SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2020
(CUCBCSS-UG)
(Regular/Supplementary/Improvement)
CC15U PH6 E01 - COMPUTATIONAL PHYSICS
Physics - Elective Course
(2015 Admission onwards)

Time: Three Hours   Maximum: 80 Marks

Section A
Answer *all* questions in a word or a phrase. Each question carries 1 mark.

1. Human readable form of program is known as ………………

2. In Python, the result of 17%4.0 is ………………

3. What does the following print?

    x = 10 / 4

    y = 5 / 2.0

    print x + y

4. The output of ['23!'] * 4 is ………………

5. The formatted string %-4d stands for ………………

Write True or False:

6. A list may contain elements of different types.

7. *fab(x)* is a function in python math module.

8. Function convert a string to a tuple in python is *tup(str).*

9. The output of print str[2:6], if str = 'Hello World!' is 'llo W'

10. A set is a mutable data type.

(10 x 1 = 10 Marks)

Section B
Answer *all* questions in two **or** three sentences. Each question carries 2 marks.

11. Distinguish between linspace and arange.

12. How sets are created in python? Discuss the different set functions in Python.

13. Explain how 'infinite looping' is achieved in python.

14. What are the steps involved in the development of program?

15. What are the advantages of numerical method over analytical method?

16. Explain the difference between 'read' and 'readline'.

17. Explain the concept of discretisation.   **(7 x 2 = 14 Marks)**

Section C
Answer any *five* questions in a paragraph. Each question carries 4 marks.
18. Explain the read and write operations in a file.
19. Discuss the various operators in Python and discuss its precedence.
20. Compare between lists and dictionaries in Python.
21. What is pickling?
22. Explain the concept of difference table with an example.
23. Explain Newton's forward difference interpolation formula.
24. Explain why proper selection of step size is important in numerical methods.

(5 x 4 = 20 Marks)

Section D
Problems- write all relevant formulas, all important steps carry separate marks
Answer any *four* questions. Each question carries 4 marks.
25. Discuss a Python program to check whether the given word is a palindrome.
26. Develop a Python program for evaluating sin(x) using Taylors series expansion accurate for a particular number of decimal places.
27. Write a program for solving the quadratic equation with 'nested if'.
28. Make a tabulated chart of time, acceleration, velocity and position of a freely falling body under gravity up to 1.2 sec, by considering the opposing air drag. Solve by Euler method with a time step of 0.3 sec. Coefficient of drag= 0.4, Density of air = 1.3 kgm^{-1}, Radius of body = 0.6m, Mass of body= .5 kg.
29. Write a program to solve differential equation $\frac{dy}{dx} = xy$ using 2nd order Runge Kutta Method.
30. Using Newton- Raphson method, find the root of $x^2 - 5x + 6$
31. Fit a straight line to the following data using least square approximation method.

x	3	5	8	10	14	15	18	22	23
y	3	4	8	12	13	17	20	20	24

(4 x 4 = 16 Marks)

Section E
Write an essay on any *two* questions. Each question carries 10 marks.
32. With suitable examples, explain different flow controls in Python.
33. Differentiate between functions and modules in python and discuss them with suitable examples.
34. Write a python program to tabulate the time, acceleration velocity and position of a projectile motion of body considering the combined effect of air drag and variation of acceleration due to gravity.
35. Explain the method of numerical integration for a given function. Develop a Python program for it.

(2 x 10 = 20 Marks)

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