
10.	II Semester End Examinations	22.06.2026 – 04.07.2026	2 Weeks

Note: No of Working/instructional days : 92

ACE CE DIRECTOR PRINCIPAL

Controller of Examination
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510

DIRECTOR
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510

PRINCIPAL
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510.

Sign:
Dr. M.V.S.S. Giridhar
Prof. of CEA; JNTUH Nominee

Sign:
Dr. T. Venu Gopal
Prof. of CSE; JNTUH Nominee

Sign:
Dr. D. Ramesh
Prof. of CSE; JNTUH Nominee

(Copy to DAP&E and Copy to all the Dept. Heads)

LESSON PLAN

	SRI INDU COLLEGE OF ENGG &TECH **QUESTION BANK** **(Regulation: R22)** **Department of AI&DS**	**(Regulation:R22)**

Sub. Code &Title	**(R22CSE2112) DATASTRUCTURES**		
AcademicYear:2025-26		**Year/Sem.**	**II-I / CSE(CSIT & AI&DS)**
Faculty Name & Designation	**Ms M.SUMANJALI & Assistant Professor**		

QUESTION BANK WITH BLOOMS TAXONOMY LEVEL (BTL)

(1. Remembering 2. Understanding 3. Applying 4. Analyzing 5. Evaluating 6. Creating)

UNIT-1 : LINKED LISTS,STACK AND QUEUE			
	Multiple choice Questions	**BT Level**	**Course Outcome**
1C-1	Which type of linked list stores the address of the first node in the next pointer of the last node? a) Singly Linked List b) Doubly Linked List c) Hashed List d) Circular Linked List	L1	CO1
1C-2	In which type of linked lists traversals can be performed in both directions? a) Singly Linked Lists b) Doubly Linked Lists c) Circular Linked Lists d) None of the above	L1	CO1
1C-3	Identify the data structure which allows deletions at both ends of the list but insertion at onlyone end. a) Stack b)Priorityqueues c) Output restricted dequeue d) Input restricted dequeue	L3	CO1
1C-4	Which of the following data structure is non linear type? a)Graph b)Stacks c)Lists d)None of the above	L1	CO1
1C-5	Which data structure is used in breadth first search of a graph to hold nodes? a)Array b) Tree c) Stack d)queue	L1	CO1

1C-6	When new data are to be inserted into a data structure, but there is not available space; this situation is usually called..... a)overflow b)Underflow c) house full d) memory full	L1	CO1
1C-7	What is a data structure? a) A programming language b) A collection of algorithms c) A way to store and organize data d) A type of computer hardware	L1	CO1
1C-8	Which data structure is based on the Last In First Out (LIFO) principle? a) Tree b) Linked List c) Stack d) Queue	L1	CO1
1C-9	Which of the following statement(s) about stack data structure is/are NOT correct? a) Top of the Stack always contain the new node b) Stack is the FIFO data structure c) Null link is present in the last node at the bottom of the stack d) Linked List are used for implementing Stacks	L1	CO1
1C-10	Which data structure is needed to convert infix notation to postfix notation? a) Tree b) Branch c) Stack d) Queue	L1	CO1
1C-11	What is the value of the postfix expression 6 3 2 4 + – *? a) 74 b) -18 c) 22 d) 40	L1	CO1
1C-12	The data structure required for Depth First Traversal on a graph is? a) Array b) Stack c) Tree d) Queue	L5	CO1
1C-13	A data structure in which elements can be inserted or deleted at/from both ends but not in the middle is? a) Priority queue b) Dequeue c) Circular queue d) Queue	L1	CO1
1C-14	What is the time complexity to count the number of elements in the linked list? a) O(1) b) O(n) c) O(logn) d) $O(n^2)$	L1	CO1

1C-15	In a circular queue, how do you increment the rear end of the queue? a) rear++ b) (rear+1) % CAPACITY c) (rear % CAPACITY)+1 d) rear--	L1	CO1
IF- 1	Stack and Queue are_____data structures.	L1	CO1
1F-2	---------- data structure is used to evaluate postfix expression.	L1	CO1
1F-3	Types of linked lists are ----------	L1	CO1
1F-4	---------- Condition indicates Stack underflow.	L2	CO1
1F-5	Queue is full when ----------	L1	CO1
1F-6	Draw the example circular linked list ----------	L1	CO1
1F-7	Advantage of a circular queue is ----------	L1	CO1
1F-8	Operations on stack are ----------	L1	CO1
1F-9	Differences between single and double linked list are----------	L4	CO1
1F-10	Disadvantage of linked lists are ----------	L2	CO1
1F-11	---------- Pointers, double linked list node will have.	L2	CO1
1F-12	----------is the condition to become a queue full.	L4	CO1
1F-13	---------- is the condition that specifies a queue contains single element.	L4	CO1
1F-14	Types of queues are ----------	L1	CO1
1F-15	Applications of Queue are ----------	L2	CO1
1M-1	Match the following a. Linear data structures b. Stack c. Applications of Stack d. Dequeue 1. LIFO list 2. Insertion and Deletion can be done from both ends 3. Stack ,Queue 4. Evaluating postfix expression	L1	CO1
1M -2	Match the following a. Array b. Stack c. Queue d. Linked list 1. Insertion and deletion at different ends 2. Insertion and deletion at the same end 3. Self-referential structure is utilized 4. Elements are accessed by specifying its position	L1	CO1
1M -3	a. Stack b. Queue c. Priority queue d. Double linked list 1. Traverse in both directions. 2. Event driven simulation 3. Operation for the printer 4. Balanced parenthesis verification	L1	CO1

1M -4	a. Queue b. Tree c. Stack d. Linear data structure	1. DFS 2. LIFO list 3. Stack 4. Non Linear data structure	L1	CO1
1M -5	a. Linear Queue b. Circular Queue c. Double Linked List d. Single Linked List	1. Node will have two pointers 2. Memory wastage 3. Node contains one pointer 4. Efficient utilization of memory	L1	CO1
1D-1.	Discuss about implementation of single linked list?		L2	CO1
1D-2.	Write a program to implement single linked list?		L6	CO1
1D-3.	Explain the following data structures a)Stack operations b)Queue operations		L2	CO1
1D-4.	Write about Stack representation using array and linked list?		L1	CO1
1D-5.	Write about Queue representation using array and linked list?		L1	CO1
1D-6.	Write a program to implement stack using Linked list?		L1	CO1
1D-7.	Write a program to implement Queue using array?		L1	CO1
1D-8	Explain about Stack applications and Queue applications.		L2	CO1
1D-9	Describe Linked list? Distinguish between array and linked list?		L4	CO1
1D-10	Explain about following a) Data structure b) Abstract Data Type c) Linear data structure d) Non Linear Data structure.		L2	CO1
1D-11	Write the advantages of linked lists.Write an algorithm to insert and delete a node in single linked list.		L1	CO1
1D-12	Explain any two applications of stack with examples.		L2	CO1
1D-13	Compare Single linked list with Double linked list.		L4	CO1
1D-14	Define Data Structure. Write a brief note on different data structures with examples.		L1	CO1
1D-15	What are the limitations of Linear Queue. Explain operations of Circular queue.		L1	CO1
UNIT-II: Dictionaries				
	Multiple choice Questions		**BTLevel**	**Course Outcome**
2C-1	If Every item of the list maps to a unique index in the hash table, the function is called_____ a. Hash Free Table b. Collision Table c. Collision Free Table d. Perfect Has Table		L1	CO2

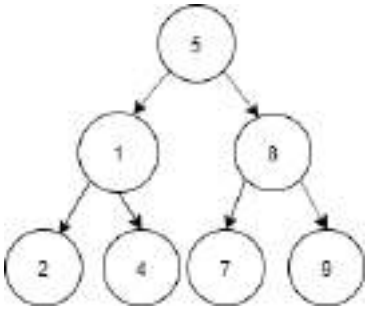
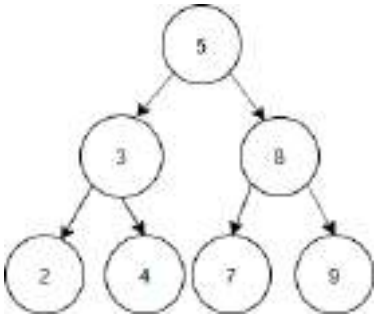
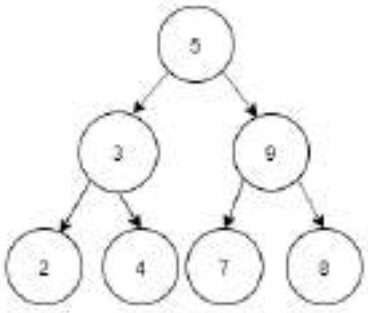
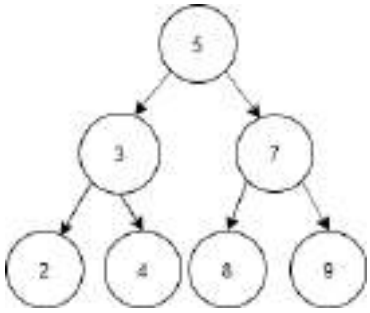
2C-2	If the hash function is h(element)=element%10, so for which of the pair of values, the collision will take place _____ a. 15 and 14 b. 12 and 2 c. 1 and 10 d. 11 and 22	L1	CO2
2C-3	What is a skip list? a. a linked list with size value in nodes Collision Table b. a linked list that allows faster search within an ordered sequence c. a linked list that allows slower search within an ordered sequence d. a tree which is in the form of linked list	L1	CO2
2C-4	Skip lists are similar to which of the following datastructure? a. stack b. Heap c. Binary Search Tree d. Balanced Binary Search Tree	L1	CO2
2C-5	The nodes in a skip list may have many forward references their number is determined. a. Probabilistically b. randomly c. sequentially d. orthogonally	L1	CO2
2C-6	Which of the following problems occur due to linear probing? a) Primary collision b) Secondary collision. c) Separate chaining. d) Extendible Hashing	L1	CO2
2C-7	Which of the following is not a collision resolution strategy for open addressing? a) Linear probing b) Quadratic probing c) Double hashing d) Rehashing	L1	CO2
2C-8	What is the hash function used in linear probing? a) H(x)= key mod table size b) H(x)= (key+ $F(i^2)$) mod table size c) H(x)= (key+ F(i)) mod table size d) H(x)= X mod 17	L1	CO2

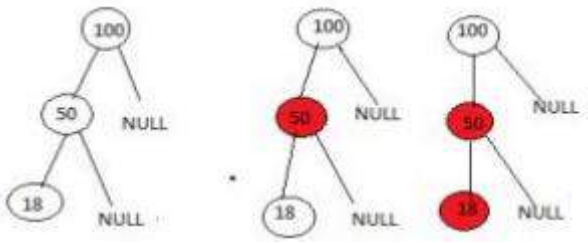
2C-9	What data organization method is used in hash tables? a) Stack b) Array c) Linked List d) Queue	L1	CO2
2C-10	In a hash table of size 10, where is element 7 placed? a) 6 b) 7 c) 17 d) 16	L1	CO2
2C-11	9. Which of the following is identical to that of a separate chaining hash node? a) Linked list b) Array c) Stack d) Queue	L2	CO2
2C-12	What is a hash table? a) A structure that maps values to keys b) A structure that maps keys to values c) A structure used for storage d) A structure used to implement stack and queue	L2	CO2
2C-13	Hashing technique which allocates fixed number of buckets is classified as a) dynamic hashing b) static hashing c) external hashing d) internal hashing	L2	CO2
2C-14	What is the load factor? a) Average array size b) Average key size c) Average chain length d) None of the mentioned	L2	CO2
2C-15	What is the search complexity in direct addressing? a) O(n) b) O(logn) c) O(nlogn) d) O(1)	L2	CO2
	Fill in the blanks		
2F-1	The function that transforms a key into a table index is called_____.	L1	CO2
2F-2	_____Permits a hash table to expand and shrink dynamically.	L2	CO2

2F-3	_____using a secondary has function on the hash key on the item.	L2	CO2
2F-4	Hash collision can be dealt with techniques like_____	L1	CO2
2F-5	If h is a hash and key is a key, _____is called the hash of key.	L3	CO2
2F-6	A good hash function is one that minimizes_____	L2	CO2
2F-7	_____allows direct access to the table.	L2	CO2
2F-8	_____is a collection of pairs of key and value where every value is associated with the corresponding key.	L1	CO2
2F-9	_____method of hash function depends upon the reminder of division.	L2	CO2
2F-10	The situation in which the hash function returns the same hash key (home bucket) for more than one record is called_____	L1	CO2
2F-11	_____lists are made up of a series of nodes connected one after the other, contains a key and value pair.	L2	CO2
2F-12	_____is a technique in which a second hash function is apply to the key when a collision occurs.	L3	CO2
2F-13	_____hashing is a dynamically updatable disk based index structure which implement a hashing scheme utilizing a dictionary.	L2	CO2
2F-14	Uniform hashing is defined as any newly inserted elements is equally likely to be placed at any of the empty positions of the_____	L1	CO2
2F-15	Re-hashing involves using_____hash function on the hash key of the item.	L1	CO2
	Match the following		
2M-1	a. Hashing b. Collision c. Hash Function d. Dictionary 1. General purpose data structure for storing a group of objects. 2. To derive the physical location of a record 3. Process of using a math function to convert input data into fixed length output. 4. Occurs when more than one value to be hashed	L1	CO2
2M-2	a. List of Bank Accounts b. Skip List c. H(key) = (Hash(key) + i2) % m) d. Using 2 keys 1. Double Hashing 2. Quadratic Probing 3. Example of dictionary 4. Variant in linked list	L1	CO2
2M-3	a. Rehashing b. Skip List c. Hashing will be done based d. Extendible Hashing 1. Does not require hashing 2. Hash Function 3. Growing and Shrinking 4. Table is resized	L1	CO2
2M-4	a. Time complexity of hash table chaining b. Best case time complexity of insertion in hash table c. Space complexity (if M 1. Keys to buckets 2. O(M) 3. O(n) 4. O(1)	L1	CO2

	keys) d. Hash function maps		
2M-5	a. Abstract data Type b. Open Hashing c. Increase and decrease in size d. Closed Hashing 1. Rehashing 2. Dictionary 3. Collision results in storing one of the records at another slot in the table 4. Whether collisions are stored outside the table.	L1	CO2
	5-MARKSQUESTIONS		
2D-1.	Discuss the term Dictionary? What are the various applications of Dictionary and Hashing?	L2	CO2
2D-2.	Write about Hash table and Hash function?	L1	CO2
2D-3.	What are the various types of hash functions.	L1	CO2
2D-4.	Demonstrate skip list representation and its node structure with example?	L3	CO2
2D-5.	Explain how does collision occur?	L2	CO2
2D-6.	Explain chaining and open addressing methods for detecting collision and overflow?	L2	CO2
2D-7.	Write about Quadratic Probing collision handling techniques.	L1	CO2
2D-8	Write about Double hashing collision handling techniques.	L1	CO2
2D-9	Discuss about the Rehashing Technique and its advantages?	L2	CO2
2D-10	Explain the concept of extensible hashing with suitable example.	L2	CO2
2D-11	What is hashing? Explain the differentiation between hashing and skip list?	L2	CO2
2D-12	Assuming the table size as the smallest prime number greater than the input size, as the hash the following keys : 62,56,45,14,78,44,36,29 & 39 to handle collisions use linear probing & quadratic probing.	L4	CO2
2D-13	What are the uses of extensible hashing?	L1	CO2
2D-14	Compare between Quadratic probing and double hashing.	L4	CO2
2D-15	What are the two methods of representing Liner list? Explain with example	L2	CO2

UNIT-III Search Trees			
	Multiple choice Questions	**BT Level**	**Course Outcome**
3C-1	Which of the following traversal outputs the data in sorted order in a BST? a) Preorder b) Inorder c) Postorder d) Level order	L1	CO3

3C-2	The height of a binary tree is the maximum number of edges in any root to leaf path. The maximum number of nodes in a binary tree of height h is: ( ) a) 2^h -1 b) 2^(h-1) – 1 c) 2^(h+1) -1 d) 2*(h+1)	L1	CO3
3C-3	What is the average case time complexity for finding the height of the binary tree? a) h = O(loglogn) b) h = O(nlogn) c) h = O(n) d) h = O(log n)	L1	CO3
3C-4	Construct a binary search tree by using post order sequence given below. Post order: 2, 4, 3, 7, 9, 8, 5. a)  b)  c)  d) 	L6	CO3
3C-5	The run time for traversing all the nodes of a binary search tree with n nodes and printing them in an order is a) O(nlg(n)) b) O(n) c) O(√n) d) O(log(n))	L3	CO3
3C-6	What is the maximum number of keys that a B+ -tree of order 3 and of height 3 have? a) 3 b) 80 c) 27 d) 26	L1	CO3

3C-7	What is an AVL tree? a) a tree which is balanced and is a height balanced tree b) a tree which is unbalanced and is a height balanced tree c) a tree with three children d) a tree with atmost 3 children	L1	CO4
3C-8	What is the maximum height of an AVL tree with p nodes? a) p b) log(p) c) log(p)/2 d) ½	L1	CO4
3C-9	Why to prefer red-black trees over AVL trees? a) Because red-black is more rigidly balanced b) AVL tree store balance factor in every node which costs space c) AVL tree fails at scale d) Red black is more efficient	L2	CO4
3C-10	Which one of the following data structures are preferred in database-system implementation? a) AVL tree b) B-tree c) B+ - tree d) Splay tree	L1	CO3
3C-11	What is the disadvantage of using splay trees? a) height of a splay tree can be linear when accessing elements in non-decreasing order b) splay operations are difficult c) splay tree performs unnecessary splay when a node is only being read d) no significant disadvantage	L1	CO4
3C-12	What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0. a) 2 b) 3 c) 4 d) 5	L4	CO4
3C-13	Consider the below formations of red-black tree. 	L1	CO4

	All the above formations are incorrect for it to be a redblack tree. then what may be the correct order? a) 50-black root, 18-red left subtree, 100-red right subtree b) 50-red root, 18-red left subtree, 100-red right subtree c) 50-black root, 18-black left subtree, 100-red right subtree d) 50-black root, 18-red left subtree, 100-black right subtree		
3C-14	When to choose Red-Black tree, AVL tree and B-trees? a) many inserts, many searches and when managing more items respectively b) many searches, when managing more items respectively and many inserts respectively c) sorting, sorting and retrieval respectively d) retrieval, sorting and retrieval respectively	L3	CO4

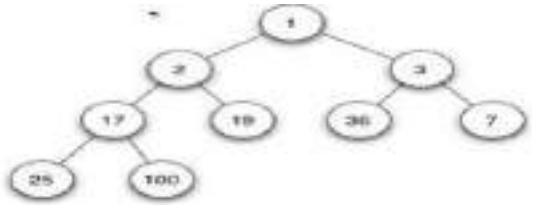
3C-15	10. What is the below pseudo code trying to do, where pt is a node pointer and root pointer?
	
	redblack(Node root, Node pt):
	if(root ==**NULL**)
	return pt
	
	if(pt.data< root.data)
	{
	root.left= redblack(root.left, pt);
	root.left.parent= root
	}
	elseif(pt.data> root.data)
	{
	root.right= redblackt(root.right, pt)
	root.right.parent= root
	}
	return root
	
	a)insert a new node
	b) delete a node
	c) search a node
	d) count the number of nodes
		L6	CO3

3C-16	B-tree of order n is a order-n multi way tree in which each non-root node contains _____ a) at most (n – 1)/2 keys b) exact (n – 1)/2 keys c) at least 2n keys d) at least (n – 1)/2 keys	L1	CO3
	Fill in the blanks		
3F-1	Breadth First Search (BFS) is started on a binary tree beginning from the root vertex. There is a vertex t at a distance four from the root. If t is the n-th vertex in this BFS traversal, then the maximum possible value of n is _____	L4	CO3
3F-2	What is the special property of red-black trees and what root should always be_____	L1	CO4
3F-3	What maximum difference in heights between the leafs of a AVL tree is possible_____	L4	CO4

3F-4	Efficiency of finding the next record in B+ tree is _____	L1	CO3
3F-5	The most widely used external memory data structure is_____	L3	CO3
3F-6	An AVL tree is an improved version of the _____	L6	CO4
3F-7	Maximum depth of an AVL tree with n nodes is _____	L3	CO4
3F-8	_____is an application of splay trees	L2	CO4
3F-9	What is a splay operation_____	L1	CO4
3F-10	What are the worst case and average case complexities of a binary search tree is_____	L4	CO3
3F-11	What are the operations that could be performed in O(logn) time complexity by red-black tree is_____,_____,_____,_____	L1	CO4
3F-12	If a node has K children in B tree, then the node contains exactly ----------keys.	L1	CO3
3F-13	A B+ tree can contain a maximum of 7 pointers in a node. What is the minimum number of keys in leaves_____	L3	CO3
3F-14	What minimum difference in heights between the leafs of a AVL tree is possible_____	L4	CO4
3F-15	The complexity of searching, inserting and deletion in AVL tree is_____	L4	CO4
	Match the following		
3M-1	a. B tree — 1. Full Binary Tree b. Zig rotation — 2. **1972** c. A Red Black Tree — 3. The node is rotated towards its right. d. A tree has 0 or 2 childrens — 4. height-balanced m-way tree	L1	CO3
3M -2	a. Minimum number of nodes in full binary tree — 1. log(n) where n is the number of nodes b. Non Linear Hierarchical DS — 2.2*h-1 c. Minimum height of full binary tree — 3. Tree d. Minimum number of nodes in a full binary tree — 4. Log2(n+1)-1	L1	CO3
3M -3	a. Root — 1. Root Node b. Siblings — 2. First node of the tree c. Level 0 — 3. Node with no child d. Leaf Node — 4. That belong to the same parent	L1	CO3
3M -4	a. AVL tree Invented by — 1. Splay Tree b. Self balancing BST — 2. Total numberof children of a node c. Zig Zag Rotation — 3. Red Black tree d. Degree — 4. GM Adelson	L1	CO4
3M -5	a. Order of complexity (average time of RB tree) — 1. O(n) b. Order of complexity (Worst case time of RB tree) — 2. O(t lont n) c. Worst case complexity of Splay — 3. O(1) d. Total time complexity of B+ Tree(Search) — 4. O(logn)	L1	CO4
	5 - MARKS QUESTIONS		

3D-1.	Write a procedure to perform insertion deletion and searching in Binary search tree?	L1	CO3
3D-2.	Explain in detail deletion of an element in BST in different cases?	L2	CO3
3D-3.	Write a program to perform following operations in Binary search tree? a) Insert an element into a binary search tree b) Delete an element from a binary search tree	L1	CO3
3D-4.	Define Binary search tree? Construct binary search tree step by step with diagrams using list of numbers {4,5,1,2,9,7,3,6,10,12,11}.	L1	CO3
3D-5.	Describe AVL Tree? Illustrate different rotations in AVL tree for balancing with appropriate example?	L2	CO4
3D-6.	Write list of operations perform on AVL tree with example?	L1	CO4
3D-7.	a) Explain a balance factor in AVL tree with example? b) Explain representation of AVL tree with example?	L2	CO4
3D-8	a) Develop a program to insert the elements into AVL tree? b) Construction of AVL tree step by step with diagrams for the list {25, 30, 35, 40, 50, 55, 60, 65, 70, 75}	L3	CO4
3D-9	Write a program to perform following operations in B+ tree? a) Insert an element into a B+ tree b) Delete an element from a B+ tree	L1	CO3
3D-10	What is Splay tree ?Illustrate Splay-tree with example?	L2	CO3
3D-11	a) List the operations in Binary Search Tree? b) How to find order of B Tree?	L1	CO3
3D-12	What is an AVL Tree? Give one example?	L1	CO4
3D-13	List the rules of Red-Black Tree? And explain with example?	L1	CO4
3D-14	Differentiate AVL tree and Binary search tree?	L4	CO4
3D-15	How do implement a splay tree? Why to prefer splay trees?	L1	CO4

UNIT – IV			
	OBJECTIVE TYPE QUESTIONS	**BT Level**	**Course Outcome**
4C-1	Which of the following sorting algorithms can be used to sort a random linked listwith minimum time complexity? a) insertion sort b) quick sort c) heap sort d) merge sort	L1	CO5

4C-2	In a max-heap, element with the greatest key is always in the which node? a) leaf node b) first node of left sub tree c) root node d) first node of right sub tree	L3	CO5
4C-3	Heap can be used as _____ a) priority queue b) stack c) a decreasing order array d) none of the mentione	L3	CO5
4C-4	If we implement heap as min-heap , deleting root node (value 1)from the heap. Whatwould be the value of root node after second iteration if leaf node (value 100) is chosen to replace the root at start.  a) 2 b) 100 c) 17 d) 3	L2	CO5
4C-5	A sorting technique is called stable if it a) Takes O(nlogn) times b) Maintains the relative order of occurrence of non-distinct elements c) Uses divide-and-conquer paradigm d) Takes O(n) space	L1	CO5
4C-6	Descending priority queue can be implemented using _____ a) max heap b) min heap c) min-max heap d) trie	L3	CO5
4C-7	Min heap can be used to implement selection sort. a) true b) false	L3	CO5
4C-8	Which one of the following array elements represents a binary min heap? a) 12 10 8 25 14 17 b) 8 10 12 25 14 17 c) 25 17 14 12 10 8 d) 14 17 25 10 12 8	L1	CO5

4C-9	The time complexity of a quick sort algorithm which makes use of median, found byan O(n) algorithm, as pivot element is a) $O(n^2)$ b) O(nlogn) c) O(nloglogn) d) O(n)	L3	CO5
4C-10	If the given input array is sorted or nearly sorted, which of the following algorithmgives the best performance? a) Insertion sort b) Selection sort c) Quick sort d) Merge sort	L1	CO5
4C-11	The time complexity of heap sort in worst case is a) O(logn) b) O(n) c) O(nlogn) d) $O(n^2)$	L5	CO5
4C-12	Counting sort performs ..... Numbers of comparisons between input elements. a) 0 b) n c) nlogn d) n^2	L4	CO5
4C-13	Which of the following sorting algorithm has the running time that is least dependanton the initial ordering of the input? a) Insertion sort b) Quick sort c) Merge sort d) Selection sort	L1	CO5
4C-14	In a binary min heap containing n elements, the largest element can be found in _____time. a) o(n) b) o(nlogn) c) o(logn) d) o(1)	L1	CO5
4C-15	Which of the following sorting algorithms in its typical implementation gives best performance when applied on an array which is sorted or almost sorted (maximum 1 ortwo elements are misplaced a) quick sort b) heap sort b) merge sort c) insertion sort	L1	CO5

	FILL IN THE BLANKS ½ MARK QUESTIONS	**BT Level**	**Course Outcome**
4F-1	---------- Method is used to create an empty graph	L3	CO5

4F-2	------- Is an external sorting algorithm which makes a use of secondary storage	L3	CO5
4F-3	The best case time complexity of merge sort algorithm is ----------	L2	CO5
4F-4	A pair of nodes connected by a line segment is called ---------	L6	CO5
4F-5	The minimum number of vertices that a cyclic graph posses is -------	L3	CO5
4F-6	The standard graphs, traversals are ----------	L3	CO5
4F-7	In an undirected graph, the sum of degrees of all the must be -------	L3	CO5
4F-8	Heap sort belongs to the family of sorting by ---------	L2	CO5
4F-9	A---------- can be used for multi-way merge	L3	CO5
4F-10	--------- Algorithm design technique is used in the quick sort algorithm?	L3	CO5
4F-11	For merging two sorted lists of size m and n into sorted list of size m+n, we require comparisons of----------	L4	CO5
4F-12	A sorting technique is called stable if it--------	L3	CO5
4F-13	--------- the worst method of choosing a pivot element.	L3	CO5
4F-14	Quick sort follows---------	L2	CO5
4F-15	The -------traversal of a graph traverses all decedents of a node before moving to an adjacent node	L3	CO5
	MATCHTHEFOLLOWING 1MARK QUESTIONS	**BT Level**	**Course Outcome**
4M-1	1. Breadth first search a) stack 2. Depth first search b) priority queue 3. Prim's algorithm c) union find 4. Kruskal minimum spanning tree d) queue	L1	CO5

4M-2	1. Merge sort 2. Heap sort 3. Quick sor 4. Insertion sort	a) sort small number of elements b) sort linked list c) information searching d) find smallest and largest number	L1	CO5
4M-3	1. Quick sort 2. Task scheduling 3. Merge sort 4. Prims's	a) divide and conquer algorithm b) greedy programming c) dynamic programming algorithm d) not stable algorithm	L1	CO5
4M-4	1. merge sort 2. heap sort 3. cycle sort 4. shell sort	a) diminishing increment algorithm b) divide and conquer algorithm c) unstable sorting algorithm d) priority queue algorithm	L1	C05

PART B			
5 MARKSQUESTIONS			
4D-1	Write about various graph representation techniques?	L1	CO5
4D-2	Classifythe types of graphs? Explain basic terminologies in graph?	L2	CO5
4D-3	Explain Breadth first search traversal with example?	L2	CO5
4D-4	Explain Depth first search traversal with example?	L2	CO5
4D-5	Write a program to implement breadth first search?	L3	CO5
4D-6	Write a program to implement depth first search?	L3	CO5
4D-7	Explain about heap sort with example?	L2	CO5
4D-8	Explain external sorting model for external sorting?	L2	CO5
4D-9	Discuss about merge sort technique with suitable example?	L2	CO5
4D-10	Explain about external sorting with an example.	L2	CO5
4D-11	Explain about quick sort technique with suitable example?	L2	CO5
4D-12	a) Distinguish between quick sort and merge sort? b) What are applications of quick sort and merge sort?	L4 L1	CO5
4D-13	Differentiate between BFS and DFS.	L4	CO5
4D-14	Write the advantages and disadvantages of quick sort	L1	CO5
4D-15	b) Distinguish between heap sort and merge sort? c) What are applications of heap sort and merge sort?	L4, L1	CO5

QUESTION BANK WITH BLOOMS TAXONOMY LEVEL (BTL)

(1.Remembering 2. Understanding 3. Applying 4. Analyzing 5. Evaluating 6. Creating)

UNIT – V			
	OBJECTIVE TYPE QUESTIONS **½ MARK QUESTIONS**	**BT Level**	**Course Outcome**
5C-1	Trie is also known as _____ a) Digital Tree b) Treap c) Binomial Tree d) 2-3 Tree	L1	CO6
5C-2	Which of the following special type of trie is used for fast searching of the full texts? a) Ctrie b) Hash tree c) Suffix tree d) T tree	L1	CO6
5C-3	Which of the following is true about the trie? a) root is letter a b) path from root to the leat yields the string c) children of nodes are randomly ordered d) each node stores the associated keys	L1	CO6
5C-4	Auto complete and spell checkers can be implemented efficiently using the trie. a) True b) False	L3	CO6
5C-5	Which of the following is the fastest algorithm in string matching field? a) Boyer-Moore's algorithm b) String matching algorithm c) Quick search algorithm d) Linear search algorithm	L1	CO6
5C-6	Which of the following algorithms formed the basis for the Quick search algorithm? a) Boyer-Moore's algorithm b) Parallel string matching algorithm c) Binary Search algorithm d) Linear Search algorithm	L1	CO6
5C-7	Which of the following is the efficient data structure for searching words indictionaries? a) BST b) Linked List c) Balanced BST d) Trie	L1	CO6
5C-8	What traversal over trie gives the lexicographical sorting of the set of the strings? a) postorder b) preorders c) inorder d) level order	L1	CO6
5C-9	What can be the maximum depth of the trie with n strings and m as the maximumsting the length? a) log2n b) log2m c) n d) m	L1	CO6
5C-10	A program to search a contact from phone directory can be implemented efficientlyusing a) a BST b) a trie c) a balanced BST d) a binary tree	L3	CO6

5C-11	What is the auxiliary space complexity of Z algorithm for pattern searching (m =length of text, n = length of pattern)? a) O(n + m) b) O(m) c) O(n) d) O(m * n)	L1	CO6
5C-12	Which of the following is not true? a) Trie requires less storage space than hashing b) Trie allows listing of all the words with same prefix c) Tries are collision free d) Trie is also known as prefix tree	L1	CO6
5C-13	Which of the following is true about the trie? a) root is letter a b) path from root to the leat yields the string c) children of nodes are randomly ordered d) each node stores the associated keys	L1	CO6
5C-14	Which of the following special type of trie is used for fast searching of the full texts? a) Ctrie b) Hash tree c) Suffix tree d) T tree	L1	CO6
5C-15	Auto complete and spell checkers can be implemented efficiently using the trie. a) True b) False	L3	CO6

	FILL IN THE BLANKS ½ MARK QUESTIONS	**BT Level**	**Course Outcome**
5F-1	- -------- function is used to prevent backtracking on a string.	L2	CO6
5F-2	The term trie is delivered from the word -------	L1	CO6
5F-3	The number of nodes in a tree is --------	L1	CO6
5F-4	A standard trie has a binary structure when the alphabet has only ---------- channels	L2	CO6
5F-5	---------structure is useful when the size of key values vary	L2	CO6
5F-6	---------support search, insert and delete operations in O(d-m) time	L1	CO6
5F-7	----------eliminates the character of nodes	L1	CO6
5F-8	In--------- method,traversal is started from a given vertex V in the graph	L2	CO6
5F-9	Heap can be classified as ----------	L2	CO6

5F-10	Trie is also known as---------	L1	CO6
5F-11	A program to search a contact from phone directory can be implemented efficiently using ----------_____	**L3**	CO6
5F-12	construction of suffix trie take--------	L6	CO6
5F-13	_ --------- can be the maximum depth of the trie with n strings and m as themaximum sting the length	L4	CO6
5F-14	_ ---------- type of trie is used for fast searching of the full texts	L1	CO6
5F-15	_ -------- structure is useful when the size of key values varies	L1	CO6
	MATCH THE FOLLOWING **1 MARK QUESTIONS**	**BT Level**	**Course Outcome**
5C-1	1. Prim's algorithm 2. Dijkstra's algorithm 3. Faster all pairs shortest path 4. Edmonds-karp algorithm	a) $O(V^2 \log V)$ b) $O(VE^2)$ c) O(ELGV) d)$O(V^2)$	1 CO6
5C-2	1. Pattern matching 2. Navi based algorithm 3. Boye moor algorithm 4. Knuth-morries pttern 5. Tries	a) brute force algorithm b) search string notewpad c) supports fast string matching d) backward approach e) compares character left -right	2 CO6
5C-3	1.O(n) 2. Suffix trie 3. Labeled edge 4. Compressed trie	b) eliminates character of a nodes c) compressed trie with an extra field d) number of nodes in a trie e) assign inoties	1 CO6
5C-4	1Trie 2. Binary trie structures 3. C standard function 4. Number of nodes in a trie	a) O(N) b) derived from retrival c) alphabets have two characters d) stdio.h	1 CO6
5C-5	1. Suffix tries 2. Standard tries 3. Compressed tries 4. Trie data structure	a) used to activate space optimization b) based on prefix of string c) faster insertion d)ordered tree data structure	2 CO6

	PART B		
	5 MARKS QUESTIONS		
5C-1	Discuss about various types of tries.	L2	CO6
5C-2	Write an algorithm of Standard Trie.	L1	CO6
5C-3	Write and explain Boyer Moore pattern matching algorithm?	L2	CO6

5C-4	Explain the features that distinguish between Boyer Moore algorithm from the conventional algorithms.	L2	CO6
5C-5	Write and explain Knuth-Morris-pratt pattern matching algorithm?	L2	CO6
5C-6	Discuss Knuth Morries Pratt (KMP) algorithm. Compute whether the pattern P=10100111 is present in the string T=1001010100111 or not.	L6	CO6
5C-7	What are theadvantages of trie? Comparetrie with Hash table?	L4	CO6
5C-8	Explain about the compressed trie with an example.	L2	CO6
5C-9	Calculate the failure function (or) prefix table in a search string "ABACAABADCABACABAABB".	L5	CO6
5C-10	Differentiate standard tries and compressed tries?	L4	CO6
5C-11	Explain the Brute-force algorithm with an example	L2	CO6
5C-12	Explain about the Suffix tries with an example.	L2	CO6
5C-13	Write an algorithm of compressed trie	L4	CO6
5C-14	Write an algorithm of standard trie.	L4	CO6
5C-15	Draw the Standard Trie and Compressed Trie for the following String {area, array, aim, acid, act, rest, rate, ratio}	L6	CO6

	SRI INDU COLLEGE OF ENGG &TECH **MODEL QUESTION PAPER** **(Regulation: R22)** **Department of CSIT&AI&DS**	**(Regulation:R22)**
	Sub. Code &Title | **(R22CSE2112) DATASTRUCTURES**	
	AcademicYear:2025-26 | **Year/Sem.** | **II-I / CSE(CSIT&AI&DS)**	
	Faculty Name & Designation | **MS M.SUMANJALI & Assistant Professor**	

DURATION: 2Hrs **Max Marks: 30M**

PART – A

Answer ALL multiple choice questions. **10Q X ½ M=5M**

1. Which type of linked list stores the address of the first node in the next pointer of the lastnode? [ ]
   a) Singly Linked List
   b) Doubly Linked List
   c) Hashed List
   d) Circular Linked List

2. Which data structure is based on the Last In First Out (LIFO) principle? [ ]
   a) Tree
   b) Linked List
   c) Stack
   d) Queue

3. What is the time complexity to count the number of elements in the linked list? [ ]
   a) O(1)
   b) O(n)
   c) O(logn)
   d) $O(n^2)$

4. What data organization method is used in hash tables? [ ]
   a) Stack
   b) Array
   c) Linked List
   d) Queue

5. What is a hash table? [ ]
   a) A structure that maps values to keys
   b) A structure that maps keys to values
   c) A structure used for storage
   d) A structure used to implement stack and queue

6. Which one of the following data structures are preferred in database-system implementation? [ ]
   a) AVL tree
   b) B-tree

c) B+ - tree
d) Splay tree

7. When to choose Red-Black tree, AVL tree and B-trees? [ ]
   a) many inserts, many searches and when managing more items respectively
   b) many searches, when managing more items respectively and many inserts respectively
   c) sorting, sorting and retrieval respectively
   d) retrieval, sorting and retrieval respectively
8. In a max-heap, element with the greatest key is always in the which node? [ ]
   a) leaf node
   b) first node of left sub tree
   c) root node
   d) first node of right sub tree
9. Descending priority queue can be implemented using _____
   a) max heap [ ]
   b) min heap
   c) min-max heap
   d) trie
10. Which of the following is the fastest algorithm in string matching field? [ ]
   a) Boyer-Moore's algorithm
   b) String matching algorithm
   c) Quick search algorithm
   d) Linear search algorithm

II. Answer all fill in the blanks. **6Q X ½ M= 3M**

11. Types of queues are ----------
12. _____allows direct access to the table.
13. _____method of hash function depends upon the reminder of division.
14. If a node has K children in B tree, then the node contains exactly ----------keys.
15. The standard graphs, traversals are ----------
16. Heap can be classified as ----------

III. Answer all the Match the following Questions. **2Q X 1M = 2M**

17.

a. Queue	1. DFS
b. Tree	2. LIFO
c. Stack	3.Stack
d. Linear data structure	4.Non Linear data structure

18.

a. Suffix tries	1. used to activate space optimization
b. Standard tries	2. based on prefix of string
c. Compressed tries	3. faster insertion
d. Trie data structure	4. ordered tree data structure

PART B

Answer any FOUR Questions. **4QX5M = 20M**

19. Discuss about implementation of linked list.
20. Write a program to implement stack using linked list.
21. Compare between Quadratic probing and Double Hashing.
22. Write list of operations perform on AVL tree with example?
23. Write a program to implement breadth first search?
24. Write and explain Boyer Moore pattern matching algorithm?

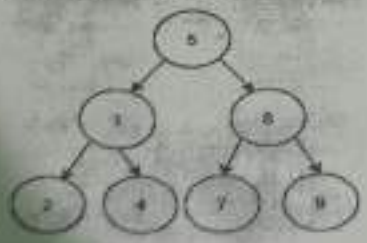
Part – A

Answer *All* multiple choice questions. **Marks: 10Qx1/2M = 5M**

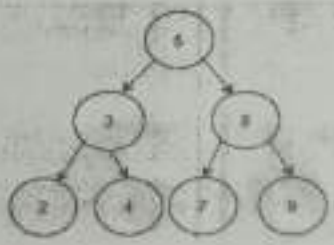
* (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating.)

			*Bloom Taxonomy Level	Course Outcome
1.	What is a data structure? A) A programming language B) A collection of algorithms C) A way to store and organize data D) A type of computer hardware.	[ ]	I	CO1
2.	Which data structure is based on the Last In First Out (LIFO) principle? A) Tree B) Linked List C) Stack D) Queue.	[ ]	I	CO1
3.	Which data structure is needed to convert infix notation to postfix notation? A) Tree B) Branch C) Stack D) Queue.	[ ]	I	CO1
4.	What is the value of the postfix expression 6 324+ –*? A) 74 B) -18 C) 22 D) 40.	[ ]	V	CO1
5.	If the hash function is h(element)=element%10, so for which of the pair of values, the collision will take place. A) 15 and 14 B) 12 and 2 C) 1 and 10 D) 11 and 22.	[ ]	I	CO1
6.	Which of the following problems occur due to linear probing? A) Primary collision B) Secondary collision C) Separate chaining. D) Extendible Hashing.	[ ]	I	CO2
7.	What is a hash table? A) A structure that maps values to keys B) A structure that maps keys to values C) A structure used for storage D) A structure used to implement stack and queue.	[ ]	II	CO2
8.	Hashing technique which allocates fixed number of buckets is classified as. A) Dynamic hashing B) Static hashing C) External hashing D) internal hashing.	[ ]	II	CO2
9.	Which of the following traversal outputs the data in sorted order in a BST? A) Preorder B) Inorder C) Postorder D) Level order	[ ]	I	CO3
10.	Construct a binary search tree by using post order sequence given below. Post order: 2, 4, 3, 7, 9, 8, 5.	[ ]	VI	CO3

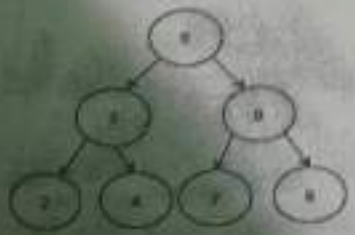
A)



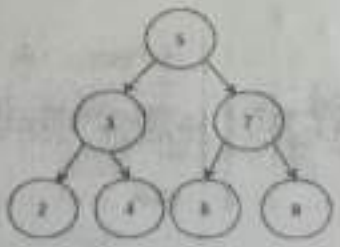
B)



C)



D)



P.T.O.

Answer *All* fill in the blank questions. **Marks: 6Qx1/2M = 3M**

11.	_____ is the condition to become a queue full.	IV	CO1
12.	_____ is the condition that specifies a queue contains single element.	IV	CO1
13.	Applications of Queue are _____.	II	CO1
14.	_____ using a secondary has function on the hash key on the item.	II	CO2
15.	If h is a hash and key is a key, _____ is called the hash of key.	III	CO2
16.	If a node has K children in B tree, then the node contains exactly _____ keys.	I	CO3

Answer *All* Match the following questions. **Marks: 2Qx1M = 2M**

17.

1.	Linear data structures	a)	LIFO list
2.	Stack	b)	Insertion and Deletion can be done from both ends
3.	Applications of Stack	c)	Stack, Queue
4.	De-queue	d)	Evaluating postfix expression

I CO1

18.

1.	Abstract data Type	a)	Rehashing
2.	Open Hashing	b)	Dictionary
3.	Increase and decrease in size	c)	Collision results in storing one of the records at another slot in the table
4.	Closed Hashing	d)	Whether collisions are stored outside the table.

I CO2

Part – B

Answer any *FOUR* questions. **Marks: 4Qx5M = 20M**

19.	Discuss about implementation of single linked list.	II	CO1
20.	Write a program to implement stack using Linked list.	I	CO1
21.	Compare Single linked list with Double linked list.	IV	CO1
22.	Explain how does collision occur.	II	CO2
23.	Compare between Quadratic probing and double hashing.	IV	CO2
24.	Define Binary search tree. Construct binary search tree step by step with diagrams using list of numbers {4,5,1,2,9,7,3,6,10,12,11}.	I	CO3

*****

PREVIOUS YEAR QUESTION PAPERS

BR-18 HallTicket No: D4

Subject Code: R18CSE2101

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

Recognized under 2(f) and 12(B) of UGC Act 1956

II B.Tech – I Semester – (Regular) End Examinations - November - 2019

DATA STRUCTURES

(Common to CSE, IT)

Duration: 3 Hrs 06.11.2019 Max Marks: 70M

Section – A

Answer *All* the following questions Marks: 5Qx4M = 20M

1. Evaluate the following postfix expression 632-*+1$7+.
2. Compare AVL tree and Red black tree.
3. Write the pseudocode to find the height of AVL tree.
4. Describe external sorting with example.
5. Write the standard trie for the set of strings S = { bear, bell, bid, bull, buy, sell, stock, stop} .

Section – B

Answer any *FIVE* questions choosing at least one from each Unit

Marks: 5Qx10M = 50M

UNIT : I

6. Write a C program to implement stack using linked list representation.

(OR)

7. Write a c Program to convert given infix expression to postfix form using stack.

UNIT : II

8. Explain Searching an element in Skip list with an example and also write Pseudo code for the same.

(OR)

9. Explain with an suitable example of Extendible Hashing.

UNIT : III

10. Write a C program to construct binary search tree from the given data 4,6,8,2,5,1,7,3.

(OR)

11. Describe AVL Tree? Illustrate different rotations in AVL tree for balancing with appropriate example.

UNIT : IV

12. Construct a binary search tree from the given data 7,5,3,6,2,1,8,4,9 and perform in-order ,pre-order and post -order traversal .

(OR)

13. Explain the working of merge sort with pseudocode. Sort the given elements 3,3,9,1,2,8,4,6 using merge sort technique.

UNIT : V

14. Explain working of Boyer Moore Algorithm with an suitable example.

(OR)

15. Explain Knuth-Morris-pratt pattern matching algorithm with an example.

***

BR-18 HallTicket No.:_____ D4

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)(Recognized under 2(f) and 12(B) of UGC Act 1956)

II B.Tech - I Semester –End Examinations (Suppl.) October-2020

R18CSE2101 – DATA STRUCTURES

(Common to CSE & IT)

Duration:2 Hrs **14.10.2020 (FN)** **Max Marks:70M**

Section – A

Answer Any Three of the following questions. **Marks: 3Qx6M =18M**

1. Write the postfix form of given infix expression a^b+(c*d-e+(f/g+h)/i)/j^k^l.
2. Discuss splay trees with an example.
3. List the different methods for collision resolution
4. Explain external sorting with example.
5. Mention the applications of suffix trie.

Section – B

Answer *FOUR* questions from the following

Marks: 4Qx13M = 52M

UNIT – I

6. Write a C program to implement basic operation of queue using linked list representation.

(OR)

7. Write a C Program to evaluate given postfix expression using stack.

UNIT - II

8. Explain deleting an element in Skip list representation .Also write Pseudo code for the same

(OR)

9. Explain the separate chaining in detail. Use the hash function 'key mod 7', to insert the following sequence of keys in the hash table 50, 700, 76, 85, 92, 73,101.Use separate chaining technique for collision resolution.

UNIT - III

10. Explain in detail deletion of an element in BST in different cases.

(OR)

11. Illustrate red black trees with an example . Mention its advantages. Compare it with AVL trees

UNIT - IV

12. Construct a binary search tree from the given data 8,9,3,6,2,1,7,4,5 and perform in-order ,pre-order and post -order traversal .

(OR)

13. Explain the working of heap sort .Sort the given elements 5,3,9,1,2,8,4,7,6 using heap sort technique

UNIT-V

14. Explain the Brute-force pattern matching algorithm with an example.

(OR)

15. Explain Knuth-Morris-pratt pattern matching algorithm with an example.

****

BR-18	Write Your H.No.		D4
Subject Code:	R18CSE2101		

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

II B.Tech I Semester (Reg./Suppl.) End Examinations March - 2021

DATA STRUCTURES

10 /03/2021 (Common to CSE and IT) Day- 2

Duration: 3 Hrs **Marks: 5Qx14M = 70M**

Answer *FIVE* questions (Treat Q.No.11 as a single question).

UNIT-I

1. Write a program in C to create two queues using linked list and identify which queue is having more number of elements and search a given element is present in both queues.

(OR)

2. Given an array arr[] of n elements, write a function to search a given element x in arr[].
   Input : arr[] = {10, 20, 80, 30, 60, 50, 110, 100, 130, 170}
   X=130
   Output : ?
   Implement the above concepts using C Program.

UNIT-II

3. Using the hash function 'key mod 7', insert the following sequence of keys in the hash table-
   50, 700, 76, 85, 92, 73 and 101
   Use separate chaining technique for collision resolution.

(OR)

4. Assuming the table size as the smallest prime number greater than the input size, hash the following keys: [52, 66, 35, 04, 68, 34, 26, 19, 29]. To handle collision, use
   a) Linear probing and
   b) Quadratic probing. Which of the two methods has less number of total Probes?

UNIT-III

5. Write a procedure (no code required) to delete a node from a AVL tree with suitable examples and neat figures.

(OR)

6. a) Construct a Binary Search Tree for the following order of input (step by step construction is expected) [40, 29, 12, 34, 78, 54, 90, 57, 77, 44, 23, 11, 8, 19] [7].
   b) Traverse the above BST through Inorder, Postorder and Preorder.

UNIT-IV

7. With Example explain the following:
   a) Breadth first Traversal.
   b) Depth first Traversal.

(OR)

8. Sort the following data using (MAX) heapsort: [20, 12, 35, 15, 10, 80, 30] and illustrate with appropriate figures for each iteration.

UNIT-V

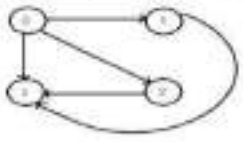
9. How to build a Suffix Tree for a given text? Also explain how to search a pattern in the built suffix tree.
   "AndroidOS\0".

(OR)

10. Explain how Knuth Morris Pratt string Search Algorithm are performed with the example String pattern.

P.T.O.

11. **Answer any *THREE* questions from the following.**
    (5M+5M+4M)
    a) Write down the algorithm for inserting the value at the beginning of the queue?
    b) What do you mean by collision resolution in hashing technique?
    c) Mention how Zig-Zig and Zag-Zag rotations are performed in the splay tree.
    d) Find the number of paths of length K in a directed graph for the following.



    e) Define how brute force approach is used to search the value. Specify its best and worst case time complexities.

BR-18 **SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY**

D4

(An Autonomous Institution Under 2(f) and 12(B) of UGC Act 1956, New Delhi)

II B.Tech - I Semester - II Mid Term Examinations

(R18CSE2101) DATA STRUCTURES - (Common to CSE & IT)

Duration: 90Mins **Dt: 30.10.2019 AN** **Max Marks: 25M**

Section – A

Answer *All* the questions **Marks: 5Qx1M = 5M**

1. List the rules of Red-Black Tree?
2. Define complete graph and weighted graph.
3. Describe external sorting.
4. What are the different types of Pattern Matching Algorithms?
5. What are the applications of pattern matching?

Section – B

Answer any *FOUR* questions **Marks: 4Qx5M = 20M**

6. Illustrate Red-Black tree with example?
7. Illustrate Splay-tree with example.
8. Explain Depth first search traversal with example.
9. Discuss about merge sort technique with suitable example.
10. Explain about the compressed trie with an example.
11. Explain the Brute-force algorithm with an example.

***

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

II B.Tech. I Semester (SUPPL.) End Examinations, Aug./Sept. – 2022.

(R18CSE2101) DATA STRUCTURES

01/09/2022 (For CSE and IT) Day- 2 (FN)

Duration: 3 Hrs **Maximum Marks: 70M**

Blooms Taxonomy : (I-Remembering, II-Understanding, III-Applying, IV-Analyzing, V-Evaluating and VI-Creating)

Course Outcomes : CO

Answer any FIVE questions from the following. *(5Qx14M =70M)*

1.	Develop functions to insert and delete given element from the linked list.		III	CO1
2.	What is Queue? Implement operations of Queue using arrays.		II	CO2
3.	What is hash table? Develop functions for inserting and searching an element in Hash table.		III	CO1
4.	Why and when double hashing and rehashing techniques are needed? Explain.		V	CO2
5.	Discuss with examples how height is balanced in AVL trees.		IV	CO4
6.	Write a algorithm for Merge Sort and derive its time complexity.		II	CO3
7.	What is Tries? Implement find and insert operations on it.		III	CO6
8.	a)	Develop a function to count number of nodes in linked list.	II	CO4 (4M)
	b)	What is hashing? List types of hash functions.	I	CO1 (4M)
	c)	Define binary search tree, complete binary tree and full binary tree.	IV	CO2 (3M)
	d)	Define complete graph, null graph.	II	CO1 (3M)

*****

Write Your Ht.No.

D4

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

II B.Tech. I Semester (Suppl.) End Examinations, February – 2022.

(R18CSE2101) DATA STRUCTURES

(For CSE and IT)

03/03/2022 **Day- 2 (FN)**

Duration: 3 Hrs **Maximum Marks: 70M**

Blooms Taxonomy : (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating and L6-Creating)

Course Outcomes : CO

Answer any FIVE questions from the following. ***(5Qx14M =70M)***

1.	What is linked list? Implement the insertion and deletion operation on linked list.	L3	CO1	
2.	What is stack? Implement operations of Stack using arrays.	L3	CO2	
3.	What is hashing? Discuss about various types of Hash functions.	L1	CO1	
4.	Linear probing and Quadratic probing.	L2	CO2	
5.	Write algorithms to perform deletion and insertion operations in AVL trees.	L4	CO4	
6.	Discuss time complexity of Merge Sort for various cases.	L5	CO3	
7.	Discuss Compressed Tries and Suffix tries.	L2	CO6	
8.	a) Compare Linked list and Array.	L2	CO4	**(4M)**
	b) Develop algorithm or function to find maximum element from binary search tree.	L4	CO2	**(4M)**
	c) Write Algorithm for DFS.	L2	CO1	**(3M)**
	d) What is Collision? List collision resolution techniques.	L1	CO1	**(3M)**

*****

BR-18 **SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY**

D4

(An Autonomous Institution Under 2(f) and 12(B) of UGC Act 1956, New Delhi)

II B.Tech - I Semester - I Mid Term Examinations, August - 2019

(R18CSE2101) DATA STRUCTURES - (Common to CSE & IT)

Duration: 90Mins **Dt: 26.08.2019 AN** **Max Marks: 25M**

Section – A

Answer *All* the questions **Marks: 5Qx1M = 5M**

1. Explain the advantages and disadvantages of linked list.
2. Explain the applications of Linked list.
3. Define double hashing?
4. Define collision.
5. List the operations in Binary Search Tree.

Section – B

Answer any *FOUR* questions **Marks: 4Qx5M = 20M**

6. Discuss about implementation of single linked list.
7. Explain the following data structures operations a) Stack operations b) Queue operations.
8. Write about Queue representation using array and linked list.
9. What are the two methods of representing Liner list? Explain with example.
10. Write about Hash table and Hash function.
11. Write a procedure to perform insertion deletion and searching in Binary search tree.

***

D4

BR-18

Write Your Ht.No.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

II B.Tech. I Semester (Suppl.) End Examinations, February – 2022.

(R18CSE2101) DATA STRUCTURES

(For CSE and IT)

03/03/2022 **Day- 2 (FN)**

Duration: 3 Hrs **Maximum Marks: 70M**

Blooms Taxonomy : **(L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating and L6-Creating)**

Course Outcomes : **CO**

Answer any FIVE questions from the following. ***(5Qx14M =70M)***

1.	What is linked list? Implement the insertion and deletion operation on linked list.	L3	CO1	
2.	What is stack? Implement operations of Stack using arrays.	L3	CO2	
3.	What is hashing? Discuss about various types of Hash functions.	L1	CO1	
4.	Linear probing and Quadratic probing.	L2	CO2	
5.	Write algorithms to perform deletion and insertion operations in AVL trees.	L4	CO4	
6.	Discuss time complexity of Merge Sort for various cases.	L5	CO3	
7.	Discuss Compressed Tries and Suffix tries.	L2	CO6	
8.	a) Compare Linked list and Array.	L2	CO4	*(4M)*
	b) Develop algorithm or function to find maximum element from binary search tree.	L4	CO2	*(4M)*
	c) Write Algorithm for DFS.	L2	CO1	*(3M)*
	d) What is Collision? List collision resolution techniques.	L1	CO1	*(3M)*

*****

BR-22 HT.No. D4

QC2591

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

II B.Tech. I Semester (REG & SUPPL) End Examinations, JANUARY– 2025.

(R22CSE2112) DATA STRUCTURES

03/01/2025 (For CSE, CS, AIML, AIDS, DS, IoT, CSIT & IT) Day-2(FN)

Duration: 3 Hrs **Maximum Marks: 60M**

Blooms Taxonomy : (I-Remembering, II-Understanding, III-Applying, IV-Analyzing, V-Evaluating and VI-Creating)

Course Outcomes : CO

PART – A

Answer ALL the following questions. **(10Qx1M=10M)**

1.	a)	List various types of Data structures.	I	CO1
	b)	What are the applications of Queue?	I	CO1
	c)	Represent a linear list using an example.	I	CO2
	d)	What is Extendible hashing?	I	CO2
	e)	Represent the height of a AVL tree using an example.	III	CO3
	f)	Discuss about B^+-Tree.	IV	CO3
	g)	List various Graph traversal methods.	I	CO4
	h)	What is External sorting?	I	CO4
	i)	Define Pattern matching.	I	CO5
	j)	Write about Suffix Tries.	I	CO5

PART – B

Answer FIVE questions choosing at least one from each unit. **(5Qx10M=50M)**

UNIT-I

2a.		Explain Insertion, Deletion and Searching operations for single linked list using an example.	IV	CO1
		(OR)		
2b.		Describe about Linked representation of stacks.	III	CO1

UNIT-II

3a.		Explain about Open addressing and Linear probing.	II	CO2
		(OR)		
3b.		Discuss about Skip list representation.	II	CO2

UNIT-III

4a.		Define Binary Tree. List and explain various operations in Binary Tree.	III	CO3
		(OR)		
4b.		Discuss various operations in AVL trees using an example.	VI	CO3

UNIT-IV

5a.		Using an example describe about Merge sort in detail.	IV	CO4
		(OR)		
5b.		Define Graph. Explain various implementation methods for Graph.	V	CO4

UNIT-V

6a.		Write about Knuth-Morris-Pratt Algorithm.	VI	CO5
		(OR)		
6b.		Explain about Brute force method in detail.	III	CO5

*****