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| **ST. JOSEPH’S COLLEGE**  **(AUTONOMOUS), Bengaluru-27**  **BSc- II Semester**  **SEMESTER EXAMINATION: JULY 2022**  **CS 221- Data Structures Using C**  ( Total number of pages ; 3 and three parts )  Time: 2 Hour Max Marks: 60 | | |
| **PART A: Answer all of the following ( 1 X 10 = 10 )** | | |
| 1 | .In a stack, if a user tries to remove an element from an empty stack it is called \_\_\_\_\_\_\_\_\_ A) Underflow B) Empty collection C) Overflow D) Garbage Collection |  |
| 2 | The postfix form of A\*B+C/D is?  A) \*AB/CD+  B) AB\*CD/+  C) A\*BC+/D  D) ABCD+/\* |  |
| 3 | In linked list implementation of a queue, where does a new element be inserted? A) At the head of link list B) At the tail of the link list C) At the centre position in the link list D) None |  |
| 4 | . The height of a BST is given as h. Consider the height of the tree as the no. of edges in the longest path from root to the leaf. The maximum no. of nodes possible in the tree is? A) 2h-1 -1 B) 2h+1 -1 C) 2h +1 D) 2h-1 +1 |  |
| 5 | A binary search tree is generated by inserting in order the following integers:  55, 10, 65, 5, 20, 58, 97, 3, 8, 37, 60, 25  The number of the node in the left sub-tree and right sub-tree of the root, respectively, is  A) (4, 7)  B) (8, 3)  C) (7,4 )  D) (3, 8) |  |
| 6 | If the MAX\_SIZE is the size of the array used in the implementation of circular queue, array index starts with 0, front points to the first element in the queue, and rear point to the last element in the queue. Which of the following condition specify that circular queue is FULL? A) Front=rear= -1 B) Front=(rear+1)%MAX\_SIZE C) Rear=front+1 D) Rear=(front+1)%MAX\_SIZE |  |
| 7 | A data structure in which elements can be inserted or deleted at/from both the ends but not in the middle is?  A) Queue  B) Circular queue  C) Dequeue  D) Priority queue |  |
| 8 | Which of the following statement(s) about stack data structure is/are NOT correct?  A) Linked List are used for implementing Stacks  B) Top of the Stack always contain the new node  C) Stack is the FIFO data structure  D) Null link is present in the last node at the bottom of the stack |  |
| 9 | In a linked list each node contains minimum of two fields. One field is data field to store the data second field is? A) Pointer to character B) Pointer to integer C) Pointer to node D) Node |  |
| 10 | Which of the following is false about a binary search tree? A) The left child is always lesser than its parent B) The right child is always greater than its parent C) The left and right sub-trees should also be binary search trees D) In order sequence gives decreasing order of elements |  |
|  | **PART B**  **Answer any 5 of the following:** | **5x4=20** |
| 11. | Using a STACK show the conversion of the following INFIX expression into a POSTFIX expression  **A – ( B + C )^2/(( E- F) \* 3 )** | 4 |
| 12. | Create a data type to represent the node of a linked list. Use it to write a function sub program to print the content of a LINKED LIST. | 4 |
| 13. | Write the algorithm to insert a number into an ordered linked list. | 4 |
| 14. | Given the following list of numbers create a BINARY SEARCH TREE.  55, 70, 25, 30, 10, 80, 60, 90, 65,15, 27, 63 | 4 |
| 15. | Write the algorithm to insert a number into a BINARY SEARCH TREE. | 4 |
| 16. | Write a function sub program in C to return the number of nodes in a linked list. The Head of the list is declared as a global variable. | 4 |
| 17. | Declare a data type to represent the node of the BINARY SEARCH TREE. Write a function to do INORDER TRAVERSAL (recursive function)**.** | 4 |
| **PART C ( Answer any two of the following ) 2x15=30** | | |
| 18. | 1. Mention the uses of a queue.   b) Write functions Push(), Pop() and StackEmpty(). Use them in the main program to check whether a given string is a PALINDROME. | 3  12 |
| 19. | Write a menu driven program in C to show the working of a CIRCULAR QUEUE ( Linked list version) with the following options: 1: Insert a number ( Enqueue) 2 : Delete the first number ( Dequeue), 3: Display the contents of the Queue, 4: Exit | 15 |
| 20. | 1. Show how to evaluate the following postfix expression using a stack.   10, 15, 5, 2, \*, - , 2, ^, 3, 2, +, 2, \*, /, +   1. Write a program in C with function sub programs to input, print and sort numbers using BUBBLE SORT. | 3  12 |