30.11.2023 (E)

SOMAIYA VIDYAVIHAR UNIVERSITY

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| Maximum Marks: 100 | Semester: July 2023 –October 2023<br>Examination: ESE Examination | Duration:3 Hrs. |
| Programme code: _04___<br>Programme: __BTech_ | Class: SY | Semester:_III_(SVU 2020) |
| Name of the Constituent College:<br>K. J. Somaiya College of Engineering | Name of the department: IT / Comp | |
| Course Code: 116U04C302 | Name of the Course: Data Structures | |

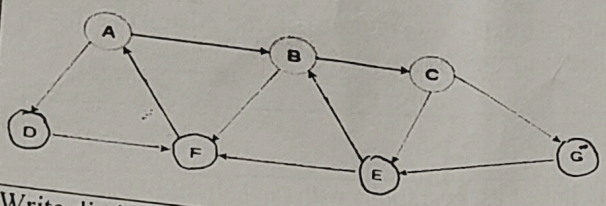
Instructions: 1)Draw neat diagrams 2) All questions are compulsory
3) Assume suitable data wherever necessary

| Que. No. | Question | Max. Marks |
|---|---|---|
| Q1 | Solve any **Four** | **20** |
| i) | What is ADT (Abstract Data Type)? What are the advantages of ADT? | 5 |
| ii) | What is data structure? List the data structures classified based on its type of data structure. | 5 |
| iii) | Differentiate between array and linked list (5 valid points) | 5 |
| iv) | What is complete binary tree? Explain BFS (Breadth First Search) on complete binary tree with the help of suitable example. | 5 |
| v) | Differentiate between map and dictionary data structure (5 valid points) | 5 |
| vi) | Sort following numbers using counting sort –<br>3, 5, 4, 7, 3, 4, 7, 2, 8, 2, 3 | 5 |

| Que. No. | Question | Max. Marks |
|---|---|---|
| Q2 A | Solve the following | **10** |
| i) | Convert following prefix to infix form using stack (show all steps clearly)<br>/ * / + + a – b c + d e f g h | 5 |
| ii) | Write pseudocode to implement linear queue ADT functions. | 5 |
| | OR | |
| Q2 A | Write pseudocode for converting infix expression to postfix form. Also write the pseudocode/algorithm for the data structure used in conversion. | 10 |
| Q 2 B | Solve any **One** | **10** |
| i) | Explain following circular singly linked list operations with the help of block diagrams<br>1) Insert_at_end<br>2) Delete_after<br>3) Search a given number | 10 |
| ii) | Explain following doubly linked list operations with the help of block diagrams<br>1) Insert_before a node<br>2) Delete_before<br>3) Display all numbers | 10 |

| Que. No. | Question | Max. Marks |
|---|---|---|
| Q3 | Solve any Two | 20 |
| i) | Write the algorithm to construct a BST from given postorder and inorder traversal. Apply the same and construct BST using following<br>Postorder traversal: 1 , 6, 8, 9, 7, 11, 13, 15, 12, 10<br>Inorder traversal: 1, 6 ,7, 8, 9, 10, 11, 12, 13, 15 | 10 |
| ii) | State the need of height balanced trees. Insert following numbers in the given order on an initially empty AVL tree. Clearly specify the necessary information at each insertion.<br>20,10,30,40,50,60,25,21,55,58 | 10 |
| iii) | Explain B-Tree with the help of an example. Show all the cases of insertion operations on the B-Tree. | 10 |

| Que. No. | Question | Max. Marks |
|---|---|---|
| Q4 | Solve any Two | 20 |
| i) | State the properties of a good hash function. Hash the following number in a hash table of size 9 using standard modulus hash function. Resolve the collisions using linear probing. 3, 2, 9, 6, 11, 13, 7, 12, 18 | 10 |
| ii) | Write the pseudocode for binary search. Apply the same on following set of numbers to search for 52.<br>12,25,31,40,44,45,52,56,67,82 | 10 |
| iii) | Write the pseudocode for insertion sort. Apply the same on following set of numbers (show all the steps clearly)<br>40,25,12,52,44,82,31,67,45,56 | 10 |

| Que. No. | Question | Max. Marks |
|---|---|---|
| Q5 | Attempt any four | 20 |
| i) | Differentiate between static implementation and dynamic implementation. | 5 |
| ii) | Explain the use of linked list for polynomial representation. | 5 |
| iii) | Differentiate between circular queue and priority queue (5 valid points). | 5 |
| iv) | Consider the following graph and represent the same using adjacency matrix and adjacency list.<br>  | 5 |
| v) | Write dictionary ADT. | 5 |
| vi) | Write short note on applications of set data structure. | 5 |