

D 110234

(Pages : 2)

Name.....

Reg. No.....

**FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2024**

Physics/Applied Physics

PHY 5B 06/APH 5B 06—COMPUTATIONAL PHYSICS

(2019 Admission onwards)

Time : Two Hours

Maximum : 60 Marks

The symbols used in this question paper have their usual meanings.

Section A (Short Answer Type)

*Answer all questions in two or three sentences.
Each correct answer carries a maximum 2 marks.*

1. What is an algorithm ? Write an algorithm to read two numbers and print their sum.
2. What are the different data types in python ?
3. How to add comments in python. What is the importance of comments in programming ?
4. What is a tuple ? How is it different from 'list'.
5. Write down Newton-Raphson formula.
6. What is the significance of computers in numerical simulations ?
7. Write down the output of the following :
 - (a) $3.4//3$.
 - (b) $3.4 \% 3$.
8. How do you create a two dimensional array using Numpy ? Give an example.
9. Write the output of the following commands
 - (a) `print("hello", "world", sep="---")`.
 - (b) `x=2; x+=2; print(x)`.
10. Write a program, using a function to read a velocity in kilometers per hour and print it in meters per second.

Turn over

11. Write a program to create a one dimensional array of numbers from 0 to 9 using numpy.
12. Write down the commands for labeling axes and choosing line styles in plots using Matplotlib.

Section B (Paragraph / Problem Type)

(Answer all questions in a paragraph of about **half a page to one page**, each correct answer to a maximum of 5 marks).

13. Write a program to draw the position time graph for a freely falling object.
14. Find the real root of the equation $x^3 - x - 11 = 0$ by using the bisection method.
15. Apply Runge Kutta method to find an approximate value of $y(0.2) = 0$, given $y' = x$ and $y(0) = 1$.
16. Write a python program to read two 3×3 matrices and print the matrix product of them using Numpy for the same.
17. Write a program to solve $y' = \cos(x)$, given $y(0) = 0$. Add code to plot the solution.
18. Evaluate $I = \int_0^6 \frac{1}{1+x} dx$ using Simpson's rule.
19. Write a program to graphically simulate the radioactive decay of an element where initial amount and half life is given.

Section C (Essay Type)

Essays - Answer in about **two pages**, any one question.

The question carries 10 marks.

20. Explain Newton's interpolation formula. The population of a town in the census is as follows. Estimate the population for the year 1965 using Newton's forward interpolation formula.

Year	:	1961	1971	1981	1991	2001
Population	:	46	66	81	93	101

21. Given $\frac{dy}{dx} = x^2 - y$, $y(0) = 1$, find $y(0.1)$ correct to 3 decimal places using Euler method and Runge-Kutta method. Write programs for both the methods.