2018

M.Sc. 1st Semester Examination

APPLIED MATHEMATICS WITH OCEANOLOGY

AND

COMPUTER PROGRAMMING

PAPER—MTM-104

Full Marks : 50

Time : 2 Hours

The figures in the margin indicate full marks.

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

Illustrate the answers wherever necessary.

Advanced Programming in C and MATLAB

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

   (a) Write a program in MATLAB to find the sum of integers and fractional parts of a series of numbers.

   (b) What function is used in MATLAB to find the product of two polynomials ? Illustrate this using following two functions $2x^5 + 4x^3 + 7x^2 + 6x + 5$ and $3x^4 - 8x^3 - 5x + 7$.

(Turn Over)

(c) How the lower and upper parts are obtained from nth diagonal of a matrix in MATLAB ? Explain it.

(d) What is cell array ? How will you write the name, address and age of three students in a cell array in MATLAB ?

(e) Summarize the rules for assigning numerical values to enumeration constants. What default values are assigned to enumeration constants ?

(f) What are **type *casting*** and ***const*** qualifier in C language ? Illustrate with example.

(g) What is the difference between **if** and **#if** in C ?

(h) What is the difference between 'getc' and 'getw' functions in C ?

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

(a) Write a program in MATLAB to add two arrays or two matrices.

(b) Describe the types of variables in MATLAB according to their scopes in two or more functions.

(c) "Division by a matrix is equivalent to multiplication by its inverse" — Explain it in MATLAB with example.

(d) How relational and logical operations can be performed in MATLAB ? Explain it.

(e) How is a multidimensional array defined in terms of an array of pointers ? What does each pointer represent ? How elements can be accessed in this case ?

(f) Write a function in C that prints all non-Fibonacci numbers within a given range of values. The function accepts the range as its arguments.

(g) What is meant by low-level programming ? Suppose that v is a signed, 16-bit integer quantity whose hexadecimal value is 0x369c. Evaluate each of the following shift expressions. (Utilize the original value of v in each expression).

(a) $v << 4$, and (b) $v >> 4$.   2+2

(h) What is meant by dereferencing ? What is the difference between a pointer and a dereferened pointer ? Write a program in C to accept a string and print the address of its beginning location.

3. Answer any *two* questions :   2×8

(a) What do you mean by recursive function ? Write a function in MATLAB to find the value of a determinant of any order recursively.   2+6

         (Turn Over)

4

(b) What is the function of feval( ) ? Write a function in MATLAB to find a root of $f(x) = 0$ by Newton-Raphson method checking for divergence to be modified so that error keeps on increasing for five continuous iterations.

2+6

(c) What is a self-referential structure ? For what kinds of applications self-referential structures are useful ? Write a program in C to construct a linked list containing three components, where each component consists of two data items : a string and a pointer that references the next component within the list.

1+1+6

(d) What is meant by opening a data file ? How is this accomplished ? Write a program in C to remove all the comments from a C - source code. Assume that C comments do not nest and a comment starts with /* and terminates with */.

1+1+6

[Internal Assessment — 10 Marks]