2022

1st Semester Examination

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

Paper : MTM - 104

(Advanced Programming in C and MATLAB)

Full Marks : 40 Time : Two Hours

The figures in the margin indicate full 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=8

   (a) Write a program to find the length of a string not using a built-in-function. 2

   (b) Write a program demonstrating a macro. 2

   (c) Write down the differences between structure and union. 2

   (d) Explain different types of logical bitwise operators. 2

   (e) What is difference between $i++$ and $++i$? Explain with example. 2

   (f) What is ternary operator? Write a program using it. 2

P.T.O.

2. Answer any ***four*** questions in MATLAB : 4×4=16

(a) The exponential power of x is approximated by the following infinite series $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots$. Write a program to find out how many terms will be sufficient in the right-hand side of the given expression to ensure that the result is within 5% error of the exact value. 4

(b) Write a program to count the number of elements in a list which are greater than a threshold value. 4

(c) Explain the relational and logical operations with examples. 4

(d) How are more than one element accessed from an array? Write a program to find the value of a determinant. 2+2

(e) What is the procedure to find the inverse of a matrix? Write a function to find $n!$. 2+2

(f) What is the difference between *disp* ( ) and *fprintf* ( ) functions? Illustrate with examples. Write a program to display a list of numbers in reverse order. 2+2

3. Answer any ***two*** questions in C : 8×2=16

(a) (i) What is purpose of the *printf* function? How is it used within a C program? Compare with the *putchar* function. 3

(ii) Using a function to calculate the real roots of the quadratic equation $ax^2 + bx + c = 0$, write a program to display the real roots. 5

(b) (i) What kind of information is represented by a pointer variable? What is relationship between the address of a variable v and the corresponding pointer variable pv? 3

(ii) Write a program that will calculate the sum of every third integer, beginning with $i = 2$ for all values of i that are less than 100. Write the loop (*i*) using a *while* statement and (*ii*) using a *for* statement. 5

(c) (i) Write a program to find the product of two complex numbers defining a complex number using structure. 5

(ii) Explain the *switch* statement. 3

(d) (i) Write a program that will generate a table of values for the equation $y = 2e^{-0.1t}\sin(0.5t)$ where t varies between 0 and 60. Allow the size of the t-increment to be entered as an input parameter. 5

(ii) In what way does an array differ from an ordinary variable? 3
