2002
COMPUTER PROGRAMMING WITH C

Time Allotted: 3 hours   *Full Marks:70*

The questions are of equal value
The figures in the margin indicate full marks
Candidates are required to give their answers in their own words as far as practicable

Answer any Five Questions

1. (a) What are the basic data types used in C language ? What are user-defined data types? Explain briefly.

   (b) Discuss the relative precedences and associativity of the arithmetic operators. What are bitwise operators? Explain with examples.

   (c) What are the functions of the typecast operator and size of operator?

   (d) What are auto variables and static variable? Explain.

   4+4+2
   +4=14

2. (a) Compare the use of the switch statement with the use of the nested if-else statement? Which is more convenient and why?

   (b) Compare the purpose of the "break" statement with that of the "continue" statement. Within which control statements can they be included? State each of them individually.

   (c) Write a C program to evaluate the sum of the first n terms of the following series:

   $$1 - \frac{3}{2} + \frac{5}{6} - \frac{7}{24} + \frac{9}{120} - \cdots$$

   The value of n should be given as input.

   4+4+6
   =14

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*) Write a C program that will read a positive integer value, and compute the following sequence:
If the number is even , divide it by 2;
If it is odd, multiply by 3 and add 1.
Repeat the process until the value is 1, printing out each value. Finally print out how many of these operations you did perform for the given input. Assume the input integer to be greater than 1.

(b) Write a C program to count the vowels and consonants in a text given as standard input. Then print out the number of occurrences of each of the vowels 'a', 'e', 'i', 'o', 'u' in the text , the total number of letters , and each of the vowels (i.e. vowel count) as an integer percentage of the total number of letters.   7+7 =14

4. (a) What are formal arguments and actual arguments? What is the relationship between them? Can the names of the formal arguments within a function coincide with the names of other variables defined
   i.   Outside the function
   ii.   Within the function
Explain with examples.

(b) Write a complete C program using a recursive function to convert a decimal integer , taken as input , into its hexadecimal equivalent.   7+7 =14

5. (a) A 2-dimensional array is declared in the following way :
   int list [10] [20] ;
   Now if the element list [5] [10] occupies the memory location 2010 and the compiler takes the size of an integer as 2 bytes , what will be the location for the element list [15] [15] ? Give reasons for your answer.

(b) What is the difference between a structure variable and an uncon variable in respect of memory allocation ?

(c) What is the difference between the functions malloc( ) and calloc ( ) ?

(d) Write a C program to print the product of two given matrices .   2+3+2
+7=14

6. (a) What is the C preprocessor ? What is its use ?

(b) What is the difference between an array of pointers and pointer to an array ?

(c) What are command line arguments ?

(d) Write a C program that takes only three variables (a,b,c) and rotates the values stored in them so that value of a goes to b , b to c and c to a.

(e) Write a function "replace" that takes a pointer to a string as a parameter , which replaces all spaces in that string by "-" sign   2+2+2+
and returns the number of spaces it replaced.   4+4=14

7. (a) What will be the output of the following C segment :
```
main ( )
{
char str[ ] = "CAUTION" ;
char *p ;

p = str + 5;
printf( "% c\n" , *p--);

printf( "% c" , *p);   }
```

(b) Write short notes on :(any 2)
    i)   Library functions.
    ii)   Multidimensional array.
    iii)   Pointer arithmetic.   2+2x6
    iv)   Passing arguments to a function.   =14

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