Code No: RR10203 **Set No. 1**

I B.Tech Supplimentary Examinations, February 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

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1. (a) What are the general characteristics of C?
   (b) Give and Explain the structure of a C program?
   (c) Write a C program to print the Pascal's triangle. [4+4+8]

2. (a) How are initial values written in a one-dimensional array definition? Is the entire array be initialized? What value is automatically assigned to those array elements not explicitly initialized?
   (b) Write a program to calculate mean, variance and standard deviation of n numbers.
   S=$\sqrt{variance}$, where
   Variance = 1/n sum $(x_i - m)^2$
   M= mean of n numbers. [8+8]

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) What is a pointer? List out the reasons for using pointers.
   (b) Write a C Program to illustrate the use of indirection operator "*" to access the value pointed by a pointer. [8+8]

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. Write a C Program to exchange two nodes of a singly linked list. [16]

7. Write notes on **spanning tree**. Write and explain the algorithm for minimal cost. [16]

8. (a) Write a C program to sort given integers using partition exchange sort.
   (b) Derive the time complexity of partition exchange sort. [8+8]

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Code No: RR10203 **Set No. 2**

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

Answer any FIVE Questions
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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) 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) How does a structure differ from an array?
   (b) Write a C program using structure to read and print the student's records of a class with the following members. [6+10]

Field Name	Data Type
name	string
reg_no	integer
major	string
result	string

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. Declare two stacks of varying length in a single array. Write C routines push1, push2, pop1 and pop2 to manipulate the two stacks. [4x4=16]

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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 C program to add two such polynomials. [16]

7. A digraph is strongly connected if 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≥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≥2 [8+8]

8. (a) Explain the algorithm for **exchange sort** with a suitable example.

   (b) Compare **sort** and **exchange sort** [8+8]

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

Answer any FIVE Questions
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1. Write a program that calculates the value of money at the end of each year of investment assuming an interest rate of 12 percent and prints the year & corresponding amount in two columns for a period of 10 years with an intial investment of 5 years.
   Formula: Value at end of year = value at start of year (1+interest rate) [16]

2. (a) Write a C program to do Matrix Multiplications.
   (b) Write in detail about one dimensional and multidimensional arrays. Also write about how initial values can be specified for each type of array? [8+8]

3. (a) Write a C program to illustrate the comparison of structure variables.
   (b) What is the use of a structure? Given an example for a structure with initialized values. [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. Write an algorithm, given the address of an input binary tree, prints the equivalent infix expression with minimum number of paranthesis. [16]

8. Write an algorithm for performing selection sort when the input elements are represented as a linked list. [16]

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

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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. 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 to compare structure variables? Give an example.
   (b) Define a structure type *struct ABS*, that contains name, age, designation, and salary. Using this structure, write a C program to read this information for one person from the keyboard and print the same on the screen. [6+10]

4. (a) How to use pointer variables in expressions? Explain through examples.
   (b) Write a 'C' Program to illustrate the use of pointers in arithmetic operations. [8+8]

5. Define input-restricted deque as deque in which insertion is restricted to one end and deletion can be made at either end. Write routines to implement operations on this deque. [16]

6. Write a C program to create a singly linked list and split it at the middle and make the second half as the first and vice-versa. Display the final list. [16]

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7. Write an algorithm for determining whether two **binary trees** A and B are similar based on the **traversal** method. [16]

8. Write an algorithm for two way merge sort. Analyse its time complexity. [8+8]

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