Department of CSA, Sambalpur University
Python Programming
Lab Manual-1

1. Write a program to find the square root of a floating-point number.

2. Write a Python program to convert temperature in degree Celsius to degree Fahrenheit. If water boils at 100 degree C and freezes as 0 degree C, use the program to find out what is the boiling point and freezing point of water on the Fahrenheit scale.
   $(Hint: T(°F) = T(°C) \times 9/5 + 32)$

3. Write a Python program to calculate the amount payable if money has been lent on simple interest. Principal or money lent = P, Rate of interest = $R\%$ per annum and Time = T years. Then Simple Interest $(SI) = (P \times R \times T)/100$.
   Amount payable = Principal + SI.
   P, R and T are given as input to the program.

4. Write a program to calculate in how many days a work will be completed by three persons A, B and C together. A, B, C take x days, y days and z days respectively to do the job alone. The formula to calculate the number of days if they work together is $xyz/(xy + yz + xz)$ days where $x, y,$ and z are given as input to the program.

5. Write a program to swap two numbers using a third variable.

6. Write a program to swap two numbers without using a third variable.

7. Write a program to find sum and average of three numbers.

8. The volume of a sphere with radius r is $\frac{4}{3}\pi r^3$. Write a Python program to find the volume of sphere with radius $7cm$, $12cm$, $16cm$, respectively.

9. The volume of a sphere with radius r is $\frac{4}{3}\pi r^3$. Write a Python program to find the volume of sphere with radius r taken as input from user.

10. Write a program that asks the user to enter their name and age. Print a message addressed to the user that tells the user the year in which they will turn 100 years old.

11. The formula $E = mc^2$ states that the equivalent energy (E) can be calculated as the mass (m) multiplied by the speed of light $(c = about\ 3 \times 10^8\ m/s)$ squared. Write a program that accepts the mass of an object and determines its energy.

12. Presume that a ladder is put upright against a wall. Let variables length and angle store the length of the ladder and the angle that it forms with the ground as it leans against the wall. Write a

Python program to compute the height reached by the ladder on the wall if the values of length and angle are entered by the user.

13. Write a program to find the value of the polynomial $P(x) = 3x^5 + 3x^4 - 4x^3 + 10$. The value of x is input by the user.

14. Write a program to find the total price of an item, if quantity and price per quantity is entered by the user.

15. Write a program to find the area of triangle with sides a, b and c. Use Heron's formula as follows:

$$Area\ of\ \Delta = \sqrt{s(s-a)(s-b)(s-c)}, where\ s = \frac{a+b+c}{2}$$

16. Find the value of the Sigmoid function $S(x) = \frac{1}{1+e^{-x}}$ at $x = n$, where n is entered by the user.

17. Find the $\mathbf{n^{th}}$ Fibonacci number. The $\mathbf{n^{th}}$ Fibonacci number is given as follows:

$$F(n) = \frac{(\varphi)^n - (-\frac{1}{\varphi})^n}{\sqrt{5}}, \text{ where } \varphi = \frac{1+\sqrt{5}}{2}$$

18. Write a program to find the sum, difference, product and average of two complex numbers. Two complex numbers are entered by the user. The format of the complex number is $a + bj$, where a and b are real numbers.

19. Find the absolute value of a complex number $c = a + bj$.

20. Find the Euclidean distance between two points (a, b) and (c, d). The distance formula is given as follows:

$$Euclidean\ Distance = \sqrt{(c-a)^2 + (d-b)^2}$$

21. Find the gravitational force between earth and sun. The gravitational force is given as follows:

$$F = \frac{GMm}{r^2}$$

Where, M = Mass of sun $(2 \times 10^{30}\ Kg)$
m = Mass of earth $(6 \times 10^{24}\ Kg)$
r = Distance between earth and sun $(1.5 \times 10^{11}\ m)$
G = Gravitational Constant (6.67×10^{-11})

22. In Tokyo Olympic Neeraj Chopra threw javelin at an angle of 46 degree with initial velocity of $29.378\ m/sec$. Write a python program to find the horizontal distance of the javelin threw by Chopra. Use the formula given below:

Horizontal distance of the projectile = $\frac{u^2 \sin(2\theta)}{g}$ Where,

u = initial velocity of the projectile
θ = angle of the initial velocity from the horizontal plane in radian
g = acceleration due to gravity