647510 **MSC4PhyC401x** **Seat No :_____**

M.SC.(Phy.) Semester - 4 (*CBCS*) Examination
April/May-2022 (NEW COURSE)
Numerical Analysis and Computer Programming (Core)

Time: 2:30 Hours **Marks: 70**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1 Answer any seven questions. (14)

1. What do you mean by 'curve fitting'? why it is necessary?
2. List the direct and iterative numerical methods used to solve the linear equations.
3. What do you understand by interpolation and extrapolation of data?
4. What are the different rules of numerical integration and methods of solving ordinary differential equations?
5. Define a fourier series and write it's mathematical expression.
6. Define digital computer and compilers.
7. What is importance of 'operating system'?
8. List the different types of IF statements.
9. Name the computer languages used for writing scientific programs.
10. Discuss in short importance of flow chart.

Q.2 Answer any two. (14)

1. Fit a parabola $y=ax^2+bx+c$ in least square sense to the data.

X	10	12	15	23	20
Y	14	17	23	25	21

2. Solve the following set of equations using Cramer's rule: $2x+3y+2z = 14$, $5x+y+z=10$ And $x+5y+3z=20$.
3. Obtain the exact form of *f(x)* by using the following data and by employing Newton's forward formula.

X	0	1	2	3
F(x)	1	3	7	13

Hence find f(6) and f(11).

Q.3 Answer the following. (14)

1. Evaluate $\int_0^{10} \frac{1}{1+x^2}$ dx by using different rules of numerical integration.
2. $Y' = \frac{y^2-x^2}{y^2+x^2}$; $x_0 = 0$, $y_0 = 1$, h=0.2 find y_1 and y_2 using Range-Kutta method of second order.

OR

Q.3 answer the following.

1. Using logical IF statement, write a FORTRAN program to calculate the mean weight of male and female candidates.
2. Explain the hierarchy of operation followed by FORTRAN. Define integer and real variables, list and explain the built-in functions.

Q.4 Answer any two. (14)

1. Briefly discuss the FORMAT function. List and explain the use of various FORMAT specifiers with appropriate examples.
2. Discuss in brief two examples of each shape used in flow-chart.
3. Describe in detail, the method of generating algorithm.

Q.5 Answer any two of the following. (14)

1. List the control statements. Using the flow chart explain the various logical IF statements.
2. Write a common statement for the 'Do'. Discuss 'Implied' do loop and its implementation. Discuss the rule to be followed using 'Do' loop.
3. Show how fourier series is used for expansion of Reimann-Zota function.
4. Using fourier series analysis, prove that full wave rectifier does a fairly good job of approximating direct current.

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