EC6301 OBJECT ORIENTED PROGRAMMING AND DATA STRUCTURES

2Mark Questions with Answers

UNIT-III

LINEAR DATA STRUCTURES

1. Write down the definition of data structures?

A data structure is a mathematical or logical way of organizing data in the memory that consider not only the items stored but also the relationship to each other and also it is characterized by accessing functions.

2. Give few examples for data structures?

Stacks, Queue, Linked list, Trees, graphs

3. Define Algorithm?

Algorithm is a solution to a problem independent of programming language. It consist of set of finite steps which, when carried out for a given set of inputs, produce the corresponding output and terminate in a finite time.

4. What are the features of an efficient algorithm?

- Free of ambiguity
- Efficient in execution time
- Concise and compact
- Completeness
- Definiteness
- Finiteness

5. List down any four applications of data structures?

Compiler design

Operating System

Database Management system

Network analysis

6. What is meant by an abstract data type (ADT)?

An ADT is a set of operation. A useful tool for specifying the logical properties of a datatype is the abstract data type. ADT refers to the basic mathematical concept that defines the datatype.

E.g. Objects such as list, set and graph along their operations can be viewed as ADT's.

7. What are the operations of ADT?

Union, Intersection, size, complement and find are the various operations of ADT.

8. What is meant by list ADT?

List ADT is a sequential storage structure. General list of the form a1, a2, a3,.,….., an and the size of the list is 'n'. Any element in the list at the position I is defined to be ai, ai+1 the successor of ai and ai-1 is the predecessor of ai.

9. What are the various operations done under list ADT?

- Print list
- Insert
- Make empty
- Remove
- Next
- Previous
- Find kth

10. What are the two parts of ADT?

- Value definition
- Operator definition

11. What is a Sequence?

A sequence is simply an ordered set of elements. A sequence S is sometimes written as the enumeration of its elements, such as S = If S contains n elements, then length of S is n.

12. What are the four basic data types?

Int, float, char and double.

13. What are the two things specified in declaration of variables in C?

- It specifies the amount of storage that must be set aside for objects declared with that type.
- How data represented by strings of bits are to be interpreted.

14. What is a pointer?

Pointer is a variable, which stores the address of the next element in the list. Pointer is basically a number.

15. What is an array?

Array may be defined abstractly as a finite ordered set of homogenous elements. Finite means there is a specific number of elements in the array.

16. What are the two basic operations that access an array?

Extraction:

Extraction operation is a function that accepts an array, a, an index, i, and returns an element of the array.

Storing:

Storing operation accepts an array, a, an index i , and an element x.

17. Define Structure?

A Structure is a group of items in which each item is identified by its own identifier, each of which is known as a member of the structure.

18. Define Union?

Union is collection of Structures, which permits a variable to be interpreted in several different ways.

19. Define Automatic and External variables?

Automatic variables are variables that are allocated storage when the function is invoked.

External variables are variables that are declared outside any function and are allocated storage at the point at which they are first encountered for the reminder of the program's execution.

20. Define Recursion?

Recursion is a function calling itself again and again.

21. What is a Fibonacci sequence?

Fibonacci sequence is the number of integers 0, 1, 1, 2, 3, 5, 8, 13, 21, 34,……

Each element in this sequence is the sum of the two preceding elements.

22. What is a Stack?

A Stack is an ordered collection of items into which new items may be inserted and from which items may be deleted at one end, called the top of the stack. The other name of stack is Last-in -First-out list.

23. What are the two operations of Stack?

- PUSH
- POP

24. Write postfix from of the expression A+B-C+D?

A-B+C-D+

25. What is a Queue?

A Queue is an ordered collection of items from which items may be deleted at one end called the front of the queue and into which terms may be inserted at the other end called rear of the queue. Queue is called as First in-First-Out (FIFO).

26. What is a Priority Queue?

Priority queue is a data structure in which the intrinsic ordering of the elements does determine the results of its basic operations. MinHeap and maxHeap are the two types of Priority queue.

27. What are the different ways to implement list?

- Simple array implementation of list
- Linked list implementation of list

28. What are the advantages in the array implementation of list?

a) Print list operation can be carried out at the linear time

b) Find Kth operation takes a constant time

29. What is a linked list?

Linked list is a kind of series of data structures, which are not necessarily adjacent in memory. Each structure contain the element and a pointer to a record containing its successor.

30. Name the two fields of Linked list?

- Info field
- Next field

31. What is a doubly linked list?

In a simple linked list, there will be one pointer named as 'NEXT POINTER' to point the next element, where as in a doubly linked list, there will be two pointers one to point the next element and the other to point the previous element location.

32. Name the three fields of Doubly Linked list?

- Info field
- Left field
- Right field

33. Define double circularly linked list?

In a doubly linked list, if the last node or pointer of the list, point to the first element of the list, then it is a circularly linked list.

34. What is the need for the header?

Header of the linked list is the first element in the list and it stores the number of elements in the list. It points to the first data element of the list.

35. List three examples that uses linked list?

- Polynomial ADT
- Radix sort
- Multi lists

36. Give some examples for linear data structures?

- Stack
- Queue

37. Write postfix from of the expression A+B-C+D?

A-B+C-D+

54. How do you test for an empty queue?

To test for an empty queue, we have to check whether READ=HEAD where REAR is a pointer pointing to the last node in a queue and HEAD is a pointer that pointer to the dummy header. In the case of array implementation of queue, the condition to be checked for an empty queue is READ

55. What are the postfix and prefix forms of the expression? A +B*(C-D)/(P-R)

Postfix form: ABCD-*PR-/+

Prefix form: +A/*B-CD-PR

56. Explain the usage of stack in recursive algorithm implementation?

In recursive algorithms, stack data structures is used to store the return address when a recursive call is encountered and also to store the values of all the parameters essential to the current state of the procedure.

57. Write down the operations that can be done with queue data structure?

Queue is a first - in -first out list. The operations that can be done with queue are insert and remove.

58. What is a circular queue?

The queue, which wraps around upon reaching the end of the array is called as circular queue.

59. Define max heap?

A heap in which the parent has a larger key than the child's is called a max heap.

60. Define min heap?

A heap in which the parent has a smaller key than the child is called a min heap.