21P209 (Pages: 2) Name: .....

Reg.No: .....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2022

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P PHY2 C08 - COMPUTATIONAL PHYSICS

(Physics)

(2019 Admission onwards)

Time : 3 HoursMaximum : 30 Weightage

Section A

Answer ***all*** questions. Each question carries 1 weightage.

1. Briefly write down the steps involved in the development of a computer program.
2. Write a program to get the volume and surface area of a sphere having radius 6.
3. How can you read data from and write data to python files?
4. Write a programme to read a matrix and print its inverse.
5. Write a python program to plot exp(x) and draw its graph.
6. How can you perform numerical differentiation using lagrange polynomial?
7. How can Euler's method be used to solve ordinary differential equations?
8. Explain the theory of a freely falling body by Euler's method.

(8 × 1 = 8 Weightag

Section B

Answer any ***two*** questions. Each question carries 5 weightage.

9. Explain different data types in python with examples.
10. Explain indexing and slicing of arrays with suitable examples. With the help of a python programm explain how to print an array.
11. (a) Write in detail about the 2nd order R-K method used to solve ordinary differential equations (b) Develop a python program to solve the differential equation dy/dx= 2y/x is with an initia value y(1)=2. Estimate y(1.25) with a step size 0.25.
12. With the help of Python codes, explain the numerical method of tracking the motion of a projectile b Euler method.

(2 × 5 = 10 Weightag

Section C

Answer any ***four*** questions. Each question carries 3 weightage.

13. (a) Write a program to input a number and print its factorial.
    (b) Write a program to calculate the cube of all numbers from 1 to a given number.
14. Determine the quadratic splines satisfying the data points given below. (1,8) (2,1) and (3,18).
15. Write a program in python to solve the following integral using trapezoidal method with step size=0.25

$$\int_0^1 \frac{dx}{1+x^2}$$

16. Explain the closed domain methods used to solve non-linear equations.
17. Using shooting method, solve $d^2y/dx^2=6x$, $y(1)=2$ and $y(2)=9$ in the interval (1,2)
18. Write in detail about FFT and DFT.
19. Write a python program to find value of π using Monte-Carlo simulations technique.

(4 × 3 = 12 Weightag

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