B.E. Computer Technology Fourth Semester

CT402 - Data Structures

P. Pages : 2 **GUG/W/18/1596**

Time : Three Hours * 1 2 5 5 * Max. Marks : 80

Notes : 1. Same answer book must be used for each question.
2. All questions carry equal marks.
3. Due credit will be given to neatness and adequate dimensions.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Define data structures. Also explain the classification of data structure. **8**

b) Write a menu driven program in C, with the following switch cases :- **8**
a) Create - array b) Insert - array
c) Traverse - array d) Exit
Write the program with respect to one dimensional array.

OR

2. a) Explain searching and its types. Write a C program for linear search. **8**

b) Explain sparse matrix. Sort the following list using Quick sort. **8**
[10 28 39 21 63 49 32 20 86 74]

3. a) Explain stack with the help of push, pop and display functions. **8**

b) Evaluate the expression in tabular form showing stack after every step **4+4**
5 6 2 + * 12 4 / –
Also write applications of stack.

OR

4. a) Write a short note on:- **8**
i) Priority Queues ii) Multiple Queues

b) Evaluate the following Polish expressions:- **8**
i) Infix to postfix : – $\left(A+\left(B*C-\left(D/E\uparrow F\right)*G\right)*H\right)$
ii) Infix to postfix : – $\left(A*B+C/D\uparrow E\ \%\ F\right)$
ii) Infix to prefix : – $\left(12/\left(7-3\right)+2*\left(1+5\right)\right)$
iv) Infix to prefix : – $\left(A-b/\left(c\wedge d\right)+\left(e\forall f\right)\right)$

5. a) i) Explain singly linked list with proper example. **4+4=8**
ii) Write a C function to count number of nodes in a singly linked list of n - nodes.

b) Explain creation- insertion, deletion and traversing in a circular linked list of n nodes. **8**
Write C functions for the above functions.

OR

6. a) Write a C program to implement stack using linked list. Elaborate your answer with the help of suitable example. **8**

b) Write a note on 'Generalized Lists'. **8**

7. a) Convert the following expressions into binary tree:- **8**

i) $A + (B + C * D + E) + F / G$

ii) $A/B + C/D$

iii) $(A + B + C) * (D + E + F)$

iv) $(A < B)$ && $(B < C)$ && $(C - D)$

b) Write C functions for tree traversals:- **8**
i) Preorder ii) Postorder iii) Inorder
Also give suitable example.

OR

8. a) Write short notes on the following. **8+8=16**
i) Threaded Binary tree.
ii) AVL tree and different operations on AVL tree.

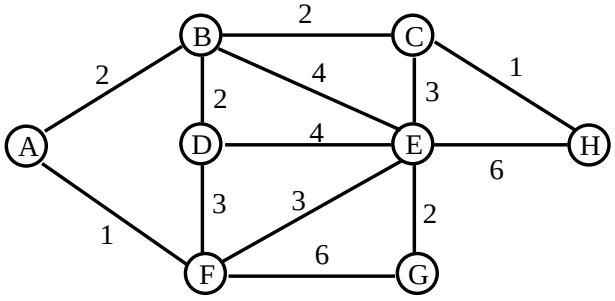
9. a) Define the following terminologies of graph. **10**
i) Graph ii) Path
iii) Cycle iv) Degree
v) Complete graph.

b) Explain adjacency matrix and adjacency list representations of graph. **6**

OR

10. a) Explain BFS and DFS graph traversals with example. **8**

b) Explain spanning tree. Find the minimum cost of the following graph using Prim's algorithm. **8**



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