

B.E. / B.Tech. Computer Science & Engineering (Model Curriculum) Semester-III
SE102CS - Data Structure & Algorithms

P. Pages : 2

Time : Three Hours



GUG/W/24/13802

Max. Marks : 80

- Notes :
1. All questions are compulsory.
 2. All questions carry equal marks.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) What is data structure? Explain different types of data structure in detail. 8
- b) Write a short note on the following: 8
- i) Time complexity.
 - ii) Space complexity.

OR

2. a) What is Analysis of algorithm? Explain the Asymptotic notation (Big O, Ω , theta) used while analyzing an algorithm. 8
- b) What is Binary Search? Explain it by taking suitable example. Also write the function for it. 8
3. a) What is node in the linked list? Write a C code function for the following circular linked list operations: 8
- i) Inserting the node at beginning.
 - ii) Deleting the node at end.
- b) Write a program in C to count the number of nodes in singly linked list. 8

OR

4. a) Write a program to do following operations on doubly linked list. 8
- i) Traversing the list
 - ii) Inserting the node at given position.
- b) Write a C program to implement stack using linked list. 8
5. a) What is stack? Write a C function to implement push and pop operation on the stack. 8
- b) Evaluate the following postfix expression: 8
- $ABC + DE^* / -$ for $A = 2, B = 5, C = 3, D = 2, E = 4$. Show the stack at each step.

OR

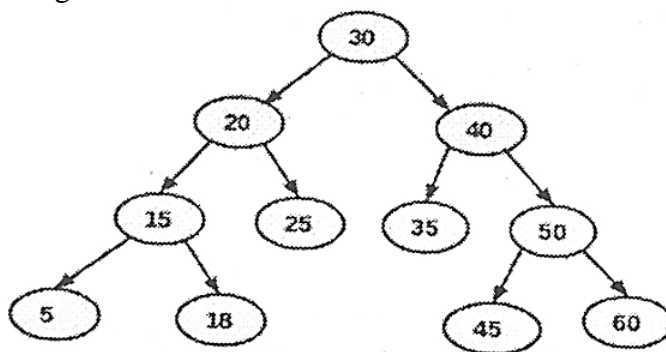
6. a) What is circular queue and state the advantages of circular queue over linear queue? Illustrate with any example. 8

- b) Write a short note on the priority queue? Convert the following infix into postfix expression. 8
- i) $(A + B) - C + D * (E / F^G)$
- ii) $[(P + Q) * Z]^{\wedge} [(X - Y) / Z + T]$

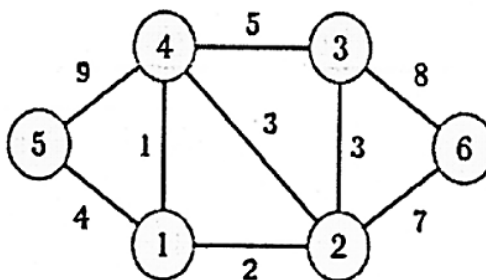
7. a) Discuss about AVL trees. 8
- b) Write a program to implement Binary Search Tree (BST) Show the BST for following input: 10, 5, 4, 12, 15, 11, 3 8

OR

8. a) Write a C function for preorder, inorder and postorder. Also write preorder, postorder and inorder for the following. 8



- b) What is B Tree? Explain with example. 8
9. a) What is Minimum spanning tree? Find MST using Prim's algorithm. 8



- b) Write a program to implement Quick sort. Show the steps to sort the given numbers: 25, 13, 7, 34, 56, 23, 13, 96, 14, 2 8

OR

10. a) What is collision? Explain any two collision resolution techniques with example. 8
- b) Explain following Graph terminologies: 8
- Weighted and Unweighted graph
 - Indegree and outdegree
 - Path and Cycle
 - Isolated Vertex
