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DM-003-1204001 Seat No. _____

M. Sc. (Sem. IV) Examination

March / April - 2022

Physics : CT-11

(Numerical Analysis & Computer Programming)

(New Course)

Faculty Code : 003

Subject Code : 1204001

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions carry equal marks.

(2) Attempt all questions.

1 Answer any seven of the following : **14**

(a) What do you understand by 'curve fitting' ? In what way it is useful ?

(b) List the methods used to solve linear equations.

(c) Find the value of Δu_x for the following value of u_x (i) e^x (ii) $\log x$.

(d) List the methods used for solving ordinary differential equation and rules used to solve numerical integration.

(e) Define a fourier series and write it's mathematical presentation.

(f) Briefly discuss significance of flow-chart.

(g) List the comparative logical statement and write its FORTRAN equivalents.

(h) Name the languages used to write scientific programs.

(i) Define 'Computer'. What is the importance of 'Operating system' ?

(j) What are the different types of "IF" statements ?

2 Answer any **two** of the following :

(a) The following table gives corresponding values of x and y. Obtain an equation of the form $y = ax + b$ using the method of least squares. **7**

x	0	5	10	15	20	25
y	12	15	17	22	24	30

(b) Solve the system of linear equations, $5x - 7y = 36$ and $3x + 2y = 3$ by (i) direct method and (ii) Cramer's rule. **7**

(c) Define operators, $\triangle$ and E and establish relationship between them. Expand $(x-1)^7$ using the Pascal triangel rule. **7**

3 Answer the following :

(a) Obtain the exact form of f(x) by using the following data and hence find f(3) and f(9). **7**

x	0	1	2	3
$f(x)$	1	3	7	13

(b) Evaluate $\int_0^5 \frac{1}{1+x}\,dx$ by using different rules of numerical intogration and compare the results with actual value. **7**

OR

3 Answer the following :

(a) Describe in detail, the method of generating algorithm. **7**

(b) List the control statements. Using the flow chart explain the various logical IF statements. **7**

4 Answer any **two** questions :

(a) Write the common statement for the 'DO'. Discuss 'Implied' do loop and its implementation. Discuss the rule of be followed using 'DO' loop. **7**

(b) Discuss in brief two examples of each shape used in flow chart. 7

(c) Explain the hierarchy of operation followed by FORTRAN. Define integer and real variables, list and explain the built-in functions. 7

5 Answer any **two** of the following :

(a) Given $y'(x) = x^2 + y^2$, $y(0) = 0$, find $y(0.4)$ using Runge-Kutta method of second order, assume $h = 0.2$. 7

(b) Discuss application of fourier series for square wave analysis; show that square wave contains large number of high frequency components. 7

(c) Using logical IF statement, write a FORTRAN program to calculate the mean weight of female and male candidates. 7

(d) Briefly discuss the FORMAT function. List and explain the use of various FORMAT specifiers with appropriate examples. 7