2072
M.Tech. (Material Science and Technology)
Second Semester
MT-204: Computational Tool and Techniques

Time allowed: 3 Hours
Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.*

x-x-x

1. (a) Define Computational tools.

   (b) What is Hyper Test Transfer Protocol? Why is it used?

   (c) What are the different methods of interpolation?

   (d) What are applications of Monte Carlo simulations?

   (e) How is Simpson's rule of numerical integration different from trapezoidal rule?

   (2x5)

Section A

2. (a) Create a document in Latex with the title Computational Tools, your name and Today's date. Include in the document the following text 'Today I am learning Latex'. Also write in line math 'a^2 + b^2 = c^2' (5)

   (b) What are computational techniques? Why are they necessary to solve numerical problems? (5)

3. (a) What are the significant features of DOS? Explain the algorithm of booting. (6)

   (b) Write a code in Mathematica for

   i) Factorial of n natural numbers

   ii) solving the equation ax+b = c for x (4)

4. (a) What are the different features of Windows Operating System? In the age of windows, DOS still holds very important place. Explain. (6)

   (b) Although Internet has revolutionised the world but it has its disadvantages too. Explain with proper reasoning. (4)

Section B

5. (a) Solve the equations using Jacobi iteration method;

   $5x-2y+3z = -1$, $-3x+9y+z = 2$, $2x-y-7z = 3$ (5)

   (b) How can integration be done using Trapezoidal rule. Use the trapezoidal rule to estimate , $\int_0^1 x^2 \, dx$ using four subintervals. (5)

P.T.O.

(2)

6. (a) Fit a least square line for the following data.

X	1	2	3	4	5
Y	2	5	3	8	7

(5)

(b) Solve the differential equation

$\frac{dy}{dx} = \frac{y-2}{x+2}$, y(2) = -1, using Euler's method at x=2.5   (5)

7. (a) Find f(2.8) from the following table.

x	0	1	2	3
f(x)	1	2	11	34

(5)

(b) In numerical analysis, the study of errors involved in the analysis method and also results is very important. Explain.

Round off the digits correct to 4-significant figures; i) 3.96312   ii) 0.0000656   (5)

x-x-x