

Code No: RR10203

Set No. 1**I B.Tech Supplementary Examinations, Apr/May 2006****C & DATA STRUCTURES**

(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Instrumentation & Control Engineering and Bio-Technology)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Write the various steps involved in executing a C program and illustrate it with a help of flowchart.
 (b) Candidates have to score 90 or above in the IQ test to be considered eligible for taking further tests. All candidates who do not clear the IQ test are sent reject letters and others are sent call letters for further tests. Represent the logic for automating this task. [8+8]
2. The annual examination is conducted for 50 students for three subjects. Write a program to read the data and determine the following:
 - (a) Total marks obtained by each student.
 - (b) The highest marks in each subject and the Roll No. of the student who secured it.
 - (c) The student who obtained the highest total marks. [5+6+5]
3. (a) How are Structure elements accessed using pointer? Which operator is used? Give an example.
 (b) Write a program to use structure within union. Display the contents of structure elements. [8+8]
4. (a) Distinguish between the following functions.
 - i. Printf and fprintf.
 - ii. eof and ferror.
 (b) Write a program to copy the contents of one file into another. [8+8]
5. Write in detail about the following:
 - (a) Circular Queue
 - (b) Dequeue [8+8]
6. Write a C program to implement addition of two polynomials. [16]
7. Write in detail about the following:

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(a) AVL tree

(b) Binary search tree

[8+8]

8. Discuss in detail about the following searching methods.

(a) Sequential search

(b) Fibonacci search

[8+8]

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1. (a) What are different types of integer constants? What are long integer constants? How do these constants differ from ordinary integer constants? How can they be written and identified?
- (b) Describe two different ways that floating-point constants can be written in C. What special rules apply in each case?
- (c) What is a character constant? How do character constants differ from numeric-type constants? Do character constants represent numerical values? [6+4+6]
2. (a) Write a program to sort the set of strings in an alphabetical order?
- (b) How are multidimensional arrays defined? Compare with the manner in which one-dimensional arrays are defined. [10+6]
3. (a) Differentiate between a structure and union with respective allocation of memory by the compiler. Give an example of each.
- (b) Write a program to read n records of students and find out how many of them have passed. The fields are student's roll_no, name, mark and result. Evaluate the result as follows


```
if markes > 35 then
    Result = "Pass" else "Fail"
```

[6+10]
4. (a) Write a 'C' Program to compute the sum of all elements stored in an array using pointers.
- (b) Write a 'C' program using pointers to determine the length of a character string. [8+8]
5. Show how to implement a queue of integers in C by using an array `int q[QUEUESIZE]`, where `q[0]` is used to indicate the front of the queue, `q[1]` is used to indicate its rear and where `q[2]` through `q[QUEUESIZE -1]` contain elements on the queue. Show how to initialize such an array to represent the empty queue and write routines `remove`, `insert` and `empty` for such an implementation. [16]

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6. Write routines to
- (a) Insert element at n^{th} position
 - (b) Delete element at n^{th} position in a doubly linked list. [8+8]
7. Write in detail about the following:
- (a) Weakly connected graph
 - (b) strongly connected graph [8+8]
8. (a) Write a C program to sort the elements of an array using selection sort technique with a suitable example.
- (b) What is the worst case and best case time complexities of selection sort? [10+6]

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1. (a) Draw a Flowchart for the following The average score for 2 tests has to be greater than 80 for a candidate to qualify for the interview. Representing the conditional logic for generating reject letters for all candidates who do not get the required average & interview call letters for the others.
 (b) Explain the basic structure of C program. [10+6]

2. (a) Distinguish between getchar and scanf functions for reading strings.
 (b) Write a program to count the number of words, lines and characters in a text. [8+8]

3. (a) Differentiate between a structure and union with respective allocation of memory by the compiler. Given an example of each.
 (b) Write a program to read n records of students and find out how many of them have passed. The fields are student's roll_no, name, mark and result. Evaluate the result as follows

```
if markes > 35 then
    Result = "Pass" else "Fail"
```

[6+10]

4. (a) What is a pointer? How is a pointer initiated? Give an example.
 (b) State whether each of the following statements is true or false. Give reasons.
 - i. An integer can be added to a pointer.
 - ii. A pointer can never be subtracted from another pointer.
 - iii. When an array is passed as an argument to a function, a pointer is passed.
 - iv. Pointers can not be used as formal parameters in headers to function definitions.
 (c) If m and n have been declared as integers and p1 and p2 as pointers to integers, then find out the errors, if any, in the following statements.
 - i. p1 = &m;
 - ii. p2 = n;

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- iii. $m = p^2 - p1$;
iv. $*p1 = \&n$; [4+6+6]
5. Define a data structure. What are the different types of data structures? Explain each of them with suitable example. [4+6+6]
6. What is Circular doubly linked list? Explain the various operations on Circular doubly linked lists with suitable algorithms. [4+12]
7. A digraph is strongly connected iff it contains a directed path from i to j and from j to i for every pair of distinct vertices i and j .
- (a) Show that for every n , $n \geq 2$, there exists a strongly connected digraph that contains exactly n edges.
- (b) Show that every n vertex strongly connected digraph contains at least n edges where $n \geq 2$ [8+8]
8. (a) Write and explain non-recursive algorithm for **binary search** with suitable example and discuss the various time complexities of binary search.
- (b) Suppose that the list contains the integers 1,2,8 in this order. Trace through the steps of **binary search** to determine what comparisons of keys are done in searching.
- i. To locate 3
ii. To locate 4.5 [8+8]

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1. (a) What are different types of integer constants? What are long integer constants? How do these constants differ from ordinary integer constants? How can they be written and identified?
- (b) Describe two different ways that floating-point constants can be written in C. What special rules apply in each case?
- (c) What is a character constant? How do character constants differ from numeric-type constants? Do character constants represent numerical values? [6+4+6]
2. (a) Explain how strings can be stored using a multidimensional arrays?
- (b) What are the string in-built functions available? Write in detail about each one of them with an example.
- (c) The names of employees of an organization are stored in three arrays, namely, first name, second name, and last name. Write a program to concatenate the three parts into one string to be called name. [4+6+6]
3. (a) What is structure within structure? Give an example for it.
- (b) Write a C program to illustrate the concept of structure within structure. [8+8]
4. (a) Explain the process of accessing a variable through its pointer. Give an Example.
- (b) Write a C program using pointers to read in an array of integers and print its elements in reverse order. [8+8]
5. Use the operations push, pop, stacktop, and empty to construct operations on stack, which do each of the following:
 Given an integer n, set i to the nth element from the top of stack, leaving the stack unchanged Set I to the bottom element of stack, leaving the stack empty.[16]
6. How can a polynomial in three variables (x,y and z) be represented by a singly linked list? Each node should represent a term and should contain the powers of x, y, and z as well as coefficient of that term. Write a routine evaluate this polynomial for given values of x,y, and z. [4+6+6]

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7. Write in detail about the following:
- (a) Weakly connected graph
 - (b) strongly connected graph [8+8]
8. (a) Write a C program to search for a given element in the integer array using binary search.
- (b) Derive the time complexity of binary search. [10+6]

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