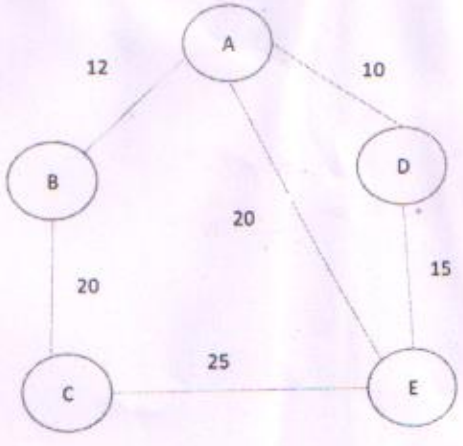
Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri(West),Mumbai 400058-India
(An Autonomous Institute Affiliated to University of Mumbai

End Semester Examination

Max. Marks: 60 | **Duration:2.15**
Class: FYMCA | **Semester: I**
Course Code:MC501 | **Date: 12/5/22**
Course: Data Structures | **Time: 11 to 1:15**

Instructions:
1. **All Questions are Compulsory.**
2. **Draw neat diagrams.**
3. **Assume suitable data if necessary.**

No	Question	Max. Marks	CO	BL
Q1 A	Compare the Worst case time complexity of Bubble Sort and Selection Sort on following data in terms of number of passes required, number of iterations required. Derive the complexity. 100 89 55 45 33 12 10 7	8	4	4
Q1 B	Construct an algorithm for Addition of the following Polynomial equations using Singly Linked List. $P(x) = 15x^{10} + 3x^5 + 10$ $Q(x) = 10x^8 + 16x^5 + 5x^2$ **OR** Apply Stack operations to check whether following expression has balanced parentheses or not. Construct an algorithm for the same. (A+ B) + (C*D) / ((F+G)	7	1	3
Q2 A	Apply Warshall's algorithm to calculate the shortest path. Construct an algorithm for the same. (Note: You need to show all the steps). 	8	2	3

<table>
<tr><td>Q2
B</td><td>Use Modulo Division hashing technique with Linear Probing collision resolution technique to calculate the address of the following set of elements. Consider number of locations as 50
100 200 449 1149 79 99 21</td><td>7</td><td>3</td><td>3</td></tr>
<tr><td>Q3
A</td><td>Build B Tree of order 5 of following data and identify which properties of B tree are satisfied?
N G A H E K Q M F W L T Z</td><td>8</td><td>2</td><td>3</td></tr>
<tr><td>Q3
B</td><td>Apply following operations on Circular Queue of size 5 and identify the front, rear and Queue values. (Note. E= Enqueue and D=Dequeue. You need to show all the steps.)
E(10), E(20), E(30), D, D, E(40), E(50), D, D, E(60)
Construct an algorithm for enqueue operation for the same.
OR
Suppose there are two singly linked lists both of which intersect at the same point and become a single linked list. The head or start pointers of both the lists are known, but the intersecting node is not known. Also, the number of nodes in each of the list before they intersect are unknown and both list may have it different, List 1 may have n nodes before it reaches to intersection point and List 2 might have m nodes before it reaches to intersection point where m and n may be m = n, m < n, m > n. Construct an algorithm for finding the merging point.</td><td>7</td><td>1</td><td>3</td></tr>
<tr><td>Q4
A</td><td>Build Huffman Tree and derive Huffman code for the following data.
<table>
<tr><td>Char</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td></tr>
<tr><td>Freq.</td><td>100</td><td>56</td><td>78</td><td>89</td><td>70</td><td>88</td><td>65</td><td>70</td></tr>
</table></td><td>8</td><td>2</td><td>3</td></tr>
<tr><td>Q4
B</td><td>Use binary search technique to find key 100 from following data. Write an algorithm for the same.
78 89 90 100 70 60 99</td><td>7</td><td>3</td><td>3</td></tr>
</table>