C 80036

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Name..................................

Reg. No........49........

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH/APRIL 2015

(U.G.—CCSS)

Core Course—Physics

PH 6B 19—COMPUTATIONAL PHYSICS

Time : Three Hours

Maximum : 30 Weightage

Section A

Answer all questions.

Each question carries ¼ weightage.

1. ———— is the physical aspect of the computer that can be seen :

    (a) Hardware.

    (b) Software.

    (c) Operating system.

    (d) Application program.

2. ———— translate high level language to low level language.

    (a) Assembler.

    (b) Compiler.

    (c) CPU.

    (d) Operating system.

3. Python was created by ————.

4. ———— is interpreted.

    (a) Python.

    (b) C++.

    (c) C.

    (d) Java.

5. To start python from the command prompt, use the command :

    (a) Execute python.

    (b) Run python.

    (c) Python.

    (d) Go python.

6. The order of error in Runge Kutta method is :

    (a) 2.

    (b) 3.

    (c) 4.

    (d) 5.

7. Which of the following programme no variable or argument declaration are necessary ?

    (a) C.

    (b) C++.

    (c) FORTRAN.

    (d) Python.

Turn over

8. Simpsons 1/3rd rule is :

    (a) First order.
    (b) Second order.
    (c) Third Order.
    (d) Fourth order.

9. In the following python code

    n = 1

    prnt n++ :

    (a) Line 1 has error.
    (b) Line 2 has error.
    (c) Both line has error.
    (d) Both lines has no errors.

10. The absolute error in Bisection methods is :

    (a) $\dfrac{1}{|b-a|}$.
    (b) $1/2^n$.

    (c) $|b-a|2^n$.
    (d) $\dfrac{|b-a|}{2^n}$.

11. What is the order of error in the expression $D^2 = h^{-2}\left(\delta^2 - \delta^4/12\right)$?

    (a) $0\left(h^2\right)$.
    (b) $0\left(h^3\right)$.

    (c) $0\left(h^4\right)$.
    (d) $0\left(h^5\right)$.

12. What is $(1+\Delta)^{-1}$?

    (a) $1 - \nabla$.
    (b) $1 + \Delta$.
    (c) $1 + \nabla$.
    (d) None of the above.

$(12 \times \frac{1}{4} = 3 \text{ we}$

Section B

Answer all **nine** *questions.*
Each question carries a weightage 1.

13. Write a programe in Python to print all the contents of a file.

14. Demonstrate the use of exception handling in Python.

15. Write a short python program to check whether the given no. is odd or even.

16. Explain how 'infinite looping' is achieved in python language.

17. Briefly explain the use of range ( ) function in Python.

18. Explain the different uses of tuples.

19. What is meant by curve fitting ?

20. List the advantages of numerical methods from analytical methods.

21. Find the root of the equation $3x = \cos x + 1$ between 0 and 1 $x_0 = 0.6$ by Newton-Raphson method.

$(9 \times 1 = 9 \text{ weightage})$

Section C

Answer any **five** *questions.*
Each question carries weightage 2.

22. Distinguish between looping through dictionaries and through a sequence.

23. With suitable example explain del statement in Python.

24. Name a module that is not included in python by default and declare it.

25. With suitable example in python explain the main operation on a dictionary.

26. Find the numerical approximate value of the integral $\int\limits_{0}^{2} x^{1/3}\, dx$ using the trapezoidal rule with eight increments.

27. Using Simpson one-third rule, find the value of the integral $\int\limits_{0}^{1} \dfrac{dx}{1+x}$ correct to third decimal place. Take $h = 0.5$.

28. Find the numerical solution of the differential equation $\dfrac{dy}{dx} = x + y$ from $x = 0$ to $x = 0.2$ by Euler's method.

$(5 \times 2 = 10 \text{ weightage})$

Section D

Answer any **two** *questions.*
Each question carries weightage 4.

29. (a) Discuss the bisection (half interval) method for solving a transcendental equations.

(b) Write a python program for solving the equation $xe^x = 3$ correct to three decimals using bisection method.

30. Write a program to obtain the numerical solution for a two-body problem in the central force field. Use the Euler method and save data into file format.

31. Write a python program to simulate two dimensional projectile motion of a body moving under gravity. Use Euler's method.

$(2 \times 4 = 8)$