

RV COLLEGE OF ENGINEERING⁽⁰⁾
 (An Autonomous Institution Affiliated to VTU)
 III Semester B. E. Examinations April/May-2024
 Artificial Intelligence and Machine Learning

FUNDAMENTALS OF DATA STRUCTURES AND DATA ANALYSIS

Time: 03 Hours

Maximum Marks: 100

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, 9 and 10.

PART-A

M CO BT

1	1.1	How do abstract data types differ from primitive data types?	02	1	1
	1.2	What is the output of the following program? <pre>#include <stdio.h> #include <stdlib.h> int main() { int *ptr; *ptr = 1024; *ptr = 2024; printf ("%d\n",* ptr); return 0; }</pre>			
	1.3	Which dynamic memory allocation function allocates memory if a continuous memory location is not available in memory, and also write the syntax of the function.	02	3	1
	1.4	Write the pseudocode of the stack pop () operation implemented using an array.	02	2	2
	1.5	Write the BFS traversal for the given Graph (Consider 0 as source vertex)	02	2	2
	1.6	Consider the below graph apply Dijkstra's algorithm to find the shortest path from D to F (write cost and path)	02	3	3
			02	3	2

1.7

Write the infix expression for the following expression tree in Fig 1.7.

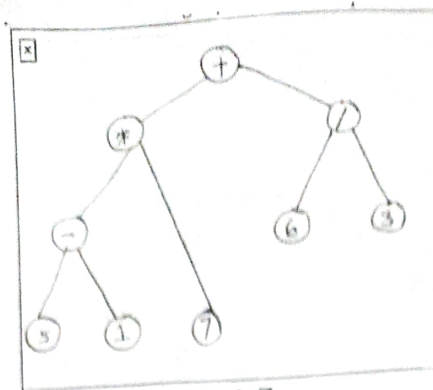


Fig 1.7

1.8

Define clustering and give an example.

1.9

By considering an example of any social networking service, give two applications of data mining.

1.10

Write the importance of the data-preprocessing phase in the CRISP - DM process.

02 3 3

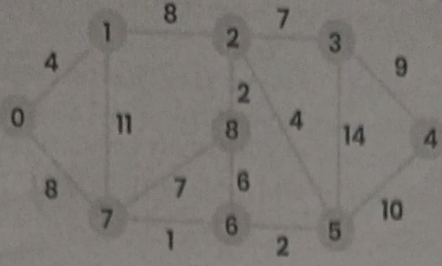
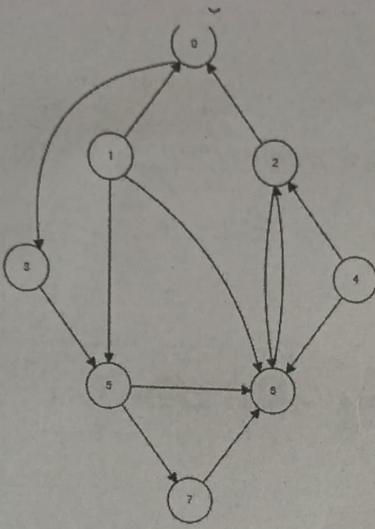
02 1 2

02 1 2

02 2 2

PART-B

2	a	Define a data structure. Discuss the classification of data structures.	06	2	1
	b	Implement the following stack operations using linked list (write only code snippet) i) Node Creation ii) A new node is inserted at the front of the list so that it becomes the top of the stack. iii) Node is removed from the front(top) of the stack.	06	2	1
	c	Write a snippet to check whether the given matrix is an identify matrix or not (Do not write the entire program write only the function).	04	2	1
3	a	Discuss how <i>BST</i> is used to create dictionary of words with an example?	08	3	3
	b	Imagine you're designing the playlist management system for a multimedia player. Identify the suitable data structure to implement the following features and justify. i) Repeat all songs ii) Custom ordering (Latest added song should play first)	04	2	1
	c	Convert the expression from infix to postfix using stack (write the operations carries out in each character scanned from the expression) ($A + B/C * (D + E) - F$)	04	2	2
OR					
4	a	You are asked to develop an application using <i>BST</i> to manage the contacts. Discuss how the following key functionalities can be implemented using <i>BST</i> (Don't write program) i) Adding a new contact ii) Searching for a contact by name iii) Deleting a contact iv) Displaying all contacts in alphabetical order v) Additionally, consider how you would handle edge cases like duplicate contacts or invalid inputs.	08	3	4
	b	Write a program to check whether the given word is palindrome or not using Stack data structure (Write only function)	04	2	2
	c	Discuss how the Stack is used in the implementation of function calls.	04	2	2

5	a	<p>Write the Dijkstra's algorithm and also for the below Fig 5a graph apply the algorithm to find the shortest path from 0 vertex to all vertices.</p>  <p style="text-align: center;">Fig 5a</p>	08	3	4
	b	<p>Write a program to demonstrate the working of a division method type of Hashing.</p> <p style="text-align: center;">OR</p>	08	2	2
6	a	<p>Write an algorithm for the DFS of a Graph Fig 6a. Give the tracing of the algorithm for the graph given below with the starting vertex as 0.</p>  <p style="text-align: center;">Fig 6a</p>	08	3	3
	b	<p>Compare and contrast the working of Linear Probing and Quadratic Probing.</p>	08	4	3
7	a	<p>How does the evolution from Big Data 1.0 to Big Data 2.0 reflect advancements in data-analytic thinking, particularly in the context of addressing complex challenges such as predicting customer churn and analyzing large-scale phenomena?</p>	08	4	4
	b	<p>Write the framework of the CRISP – DM Process and explain all the stages briefly.</p> <p style="text-align: center;">OR</p>	08	4	4
8	a	<p>Provide specific examples to illustrate the impact of data-analytic thinking on data science, engineering practices, and data-driven decision-making processes.</p>	08	3	3
	b	<p>By considering an example of a healthcare sector, give suitable examples where you apply classification, regression, clustering and profiling.</p>	08	2	3
9	a	<p>Discuss the following:</p> <ol style="list-style-type: none"> Supervised Models and Unsupervised models Entropy and Information Gain 	08	3	3

10	b	How does supervised segmentation using tree-structured models contribute to the process of attribute selection for predictive modeling? Provide a step-by-step explanation.	08	2	3
	OR				
	a	Discuss in detail Selection of Informative Attributes with an example.	08	2	3
	b	Illustrate with an example addressing the Chun Problem with Tree Induction.	08	3	4