MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

III SEMESTER B.TECH. MAKE UP EXAMINATION

JANUARY 2023

SUBJECT: DATA STRUCTURES AND ALGORITHMS [MTE 2151]

Max. Marks: **50**

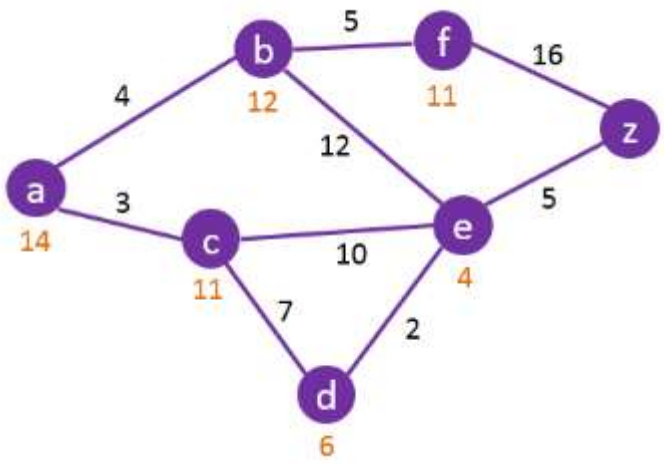
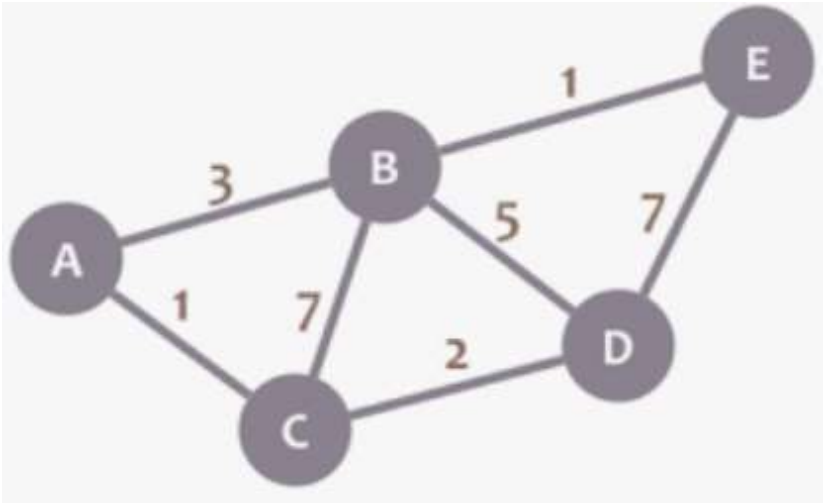
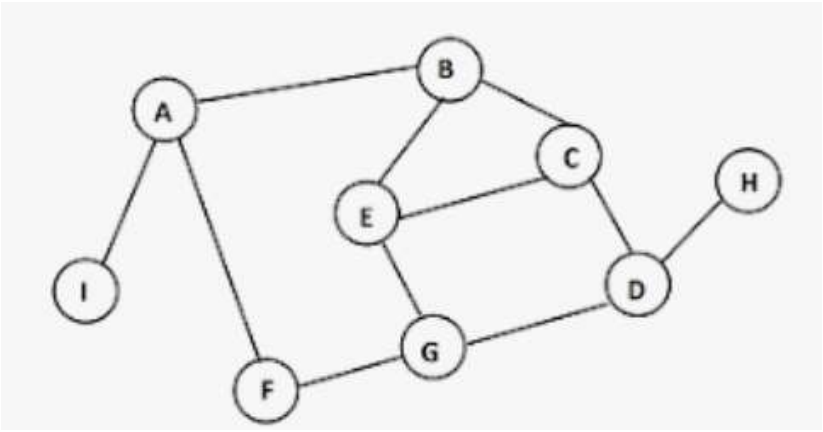
Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

Q.NO.	QUESTION	M	CO	PO	LO	BL
1.	Illustrate the POP and PUSH operations on a Stack.	**2**	**1**	**1,2**	**1,2**	**4**
2.	Illustrate the process of converting a decimal number into an octal number and further how a stack may be employed for the same purpose.	**3**	**1**	**1,2**	**1,2**	**3,4**
3.	Develop an algorithm for insertion in a doubly linked list using Tail pointer.	**5**	**2**	**1,2,3**	**1,2**	**6**
4.	Develop an algorithm to find the product of all the elements in an array of size 5	**2**	**2**	**1,2,3**	**1,2**	**6**

5.	Compute the time complexity of the code snippet given below.
	int a = 0;
	for (i = 0; i < N; i--) {
	for (j = N; j > i; j++) {
	STATEMENTS;
	}
	}
		3	**2**	**1,2,3**	**1,2**	**4**

6.	Create an AVL tree with the nodes 10, 25, 4, 56, 89, 37, 92	**5**	**2**	**1,2,3**	**1,2**	**6**
7.	Elaborate on the Chaining scheme in Maps with a suitable example	**2**	**2**	**1,2,3**	**1,2**	**3,4**
8.	Describe the difference between average-case and worst-case analysis of algorithms.	**3**	**3**	**1,2,3**	**1,2**	**4**
9.	Perform Merge sort and Heap sort on the elements 10, 25, 4, 56, 89, 37, 92	**5**	**3**	**1,2,3**	**1,2**	**4**
10.	What are the deciding factors for computing the complexity of an algorithm. Discuss in brief	**2**	**3**	**1,2,3**	**1,2**	**1**
11.	Perform a search operation for the pattern ‘MIT’ in the text ‘WELCOME TO MIT’ using Rabin Karp algorithm	**3**	**4**	**1,2,3**	**1,2**	**4**
12.	For the input 30, 20, 56, 75, 31, 19 and hash function h(K) = K mod 10, construct the open hash table (chaining mechanism).	**5**	**4**	**1,2,3**	**1,2**	**4**

13.	Deduce the shortest path from S to C using the A* algorithm. 	**2**	**5**	**1,2,3**	**1,2**	**4**
14.	Compute the shortest path from Node A to Node E using the Dijkstra's algorithm. 	**3**	**5**	**1,2,3**	**1,2**	**4**
15.	Perform Breadth First Search on the graph shown below. 	**5**	**5**	**1,2,3**	**1,2**	**4**