Code No: R05010106 **Set No. 1**

I B.Tech Regular Examinations, Apr/May 2007
C' PROGRAMMING AND DATA STRUCTURES
(Common to Civil Engineering, 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, Aeronautical Engineering and Instrumentation & Control Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write a program to determine and print the sum of the following harmonic series for a given value of n:
1+1/2+1/3+.....+1/n.
   (b) What are the logical operators used in C and illustrate with examples. [8+8]

2. (a) What is a preprocessor directive.
   (b) Distinguish between function and preprocessor directive.
   (c) What is the significance of conditional compilation.
   (d) How does the undefining of a pre-defined macro done. [4+4+4+4]

3. (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]

4. (a) What are Bit fields. What are its advantages. What is its syntax.
   (b) Write a C program to store the information of vehicles. Use bit fields to store the status information. Assume the vehicle object consists of type, fuel and model member fields. Assume appropriate number of bits for each field.[8+8]

5. Write a C program to read a text file and to count
   (a) number of characters,
   (b) number of words and
   (c) number of sentences and write in an output file. [16]
6. Declare a circular queue of integers such that F points to the front and R points to the rear. Write functions
   (a) To insert an element into queue
   (b) To delete an element from queue. [8+8]
7. Write a function in 'C' to form a list containing the intersection of the elements of two lists. [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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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is a string constant? How do string constants differ from character constants? Do string constants represent numerical Values?
   (b) Summarize the standard escape sequences in C. Describe them.
   (c) What is a variable? How can variables be characterized? Give the rules for variable declaration.
   (d) What is the purpose of type declarations? What are the components of type declaration? [4+4+4+4]

2. (a) Write a program to demonstrate passing an array argument to a function. Consider the problem of finding largest of N numbers defined in an array.
   (b) Write a recursive function power (base, exponent) that when invoked returns base exponent. [8+8]

3. (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]

4. Write a C program to compute the monthly pay of 100 employees using each employee's name, basic-pay. The DA is computed as 52% of the basic pay. Gross-salary (Basic_pay+DA). Print the employees name and gross salary. [16]

5. (a) What are the file I/O functions in C. Give a brief note about the task performed by each function.
   (b) Write a program to read an input file and count the number of characters in the input file. 16]

6. Write a C program for implementation of various operations on circular queue. [16]

7. 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]

8. (a) Write a C program to search for a given element in the integer array using binary search.
   (b) Write a C program to sort the elements of an array using tree sort method with suitable example. [8+8]

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

Answer any FIVE Questions
All Questions carry equal marks

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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) What do you mean by functions? Give the structure of the functions and explain about the arguments and their return values.
   (b) Write a C program that uses a function to sort an array of integers. [8+8]

3. (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]

4. (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]

5. (a) Distinguish between text mode and binary mode operation of a file.
   (b) Write a program to open a pre-existing file and add information at the end of file. Display the contents of the file before and after appending. [4+12]

6. Write a program to convert a given prefix expression to postfix expression using stacks. [16]

7. (a) Write a C program to implement binary tree traversals.
   (b) Write an algorithm to count the number of leaf nodes in a binary tree. What is its computing time? [8+8]

8. (a) Write a C program to sort the elements of an array using Quick sort with suitable example.
   (b) What is the worst case and best case time complexity of the above program?

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Write about space requirements for variables of different data types. [16]
2. (a) Distinguish between the following:
   i. Actual and formal arguments.
   ii. Global and local variables.
   iii. Automatic and static variables.
   (b) Explain in detail about pass by values and pass by reference. Explain with a sample program [8+8]
3. (a) Write a C program using pointer for string comparison.
   (b) Write a C program to arrange the given numbers in ascending order using pointers. [8+8]
4. (a) Describe nested structures. Draw diagrams to explain nested structure.
   (b) Write a program to declare pointer as members of structure and display the contents of the structure. Define a structure object, boy with three fields: name, age and height. [6+10]
5. (a) What is the task performed by fseek( ) function. What is its syntax. Explain each parameter in it.
   (b) Write a C program to read the text file containing some paragraph. Use fseek() and read the text after skipping n characters form beginning of the file. [8+8]
6. Write a non-recursive simulation of Towers of Hanoi problem. [16]
7. Write a routine to reverse elements of a doubly linked list by traversing the list only once. [16]
8. (a) Explain **Quick sort** with algorithm.
   (b) Analyse the worst case performance of **Quick sort** and compare with **Selection sort**. [8+8]

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