PG 1st Semester Examination, 2023

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

(*Advanced Programming in C and MATLAB*)

PAPER – MTM-104

Full Marks : 50

Time : 2 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

1. Answer any *four* questions in C : 2×4

(*a*) A program contains the following declaration

static int $x[8] = \{10, 20, 30, 40, 50, 60, 70, 80\}$;

What is the meaning of $(x+2)$? What are the values of $*x$, $(*x + 2)$ and $*(x+2)$?

(*b*) Define a structure consisting of two floating-point members, called *real* and *imaginary*. Include the tag *complex* within the definition. Declare the varaibles $x1$, $x2$ and $x3$ to be structures of type *complex*.

(*c*) Suppose that a is an unsigned integer whose value is (hexadecimal) $0xa2c3$. Write the corresponding bit pattern for this value. Then evaluate each of the following bitwise expressions, first showing the resulting bit pattern and then the equivalent hexadecimal value.

$\tilde{a}$, $a >> 3$

(*d*) Explain the input statement of the following program :

```
#include < stdio.h >
void main()
{
char text[50];
scan f("%[ABCDEFGHIJKLMNOPQ
                    RSTUVWXYZ]", text);
}
```

(*e*) Suppose that x, y and z are integer variables which have been assigned the values 2, 3 and 4 respectively. What will be the output of the following statement in C ?

$$x* = -2(y + z)/3;$$

(*f*) Suppose that i is an integer variable, and f and g are floating-point variables. What will be the nature of value of the expression : $(f < g)\ ?\ i : g$. Explain it with examples.

2. Answer any *four* questions in MATLAB : 4×4

(*a*) Suppose, you have a matrix which is stored in the memory through a variable 'MAT'. Now, order of this matrix is to be assigned into the variables 'row' and 'col'. How will it be done in MATLAB ? Write a program in MATLAB to display the result of addition of two matrices.

(*b*) Demonstrate the 'linspace'. Write a program in MATLAB to find the Euclidean norm of a vector in n dimension.

(*c*) Write a function in MATLAB to return the values of addition, subtraction, multiplication and division of two complex numbers which will be given through the input arguments of the function. Also explain relational operators with example.

(*d*) Explain 'switch' statement in MATLAB. Write a program in MATLAB to find the maximum value of a user defined column of a matrix using switch statement.

(*e*) Suppose, you have a list of n numbers including complex numbers also. You have to detect all complex numbers from the list writing a program in MATLAB.

(*f*) Write a program to count the number of characters in a character vector in MATLAB. Also demonstrate the cell array in MATLAB.

3. Answer any *two* questions in C : 8×2

(*a*) (*i*) What is the purpose of continue statement ? Within which control statements can the continue statement be included ? 3

(*ii*) Write a program that will calculate the sum of every *n*th integer, beginning with the value assigned to *n*start, continue the process for all values that do not exceed *n*stop. 5

(*b*) (*i*) What is the escape sequence ? Write down the escape sequences commonly used. 3

(*ii*) Write a program to print the palindrome numbers between two numbers which are given through input statement. 5

(*c*) (*i*) In what way does an array differ from an ordinary variable. How is a multidimensional array defined ? 3

(*ii*) Write a program to compute the deviation of each number about the average of n numbers. 5

(*d*) (*i*) What is meant by the storage class of a variable ? Mention storage class specifications. What is the scope of static variable ? 3

(*ii*) Write a program to print n successive Fibonacci numbers in the main function with the help of a user defined function to calculate the Fibonacci number. 5