

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2022

(Regular/Improvement/Supplementary)

PHYSICS

GPHY5B06T: COMPUTATIONAL PHYSICS

Time: 2 Hours

Maximum Marks: 60

SECTION A: Answer the following questions. Each carries *two* marks.

(Ceiling 20 Marks)

1. Which are the two modes of using python?
2. Write python instruction to read a list from keyboard and save it as x.
3. List arithmetic operators in python.
4. Explain range () in python.
5. Explain how to find union and intersection of two sets using python.
6. What is the output of the code;


```
f=1
for i in range(2,5):
    f=f*i
print(f)
```
7. With suitable example, explain any two conditional operators in python.
8. How matrices are created using numpy? Give one example.
9. Write the python instruction to add label to the axes in plots generated using matplotlib
10. Explain any two array operations.
11. What do you mean by curve fitting? Name any curve fitting technique.
12. Write the Taylor series expansion of $\sin(x)$.

SECTION B: Answer the following questions. Each carries *five* marks.

(Ceiling 30 Marks)

13. Write a python program to read an integer from the keyboard and print its factorial.
14. With suitable example, explain file input and file output in Python.
15. Write a python program to plot $\exp(x)$, for $0 \leq x \leq 10$.
16. Find $\int_0^1 y \, dx$ using Simpson's $1/3^{\text{rd}}$ rule from the table given below.

x	0	0.25	0.50	0.75	1.00
y	0	0.5625	1.25	2.0625	3.0

17. Using newton -Raphson method, solve the equation $x^3 - x^2 - 2 = 0$. Take $x=1.5$ as the initial guess of the root.
18. Write a brief note about the use of numerical methods in the study of physical systems and phenomenon using computer simulations.
19. Write the second order differential equations which represent the motion of a Projectile. Explain the steps involved in the simulation of a projectile.

(PTO)

SECTION C: Answer any one question. Each carries ten marks.

20. Derive Newton's forward difference interpolation formula. Use it to find the value of y at $x=0.5$, from the set of tabulated values of y given below.

x	0	1	2	3	4	5
y	0	-1	0	3	8	15

21. With necessary theory, explain the simulation of free fall. Write a python code to read the initial height and print the time of fall and velocity with which the body hits the ground.

(1×10 = 10 Marks)