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Academic Year 2023-24 (ODD Semester)

USN | 1 | R | V | 2 | 2 | A | I | 0 | 0 | 7 |

Department of Artificial Intelligence and Machine Learning

Course Code: AI233AI
Sem: III

Date: 22-Feb-2024
Duration: 90 Minutes

CIE-II

Fundamentals of Data Structures and Data Analysis (DSDA)

Answer all the Questions

SL. No		Questions	M	BT	CO
1	a)	Write an algorithm to create an expression tree for a valid postfix expression. Show the construction of an expression tree by considering **abc+*d/**	06	02	01
	b)	Prove if n is the total number of nodes in a complete binary tree of height h, then h =⌊log 2^n ⌋ + 1	04	03	01

2	a)	Write a C program to demonstrate the construction of a Binary Search Tree(BST) of runs scored by a player in various matches. The structure of the tree node is given below. After creating the BST, print the runs scored by the player along with the match number in ascending order.
		struct treenode
		{
		int matchno, runs;
		struct treenode *lchild, *rchild;
		}
			06	03	03

	b)	Discuss the threaded binary tree data structure by considering an example.	04	02	01
3	a)	Explain the concept of Graph Isomorphism by considering an example of Social Networks.	04	02	03
	b)	Write Dijkstra's algorithm to find the single source shortest path distances to all the nodes in a Graph. Give the output of Dijkstra's algorithm for the graph in Figure 3b, and assume the source vertex as 0.	06	03	01

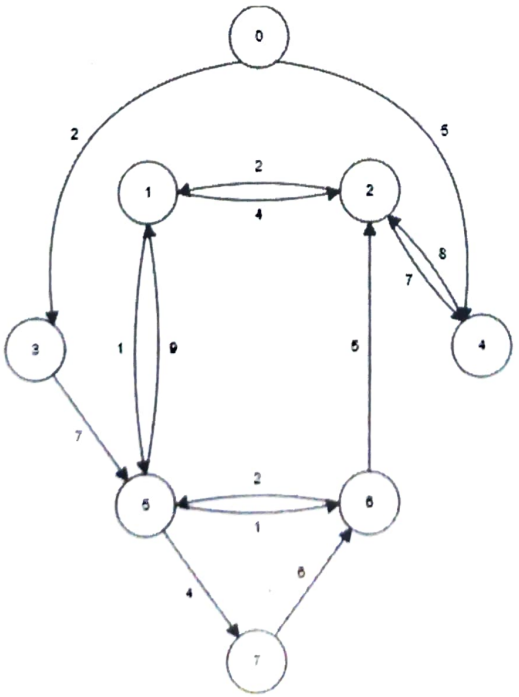
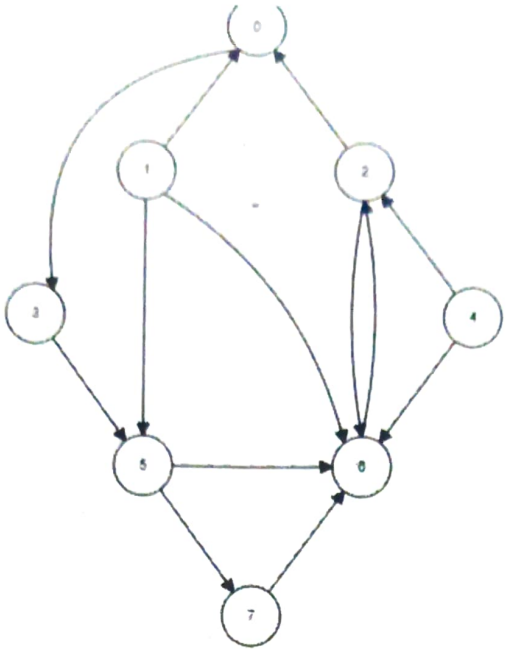


Figure 3b

4	a)	Write an algorithm for the DFS of a Graph. Give the tracing of the algorithm for the graph in Figure 4a with the starting vertex as 0.  Figure 4a	06	03	01
	b)	Breadth-First Search is one of the main algorithms used for indexing web pages, justify this statement.	04	03	03
5	a)	Hashing is producing the location's address to store the given key value. Discuss how hashing is used in password verification.	04	02	03
	b)	i. The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and **linear probing**. What is the resultant hash table? ii. Given the input {4371, 1323, 6173, 4199, 4344, 9679, 1989}, a fixed table size of 10, and a hash function H(X) = X mod 10 and **quadratic probing**. What is the resultant hash table?	06	03	01

Course Outcome	
CO1	Apply the knowledge of data structures in providing solutions to some software development requirements.
CO2	Perform data analysis of some real-world scientific/business use cases and present the analysis results.
CO3	Investigate appropriate data structures and understand requirements in solving some problems of industry and society.
CO4	Use data analysis tools to illustrate the principles of data interpretation, statistical analysis, and graphical visualizations of the datasets.
CO5	Appraise data structures and analysis knowledge to build a successful career as an AIML engineer, work in teams, and communicate their ideas effectively.

M-Marks, BT-Blooms Taxonomy Levels, CO-Course Outcomes

	Particulars	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**L1**	**L2**	**L3**	**L4**	**L5**
Marks Distribution	**Max Marks**	32	--	18	--	--	--	18	32	--	--