(6 pages)

S.No. 3248 **P 22 PYE 1 A**

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022.

Physics – Elective

COMPUTATIONAL PHYSICS WITH C++

Time : Three hours Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

I. (A) Choose the correct answer: (5 × 1 = 5)

1. In following equation which one is inline form of cubic equation.

(a) $-2x-5x^2-1$ (b) $x^4+1=0$

(c) $x^3+2x^2=x^2-x$ (d) $x^3+\sqrt{x}=0$

2. In a homogenous system if $|A| \neq 0$ then its solution $x=0$ is called

(a) Non-Trivial system

(b) Non-Homogenous system

(c) Homogenous system

(d) Trivial system

3. Which order of the polynomials can beet integrated using Trapezoidal rule?

(a) 2nd Order (b) 1st Order

(c) 3rd Order (d) 4th Order

4. Which of the following user – defined header file extension used in C++?

(a) .Cpp (b) .C

(c) .hf (d) .h

5. Which will be the output of the following C++ cock?

```
#include <isostream>
using namespace stel;
int main() {
    int a, b, c
    a = 2;
    b = 7;
    c = (a>b)? a:b;
    cont << "C:"<<C;
    return 0; }
```

(a) 14 (b) 7

(c) 9 (d) 2

(B) Fill in the blanks: (5 × 1 = 5)

6. $y = ax + b$ is the equation of ————.

7. Crammer's Rule is note suitable for ———— type of problems.

8. Euler's method is also known as ————.

9. ———— keywords is used to define the macros in C++.

10. If a class is being derived using more than live base classes ———— inheritance will be used.

II. Answer the following: (5 × 2 = 10)

11. List the methods to find the roots of non-linear equations.

12. List out the some of the elimination methods.

13. State the recursive relation using Euler's method.

14. Give the structure of C++ Program.

15. Define pointers in C++.

PART B — (5 × 5 = 25)

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

16. (a) Find a root of the equation $x^2 - 4x - 10 = 0$ using bisection method.

Or

(b) Find the root of equation $f(x) = x^2 - 3x + 2$ is the vicinity of $x = 0$ using Newton-Raphson method.

17. (a) Solve the following 3×3 system using the basic Gauss elimination method.

$$3x_1 + 6x_2 + x_3 = 16$$
$$2x_1 + 4x_2 + 3x_3 = 13$$
$$x_1 + 3x_2 + 2x_3 = 9$$

Or

(b) Solve the equation of form $f(x) = 0$ using Jacobi Iterative method.

18. (a) Discuss about Trapezoidal rule and give the function error value.

Or

(b) Discuss Simpson's 1/3 rule.

19. (a) Write a program using if else statement and explain it.

Or

(b) Write a simple program using 'for' statement and explain it.

20. (a) Explain friendly function using a program.

Or

(b) Write any five rules for overloading operators.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. (a) Explain the method of false position and derive the false position formula.

(b) Explain about Linear fitting and derive the equation of least square regression.

22. Discuss about Gauss elimination and Gauss-Seidal iterative method.

23. Use the classical RK method (Runge-Kutta) to estimate $y(0.4)$ when $g'(n) = x^2 + y^2$ with $y(0) = 0$ (Assume $h = 0.2$).

24. Write in detail about looping conditions in C++ programming with general structure.

25. Write a program for given condition.

Let's consider a shopping list of items for which we place on order with a dealer every month. The list include details such as 'code number' and 'price of each item. We would like to perform operation such as adding an item to list, deleting in item from the list and printing to total value of the order.