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Reg. No. : .....

Name : .....

Second Semester M.Sc. Degree Examination, November 2023

Physics

PH 223 – 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 system bus?
2. What are the categories of instructions available for 8085?
3. How is microcontrollers different from microprocessors?
4. What is the difference between structure and class in C++?
5. Explain how two-dimensional arrays are created in C++?
6. Drive central difference formula for the second order derivative.
7. Drive Simpson's 1/3 rule.
8. Explain Euler's method for solving a first order differential equation.

(5 × 3 = 15 Marks)

P.T.O.

SECTION – B

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

9. (a) Explain the machine cycle and bus timings of 8085 microprocessor. (8)

   (b) Discuss briefly the registers in 8085. (7)

OR

10. (a) Discuss important computer network topologies. (7)

    (b) Distinguish between RAM, ROM and Cache. (8)

11. (a) Discuss the definition of classes and objects in C++. How functions are declared in class? (8)

    (b) Write a C++ program to print the transpose of an $N \times N$ matrix. (7)

OR

12. (a) Explain how files are created and accessed in C++. (7)

    (b) Explain the concept of pointers and any two applications with illustrative C++ statements (8)

13. (a) Write a note on Lagrange's interpolation. (7)

    (b) Explain how Poisson's equation in one dimensions with a given boundary conditions is numerically solved? (8)

OR

14. (a) Discuss in brief Runge-Kutta method (second or fourth order) of solving ordinary differential equations. (7)

    (b) Write a C++ code to solve Newton's law of motion for a damped harmonic oscillator (one-dimension) with suitable initial values. (8)

(3 × 15 = 45 Marks)

SECTION – C

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

15. Write a Python code for displaying all the prime numbers within an interval.

16. Write 8085 assembly program to add and subtract two 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. Write a C++ program with a class for complex numbers and functions to add, multiply and display complex numbers, and to illustrate their use by creating and initialising objects.

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. Derive standard five point formula for iterative solution for two dimensional Laplace equation.

(3 × 5 = 15 Marks)
