16P209 (Pages:2) Name:.....

Reg.No:.....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, MAY-2017

(Regular/Supplementary/Improvement)

(CUCSS - PG)

CC15P PHY2 C08 - COMPUTATIONAL PHYSICS

(Physics)

(2015 Admission Onwards)

Time: Three Hours Maximum: 36 Weightage

Section A

Answer ***all*** questions

1. Discuss the main features of Python language
2. Explain different data types in python.
3. What is a function? How user defined functions are handled in Python?
4. Discuss file operations in Python.
5. Explain different methods of creating arrays in Python.
6. How matrices can be saved and restored using Python?
7. Discuss any one method of solving simultaneous equation using Python.
8. What are sub-plots? How sub-plots are created using Python.
9. What are polar plots? How is it generated in Python?
10. Discuss the interpolation with cubic spline and give its merits.
11. What is the importance of sampling? What is its importance in numerical integration?
12. What are the steps involved in simulating a physical problem?

(12 x 1 = 12 weightage)

Section B

Answer ***any two*** questions

13. Discuss with necessary examples, the different methods of implementing selection (conditional) structure in Python.
14. (a) Explain various functions used in *matplotlib* for visualisation in python . (b) Write a Python program for plotting Gamma function.
15. With suitable example explain the shooting and relaxation methods. What are the advantages of Relaxation Method over Shooting method?

16. (a) Explain the fourth order Runge-Kutta method for solving differential equations. (b) Develop a program for solving driven LCR circuit problem using Runge-Kutta method.

(2 x 6 =12 weightage)

Section C

Answer ***any four*** questions

17. With necessary theory, write a Python program for evaluating *cos(x)* using Taylor series expansion accurate for four decimal places.
18. Write a program for solving and printing the solution of a set of simultaneous equations of three variables by entering the coefficients as input.
19. Find the inverse of a function $f(x) = -\frac{1}{3}x + 1$
20. Given $S(x) = \begin{cases} x^3 + ax^2 - 4x + c & 0 \le x \le 2 \\ -x^3 + 9x^2 + bx + 34 & 2 \le x \le 4 \end{cases}$

    Find the constants a, b and c such that $S(x)$ is twice continuously differentiable on the interval [0, 4]
21. Write a Python program to simulate the central force motion
22. With necessary theory discuss a Python program to simulate radioactivity using Monte-Carlo method and compare with standard theoretical expression.

(4 x 3 = 12 weightage)

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