

23P209

(Pages: 2)

Name:

Reg.No:

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2024

(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. Briefly write down the steps involved in the development of a computer program.
2. Write a programme WAP to input a number and check if it is a perfect number or not.
3. Define modules in python. What are the best practices of importing modules in a python program?
4. Explain different array modification techniques with suitable examples ?
5. How to perform cross product and dot product in numpy arrays.? Explain with codes of python
6. The velocities of a car running on a straight road at intervals of 2 minutes are given below. Find the distance covered using Simpson's rule.

Time	0	2	4	6	8	10	12
Velocity	0	22	30	27	18	7	0

7. Briefly explain the Numerov's method of solving a boundary value problem.
8. Write the theory to simulate radioactivity using Monte-Carlo method.

(8 × 1 = 8 Weightage)

Section B

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

9. Explain different data types in python with examples.
10. Explain the matplotlib module with its various preparatory and plotting functions.
11. Explain the finite equilibrium method and shooting method used to solve boundary value problems.
12. With help of Python codes, explain the numerical method of tracking the motion of a projectile with air drag by 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. Find the cubic polynomial with given set of points.

x	0	1	2	3
f(x)	5	6	3	14

15. Certain experimental values of x and y are given. If $y=a_0+a_1x$, find the approximate values of a_0 and a_1 .

x	0	2	5	7
y	-1	5	12	20

16. Write a programme WAP in python to solve the equation $f(x)=x^3-x-1$ using the bisection method.

17. Explain the Euler method used to solve ordinary differential equation.

18. Write a programme WAP in python to solve the differential equation $dy/dx = -y^2$ at $y(2)$, given that $y(1)=1$, by 2nd order R-K method. Choose step size=0.2

19. A gently placed metallic ball of radius 0.05 m and mass 1 kg is moving down in a liquid with a coefficient of viscosity 0.7 PaS. Estimate the position and velocity after 0.75 second under the influence of viscous force. Use a step size of 0.25.

(4 × 3 = 12 Weightage)
