22P209 (Pages: 2) Name: .....

Reg.No: .....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2023

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P PHY2 C08 - COMPUTATIONAL PHYSICS

(Physics)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Section A

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

1. Differentiate between script mode aand interactive mode in python.
2. Differentiate between iterative construct and selection construct.
3. Write about the different types of functions in python.
4. With suitable example explain the difference between resize() and reshape() functions.
5. Write a python program to plot exp(x) and draw its graph.
6. What do you mean by spline interpolation? What are the various types?
7. What do you mean by initial value problems? Give an example.
8. A body is falling under gravity. Estimate the velocity and position after 6 second, considering the variations in the gravitational field. Do the calculations at an interval of 1 second.

(8 × 1 = 8 Weightage)

Section B

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

9. Explain strings,lists,tuples and dictionaries in python.
10. Expalin the following operation on a matrix with examples and codes of python : multiplication, transpose, trace, inverse, inner product and cross product.
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 D.E
    dy/dx= 2y/x is with an initial value y(1)=2. Estimate y(1.25) with a step size 0.25.
12. Explain the motion of an Ideal Simple Harmonic Oscillator using Euler method.

(2 × 5 = 10 Weightage)

Section C

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

13. Explain ‘Inputs and Outputs, Variables, operators, expressions and statements’ in python language.

14. Expain the Newton's difference method for numerical differentiation.

15. Appoximate the area under the curve y=f(x) between x=0 and x=8 using trapezoidal rule with n=4 subintervals.A function f(x) is given in the table of values.

x	0	2	4	6	8
f(x)	3	7	11	9	3

16. How can you perform numerical integration using Monte-Carlo method?

17. Solve the BVP using equilibrium method, $y''=12x^2$, $y(0)=0$ and $y(1)=0$.

18. Explain the eigenvalue boundary value problems.

19. Explain how to solve a two dimensional problem by Euler's method with suitable example?

(4 × 3 = 12 Weightage)

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