

S.No. 6971

P 16 PYE 2

(For candidates admitted from 2016–2021 Batch)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Physics — Elective

NUMERICAL METHODS AND C++ PROGRAMMING

Time : Three hours

Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$)

Answer ALL the questions.

1. What is C++?
2. Write the syntax of class declaration.
3. Define inverse interpolation.
4. What is curve fitting?
5. Explain augmented matrix.
6. When does the Newton-Raphson method fail?
7. Why is trapezoidal rule called so?
8. State Simpson's one-third rule.
9. What are the distinguished properties of R.K. method?
10. Write about the First Order Euler Equation.

SECTION B — ($5 \times 5 = 25$)

Answer ALL the questions, choosing either (a) or (b).

11. (a) What are the applications of C++?
Or
(b) What are the two types of functions? List and explain them.
12. (a) Derive the equation for exponential law fit in curve fitting.
Or
(b) Using Newton's interpolating polynomials, find the interpolating polynomial to the data : (1, 1), (2, 5), (3, 2), (3.2, 7), (3.9, 4).
13. (a) Compare Gauss elimination method and Gauss-Jordan method for solving a linear system.
Or
(b) What is the criteria for convergence while using Newton-Raphson method?
14. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ with $h = \frac{1}{6}$ by trapezoidal rule.
Or
(b) Derive the gaussian two point formula.

15. (a) Using modified Euler's method, compare $y(0.1)$ with $h = 0.1$ from $y' = y - \frac{2x}{y}$, $y(0) = 1$.

Or

- (b) Derive third order Runge-Kutta equation.

SECTION C — ($3 \times 10 = 30$)

Answer any THREE questions.

16. Write detailed note on conditional statement in C++ with suitable examples.
17. Elaborate the theorems that explain the properties of divided differences.
18. Using N.R. method, solve $x \log_{10} x = 12.34$ start with $x_0 = 10$.
19. Dividing the range into 10 equal parts, find the value of $\int_0^{\pi/2} \sin x dx$ by
(a) Trapezoidal rule
(b) Simpson's rule.
20. Derive Euler's equation to solve ordinary differential equation.