

I B.Tech Supplementary Examinations, Aug/Sep 2008

C AND 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) Describe in detail the execution of while statement with example.
(b) Given a number, write a program using while loop to reverse the digits of the number. For e.g. 12345 should be written as 54321.
(c) Write a program to compute the sum of the digits of a given integer number. [4+6+6]
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) List out the similarities and differences between structures and Unions.
(b) What is the general format of a union? Declare a union and assign values to it. Explain the process of accessing the union members. [8+8]
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;
 - iii. m=p2-p1;

iv. *p1 = &n; [4+6+6]

5. Let a be an array of integers. Present recursive algorithms to compute
- (a) Maximum element of the array
 - (b) The sum of elements of the array. [8+8]
6. (a) Compare and contrast singly linked list with an array.
- (b) Write a C program to count the number of nodes in a linked list. [8+8]
7. Explain the **representation of graph** using adjacency matrix. Give the necessary algorithm. [16]
8. (a) Write and explain **linear search** procedure with a suitable example.
- (b) Formulate recursive algorithm for **binary search** with its timing analysis. [4+12]

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1. (a) Write a program to convert Fahrenheit to Celsius using the formula: $C = \frac{F-32}{1.8}$
(b) What are the Relational operators used in C and illustrate it with an examples. [8+8]
2. (a) In what way array is different from an ordinary variable?
(b) What conditions must be satisfied by the entire elements of any given array?
(c) What are subscripts? How are they written? What restrictions apply to the values that can be assigned to subscripts?
(d) What advantage is there in defining an array size in terms of a symbolic constant rather than a fixed integer quantity?
(e) Write a program to find the largest element in an array. [3+2+3+3+5]
3. (a) Explain the advantages of structure type over the array type variable.
(b) Define a structure that represent a complex number (contains two floating-point members, called real and imaginary). Write a C program to add, subtract, and multiply two complex numbers. [6+10]
4. (a) Explain the way of defining, opening and closing a file. Also explain the different modes of operation.
(b) Write a C program to read data from the keyboard, write it to a file called INPUT, again read the same data from the INPUT file, and display it on the screen. [8+8]
5. Declare two queues of varying length in a single array. Write functions to insert and delete elements from these queues. [16]
6. Write a routine to concatenate two doubly linked lists. [16]
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 bubble sort technique with a suitable example.
- (b) What is the worst case and best case time complexity of bubble sort? [10+6]

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1. (a) What is the purpose of break statement?
(b) Suppose a break statement is included within the innermost of several nested control statements. What happens when break statement is executed?
(c) Write a program to print the multiplication table upto to with proper format. [4+6+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) Explain with an example how a structure can be organized in the 'C' language?
(b) Write a C program to print maximum marks in each subject along with the name of the student by using structures. Take 3 subjects and 3 students records. [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. What is a Queue? Explain the various operations performed on Queues with suitable algorithms. [4+12]
6. Write a function in 'C' to combine two ordered lists into a single ordered list. [16]
7. Write an algorithm for determining whether two **binary trees** A and B are similar based on the **traversal** method. [16]
8. By hand, trace through the steps of **selection sort** for the following lists.
(a) The following seven numbers to be sorted into increasing order:
12 20 34 27 30 36 23

Code No: RR10203

Set No. 3

(b) The following list of 14 names to be sorted into alphabetical order.

Tim Dom Eva Roy Tom Kim Guy Amy Jon Ann Jim Kay Ron Jan
[8+8]

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1. (a) Explain the following & illustrate it with an example each.
 - i. Increment & Decrement operator.
 - ii. Conditional operator.
 - iii. Bitwise operator.
 - iv. Assignment operator.
 (b) State the rules that applied while evaluating expression in automatic type conversion. [12+4]
2. (a) In what way array is different from an ordinary variable?
 (b) What conditions must be satisfied by the entire elements of any given array?
 (c) What are subscripts? How are they written? What restrictions apply to the values that can be assigned to subscripts?
 (d) What advantage is there in defining an array size in terms of a symbolic constant rather than a fixed integer quantity?
 (e) Write a program to find the largest element in an array. [3+2+3+3+5]
3. (a) Distinguish between structure and constructs in C.
 (b) Write a program using structure to read and write employee details of an organization. The field of the structure are [6+10]

Field Name	Data Type
name	string
designation	string
salary	float
dept	string
4. The roots of a quadratic equation of the form $ax^2+bx+c = 0$ are given by the following equations:

$$X_1 = -b + \sqrt{(b^2 - 4ac) / 2a}$$

$$X_2 = -b - \sqrt{(b^2 - 4ac) / 2a}$$

Write a function to calculate the roots. The function must use two pointer parameters, one to receive the coefficients a,b and c and the other to send the roots to the calling function. [16]

5. (a) Write an algorithm for performing insertion of an element into an input-restricted Dequeue.
(b) Write an algorithm for performing deletion of an element from an output-restricted Dequeue. [8+8]
6. Discuss the concept of doubly linked list. Implement the operations of insertion and deletion in a doubly linked list. [4+12]
7. Write and explain the **breath first traversal** and **depth first traversal** in a graph with algorithm. [8+8]
8. (a) Explain linear search procedure with a suitable example.
(b) Formulate a recursive algorithm for binary search with its timing analysis. [8+8]
