Roll No.							

24-PH-43

M.Sc. IV SEMESTER [MAIN/ATKT] EXAMINATION
JUNE - JULY 2024

PHYSICS

Paper - III

[Computational Methods and Programming]

[Max. Marks : 75] *[Time : 3:00 Hrs.]* *[Min. Marks : 26]*

Note : Candidate should write his/her Roll Number at the prescribed space on the question paper.
Student should not write anything on question paper.
Attempt five questions. Each question carries an internal choice.
Each question carries **15 marks.**

Q. 1 a) What do you mean by operators in C ? Explain its type with example.

b) Write down a program in C to check. If a number is even or odd using the function.

OR

a) Explain different manipulation function with example.

b) Explain difference between while and do while loop with example.

Q. 2 a) Apply false position method to solve the equation.

$3x - \cos x - 1 = 0$

b) Solve $\sin x = 1 + x^3$ using Newton Raphson method.

OR

a) Find a real root of equation -

$f(x) = x^3 - 4x - 9 = 0$

using bisection method.

b) Solve the following by Gaussian elimination method -

$2x + y + 4z = 12$

$8x - 3y + 2z = 23$

$4x + 11y - z = 33$

Q. 3 a) Fit the straight line to the following data -

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

b) Construct forward backward and divided difference table for following data -

x :	1931	1941	1951	1961	1971	1981
y :	12	15	20	27	39	52

OR

a) Using Newton's difference formula to find f(x) from the following data -

x :	0	1	2	4	5	6
y :	11	14	15	5	6	19

b) Apply Lagarange's formula to find f(5).

x :	1	2	3	4	5	7
y :	2	4	8	16	?	128

Q. 4 a) Calculate $\int_0^{\pi/2} e^{\sin x}\, dx$ correct to four decimal places by Simpson's 3/8 rule taking h = $\pi/6$

b) Solve $\frac{dy}{dx} = \frac{1}{x+y}$ for $x = 0.5$ by using Runga - Kutta's method with $x_0 = 0$, $y_0 = 1$ (take h = 0.5)

OR

a) Calculate an appropriate value of $\int_0^{\pi/2} \sin x\, dx$ by trapezoidal rule using 11 ordinates.

b) Find the solution $\frac{dy}{dx} = y^2 - t^2$ y(1) = 0 at t = 2 by modified Euler method using step size = 0.1

Q. 5 Write short notes on following (**any two**) -

i) Input output statement.

ii) Eigen vectors of matrices.

iii) Partial differential equation.

iv) Solve : $\Delta \tan^{-1} x$.

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