

St. Philomena's College (Autonomous), Mysore

PG Department of Computer Science

Question Bank (Revised Curriculum 2020 onwards)

First Year- First Semester (2020 -22 Batch)

Course Title (Paper Title): Data Structures (HC)

QP Code: 86121

Unit	Sl. No	Questions	Marks
1	1	What are data types? Give example.	2
1	2	Enlist different data types available.	2
1	3	Define Data Structure. Give an example.	2
1	4	What are Primitive Data structures? Give example.	2
1	5	Enlist the operations that can be performed on Primitive data structures.	2
1	6	What are non -primitive data structures? Give example.	2
1	7	What are linear data structures? Give example.	2
1	8	What are non - linear data structures? Give example.	2
1	9	Differentiate between Primitive and non - primitive data structures.	2
1	10	Enlist the operations that can be performed on non - primitive data structures.	2
1	11	Define traversing and searching.	2
1	12	Define Arrays. Mention different types of arrays.	2
1	13	Why do we need arrays?	2
1	14	Define 1 Dimensional array. Give syntax.	2
1	15	Define 2 Dimensional array. Give syntax.	2
1	16	Define multi dimensional array. Give syntax.	2
1	17	What are the steps involved in merging two sorted arrays?	2
1	18	Differentiate between linear and binary searching techniques.	2
1	19	Enlist the operations that can be performed on 2D array.	2
1	20	How do you calculate address of an element in 2D array stored in row major order?	2
1	21	How do you calculate address of an element in 2D array stored in column major order?	2
1	22	What is the working principle of linear search?	2
1	23	What is the working principle of Binary search?	2
2	24	Define stack. Give an example.	2
2	25	What is the working principle of stack?	2
2	26	Define multiple stack.	2
2	27	Give array representation of stack.	2
2	28	Give linked representation of stack.	2
2	29	Enlist the applications of stack.	2
2	30	Define expressions. Give example.	2
2	31	What are infix expressions? Give an example.	2

2	32	What are postfix expressions? Give an example.	2
2	33	What are prefix expressions? Give an example.	2
2	34	Define polish notation. Give an example.	2
2	35	Change this infix expression into postfix expression using brackets method. $a - b * c / d + f - k * g$	2
2	36	Change this infix expression into prefix expression using brackets method. $a - b * c / d + f - k * g$	2
2	37	Change this infix expression into suffix expression using brackets method. $x + y - z * k * m / f$	2
2	38	Change this infix expression into polish notation using brackets method. $x + y - z * k * m / f$	2
2	39	Distinguish between infix and polish notations.	2
2	40	Define Recursion. Give an example.	2
2	41	What is base case and recursive case in recursion?	2
2	42	Define Queues. Give an example.	2
2	43	What is the working principle of a queue?	2
2	44	How do you check whether a queue is empty or not?	2
2	45	How do you calculate size of a queue?	2
2	46	Enlist different types of queues.	2
2	47	Define Linear queue. Give representation.	2
2	48	Define Circular queue. Give representation.	2
2	49	Define dequeus. Give representation.	2
2	50	Define priority queues. Give representation.	2
2	51	Define Sequential allocation and linked allocation terminologies.	2
2	52	Enlist types of linked list along with memory representation.	2
2	53	Define single linear linked list. Give memory representation.	2
2	54	Define Single circular linked list. Give memory representation.	2
2	55	Define Doubly linear linked list. Give memory representation.	2
2	56	Define Doubly circular linked list. Give memory representation.	2
2	57	How stack data structure is realized with linked list?	2
2	58	How queue data structure is realized with linked list?	2
3	59	Define Trees. Give an example.	2
3	60	Define root node and leaf node.	2
3	61	Define sub trees. Give an example.	2
3	62	What are ancestor nodes and descendant nodes?	2
3	63	In a tree data structure what is in-degree and out-degree of a node?	2
3	64	Enlist different types of trees.	2
3	65	Define general trees. Give an example.	2
3	66	Define forest. Give an example.	2
3	67	Define tournament trees.	2
3	68	Define binary tree. Give an example.	2

3	69	What are similar binary trees? Give an example.	2
3	70	What is height of a tree?	2
3	71	Enlist the different traversing methods of binary tree.	2
3	72	Define AVL trees.	2
3	73	Define Binary search trees. Give an example.	2
3	74	Define left heavy tree. Give an example.	2
3	75	Define right heavy tree. Give an example.	2
3	76	Define heaps.	2
3	77	Define min-heap. Give an example.	2
3	78	Define max-heap. Give an example.	2
3	79	Define graphs. Give an example.	2
3	80	Why are graphs useful?	2
3	81	Define regular graphs. Give an example.	2
3	82	Define connected graphs. Give an example.	2
3	83	Define complete graph. Give an example.	2
3	84	Define directed graphs. Give an example.	2
3	85	What are the different ways of representing a graph?	2
4	86	Define hashing.	2
4	87	What is hash table?	2
4	88	Define hash function.	2
4	89	Define division method of hashing.	2
4	90	Define multiplication method of hashing.	2
4	91	Define mid-square method of hashing.	2
4	92	Define folding method of hashing.	2
4	93	Define rehashing.	2
4	94	Define files.	2
4	95	Define file structure. Give an example.	2
4	96	Enlist the basic file operations.	2
4	97	Define updating a file.	2
4	98	Enlist different file organization methods	2
4	99	Define text files.	2
4	100	Define binary files.	2
4	101	On basis of what considerations we must choose file organization methods.	2
1	102	Briefly explain the different operations performed on non-primitive data structures.	5
1	103	Write an algorithm for merging two unsorted arrays.	5
1	104	How data elements are stored in 2D array. Explain.	5
1	105	Write a note on applications of arrays.	5
2	106	Evaluate the following postfix expression.	5

		1) 5 4 3 * + 8 6 - *	
2	107	Write steps for evaluation of a prefix expression.	5
2	108	Write an algorithm to calculate factorial of a number.	5
2	109	Explain the concept of multiple queues with memory representation.	5
2	110	Explain the applications of queues.	5
2	111	Discuss how priority queue is useful.	5
2	112	Distinguish between Sequential allocation and Linked allocation.	5
2	113	Differentiate between single linear and circular linked list.	5
2	114	Differentiate between singly linear linked list and doubly linear linked list.	5
2	115	Explain how doubly circular linked list works with memory representation.	5
2	116	Explain applications of linked list.	5
2	117	Explain how a node can be inserted at first in doubly circular linked list.	5
3	118	Write a note on tree and its terminologies with example.	5
3	119	Write a note on Binary tree.	5
3	120	Write a note on tournament trees with example.	5
3	121	Construct a binary tree from the following data. In-order traversal: { D B H E I A F J C G } Post - order traversal: { D H I E B J F G C A }	5
3	122	Distinguish between B and B+ trees.	5
3	123	What are the applications of B trees?	5
3	124	Write a note on AVL trees.	5
3	125	Write a note on B trees.	5
3	126	Write a note on B+ trees.	5
3	127	What are applications of binary heaps?	5
4	128	Why do we need hash function? Explain.	5
4	129	Write a note on Hash table.	5
4	130	What are the properties of a good hash function?	5
4	131	What are the properties of good hash function?	5
4	132	Write a note on rehashing.	5
4	133	What is rehashing? Explain.	5
4	134	Write a note on files.	5
4	135	Explain different file attributes.	5
4	136	Explain different file attributes flags.	5
4	137	Write a note on file organization.	5
4	138	What are the advantages and disadvantages of sequential file organization method?	5
4	139	What are the features of relative file organization method?	5
4	140	What are the features of sequential file organization method?	5
4	141	What are the features of relative file organization method?	5
4	142	What are the features of indexed sequential file organization method?	5

1	143	Differentiate between different data types.	7
1	144	Discuss the different methods of storing values in 1D array.	7
1	145	How do you delete an element from the middle of the array? Explain with example.	7
1	146	How do you calculate length of a 1D array? Explain.	7
1	147	Write an algorithm for selection sort.	7
1	148	Explain the concept of 1D array with memory representation.	7
1	149	How data elements are accessed in 2D array. Explain with example.	7
1	150	Briefly explain the operations performed on 2D array.	7
1	151	Write an algorithm for multiplication of two 2D arrays.	7
2	152	Explain the concept of multiple stacks along with memory representation.	7
2	153	Why do we need stack? Explain.	7
2	154	How do you check the top element of a stack? Explain with an algorithm.	7
2	155	How stack is useful in recursion? Explain with an example.	7
2	156	How circular queue works? Explain.	7
2	157	Explain Insertion first algorithm in single linear linked list with an example.	7
3	158	Construct a binary tree from the following data. In order Traversal : { 4, 2, 1, 7, 5, 8, 3, 6 } Post order Traversal : { 4, 2, 7, 8, 5, 6, 3, 1 }	7
3	159	Discuss the concept of AVL tree with suitable example.	7
3	160	How AVL tree is different from binary search tree? Explain	7
3	161	Briefly explain Graph terminologies with a suitable example.	7
3	162	Explain adjacency matrix representation of graphs with example.	7
4	163	Explain classification of files in detail.	7
1	164	Briefly explain non - Primitive data structures.	8
1	165	Explain different types of arrays with memory representation.	8
1	166	How do you insert an element in the middle of the array? Explain with example.	8
1	167	How do you access elements from a 1D array? Explain with example.	8
1	168	Explain linear search algorithm with an example.	8
1	169	Given an array <code>int marks[] = {99,67,78,56,88,90,34,85}</code> , calculate the address of <code>marks[2]</code> , <code>marks[4]</code> and <code>marks [7]</code> if the base address = 1000.	8
1	170	Consider a 10x5 two dimensional array A, its base address is 1008 and size of each element is 2. Then calculate - * address of <code>A[8][2]</code> assuming elements are stored in row major order * address of <code>A[10][4]</code> assuming elements are stored in column major order	8
1	171	Explain the concept of row major order with suitable example.	8
1	172	Explain the concept of column major order with suitable example.	8
2	173	Explain the concept of stack along with memory representation.	8

2	174	How elements are inserted into stack? Explain with an example.	8
2	175	How elements are deleted from stack? Explain with an example.	8
2	176	How do you reverse a list using stack? Explain.	8
2	177	Briefly discuss the concept of Dequeues with memory representation.	8
2	178	Explain types of linked list with memory representation.	8
3	179	What is level order traversal? Explain with suitable example.	8
3	180	Explain the concept of binary search tree with suitable example.	8
3	181	Create a binary search tree using the following data elements. 45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81.	8
3	182	Briefly explain directed graph terminologies with a suitable example.	8
3	183	What are the applications of depth-first-search and breadth-first search algorithm?	8
4	184	Explain different file attributes flags with example.	8
1	185	Explain different data types in detail.	10
1	186	Write an algorithm for Bubble sort. Explain it with an example.	10
1	187	Discuss the concept of 2D array along with its memory representation.	10
1	188	Explain the concept of multidimensional array (3D) along with its memory representation.	10
2	189	Convert the following infix expressions into postfix expression using stack. 1) $a / b * c ^ d + e - f * g$ 2) $a - b + c * d ^ f$	10
2	190	Write an algorithm for suffix expression evaluation and explain how it works.	10
2	191	Write an algorithm to calculate GCD of two numbers. Explain the role of stack in it.	10
2	192	Explain types of linked list with memory representation.	10
2	193	How do you realize stack data structure using singly circular linked list? Explain.	10
2	194	Explain insertion first algorithm in doubly linear linked list with suitable example.	10
2	195	Discuss deletion last algorithm in doubly linear linked list with suitable example.	10
2	196	Write insert first and delete first algorithm for doubly linear linked list.	10
2	197	Write insert last and delete last algorithm for doubly linear linked list.	10
3	198	Discuss different types of trees with suitable example.	10
3	199	Explain linked representation of binary tree with suitable example.	10
3	200	Explain in-order traversal of binary tree with suitable example.	10
3	201	Explain pre-order traversal of binary tree with suitable example.	10
3	202	How insertion is done in binary search tree? Explain with an example.	10
3	203	What are left heavy tree and right heavy tree? Explain with suitable example.	10
3	204	Discuss the concept of heaps in detail with suitable example.	10
4	205	What is hashing and hash table? Explain with suitable example.	10
4	206	Explain any two hash functions with examples.	10

4	207	Explain folding method and mid-square method of hashing with example.	10
1	208	Explain the classification of data structures in detail.	15
1	209	With algorithms explain insertion, deletion and traverse operation on 1 Dimensional array.	15
1	210	Write an algorithm for binary search and explain it with an example.	15
1	211	Explain the concept of insertion sort with a suitable example.	15
2	212	Discuss the operations performed on stack with algorithm.	15
2	213	Evaluate the following prefix expressions using stack. 1) + - 2 7 * 8 / 4 12 2) * - + 4 3 5 / + 2 4 3 3) + 6 * - 3 2 4	15
2	214	Write an algorithm for conversion of infix expression into postfix expression.	15
2	215	Explain the concept of Tower of Hanoi in detail with algorithm.	15
2	216	Evaluate the following suffix expressions using stack. 1) 5 3 + 6 2 / * 3 5 * + 2) 1 2 3 * + 4 5 * 6 + 2 * + 3) 2 5 3 6 + * * 5 / 2 -	15
2	217	Explain the concept of queues with memory representation.	15
2	218	Explain the operations performed on linear queue with algorithms.	15
2	219	Explain the operations performed on circular queue with algorithms.	15
2	220	Explain the concept of Priority queues in detail along with linked representation.	15
2	221	Explain the concept of Priority queues in detail along with array representation.	15
2	222	Consider a modular implementation of queue data structure which is of maximum capacity 10. Compute the number of data elements present in the queue when 1) R = 3 and F = 1 2) R = 8 and F = 8 3) R = 2 and F = 8 4) R = 0 and F = 0 5) R = 3 and F = 5	15
2	223	Explain how stack data structure can be realized with singly linear linked list.	15
2	224	Explain how queue data structure can be realized with singly linear linked list.	15
2	225	Explain insertion operation performed on single linear linked list with example.	15
2	226	Explain deletion operation performed on single linear linked list with example.	15
2	227	How do you create a sorted singly linear linked list? Explain with an algorithm.	15
2	228	How do you combine two singly linear linked lists? Write algorithm and explain with an example.	15
2	229	Explain insertion operation performed on single circular linked list with example.	15
2	230	Explain deletion operation performed on single circular linked list with example.	15

2	231	Discuss different insertion methods of doubly linear linked list in detail.	15
2	232	Discuss different deletion methods of doubly linear linked list in detail.	15
3	233	Explain memory representation of binary tree with suitable example.	15
3	234	Write In-order, pre-order and post order traversal for the following binary tree.	15
3	235	How deletion is done in binary search tree? Explain with an example.	15
3	236	Explain LL, RR, LR, RL rotations in AVL tree with suitable example.	15
3	237	How do you insert an element in binary heap? Explain with an example.	15
3	238	How do you delete an element in binary heap? Explain with an example.	15
3	239	Discuss breadth-first search algorithm in detail with suitable example.	15
3	240	Discuss depth-first search algorithm in detail with suitable example.	15
4	241	Explain different hash functions in detail with suitable example.	15
4	242	Explain different operations performed on files.	15
4	243	Discuss sequential file organization method in detail.	15
4	244	Discuss relative file organization method in detail.	15
4	245	Discuss indexed sequential file organization method in detail.	15
4	246	Compare different file organization methods.	15
4	247	Explain advantages and disadvantages of different file organization techniques.	15

Question Paper Pattern- Blue Print

Department: PG Computer Science

Subject Name: Data Structures

Duration: 03 Hrs		Total	
marks=70			
PART A			
1	Answer any FIVE of the following		5x2=10
a	Unit 1		
b	Unit 1		
c	Unit 2		
d	Unit 2		
e	Unit 3		
f	Unit 3		
g	Unit 4		
PART B			
Answer any ONE FULL question from the following			4x15=60
2	a	Unit 1	15
	b	Unit 1	
OR			
3	a	Unit 1	15
	b	Unit 1	

4	a	Unit 2	15
	b	Unit 2	
OR			
5	a	Unit 2	15
	b	Unit 2	
6	a	Unit 3	15
	b	Unit 3	
OR			
7	a	Unit 3	15
	b	Unit 3	
8	a	Unit 4	15
	b	Unit 4	
OR			
9	a	Unit 4	15
	b	Unit 4	

MODEL QUESTION PAPER

Department: PG Computer Science			
Subject Name: Data Structures			
Duration: 03 Hrs		Total marks=70	
PART A			
1	Answer any FIVE of the following		5x2=10
a	What are data types? Give example.		
b	What is the working principle of Binary search?		
c	Give array representation of stack.		
d	Define polish notation. Give an example.		
e	Define Trees. Give an example.		
f	Define hash function.		
g	Define binary files.		
PART B			
Answer any ONE FULL question from the following			4x15=60
2	a	Explain the classification of data structures in detail.	15
OR			
3	a	How do you insert an element in the middle of the array? Explain with example.	8
	b	How do you delete an element from the middle of the array? Explain with example.	7
			15

4	a	Write an algorithm for suffix expression evaluation and explain how it works.	10	15
	b	Write steps for evaluation of a prefix expression.	5	
OR				
5	a	Why do we need stack? Explain.	7	15
	b	How elements are inserted into stack? Explain with an example.	8	
OR				
6	a	How do you insert an element in binary heap? Explain with an example.	15	
OR				
7	a	Write a note on AVL trees.	5	15
	b	Write a note on B trees.	5	
	c	Write a note on B+ trees.	5	
OR				
8	a	Explain folding method and mid-square method of hashing with example.	10	15
	b	What is rehashing? Explain.	5	
OR				
9	a	Explain advantages and disadvantages of different file organization techniques.	15	