Reg. No. : ....

Name : ....

Second Semester M.Sc. Degree Examination, January 2024

Physics with Specialization in Nano Science/Physics with Specialization in Space Physics

PHNS 523/PHSP 523 : COMPUTER SCIENCE AND NUMERICAL TECHNIQUES

(2020 Admission Onwards)

Time : 3 Hours　　　　　　　　　　　　　　　　　　　　　　　Max. Marks : 75

SECTION – A

Answer any **five** questions. Each question carries **3** marks.

1. What is meant by cache?

2. What are the registers available for 8085 and discuss their purposes.

3. What is tuple in python?

4. Why is C++ called an abject oriented language?

5. Explain how arrays are used as arguments of functions in C++.

6. Explain forward, backward and central difference schemes.

7. Explain modified Euler's method.

8. Write down and explain Runga-Kutta fourth order formula.

(5 × 3 = 15 Marks)

SECTION – B

Answer **all** questions. Each question carries **15 marks**.

9. (a) Explain the instruction set for a 8085 microprocessor. **8**

    (b) Discuss briefly the types of interrupts in 8085. **7**

OR

10. (a) Discuss briefly the OSI model of computer networks. **7**

    (b) Explain the while and for loops in Python and also compare them. **8**

11. (a) Explain how files are handled and data read from and written to files in C++. **8**

    (b) Explain how multidimensional arrays are created and used in C++. **7**

OR

12. (a) Explain pointers and their two uses C++ with examples. **8**

    (b) Discuss how functions are defined in classes and accessed with an example. **7**

13. (a) Explain Newton's forward and backward interpolation schemes. **7**

    (b) Explain how Laplace's equation in two dimensions with a given boundary conditions is numerically solved. **8**

OR

14. (a) Derive a general quadrature formula and abtain trapezoidal, and Simpson's formulae for numerical integration. **8**

    (b) Explain Gauss elimination method for finding the inverse of a matrix with an example of 3x3 matrix. **7**

(3 × 15 = 45 Marks)

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SECTION – C

Answer any **three** questions. Each question carries **5** marks.

15. Write a Python code for displaying factorial of an integer. Use recursive call to function.

16. Write 8085 assemble program to find the greatest of numbers stored in memory locations and to store the result in another location.

17. Write a C++ program for finding the roots of a nonlinear equation using Newton-Raphson method.

18. Convert the problem of numerically solving Poisson equation in one dimension to a matrix equation using finite differences.

19. Find Newton's interpolation polynomial for the following data points (x,y):

    (1,1) (2,5) (3,2) (3,2,7) and (3,9,4)

20. Write a C++ code to solve Newton's law of motion for a damped harmonic oscillator (one-dimension) with suitable initial values.

(3 × 5 = 15 Marks)