***Applied Physics Lab Activity -4 and 5***

1. Write a function **Calculation ()** such that it can accept two variables and calculate the addition and subtraction of it. And also it must return both addition and subtraction in a single return call
2. Write a function **Projectile ()** such that it can accept two variables initial velocity and angle and calculate the Maximum Height and Range of projectile. And also it must return both Maximum Height and Range in a single return call. Also plot the graph of Maximum Height and Range with respect to angle from 0 to 360 degree using matplotlib.
3. Write a function **SHM()** such that it can accept four variables (amplitude , angular frequency , phase constant , time ) and return displacement , velocity ,and acceleration in a single call.

x = xm Cos (ɷt + φ)

v = - xm ɷ Sin (ɷt + φ)

a = xm ɷ2 Cos (ɷt + φ)

Also plot the graph of displacement, velocity, and acceleration of SHM with respect of time (set time according to your choice).

1. Create a 5X2 integer array from a range between 100 to 200 such that the difference between each element is 10.
2. Following is the input NumPy array delete column two and insert following new column in its place.

import numpy

sampleArray = numpy.array([[34,43,73],[82,22,12],[53,94,66]])

newColumn = numpy.array([[10,10,10]])

Expected Output:

Printing Original array

[[34 43 73]

[82 22 12]

[53 94 66]]

Array after deleting column 2 on axis 1

[[34 73]

[82 12]

[53 66]]

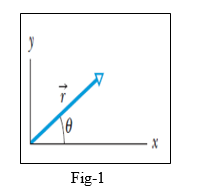
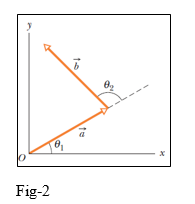
Array after inserting column 2 on axis 1

[[34 10 73]

[82 10 12]

[53 10 66]]

1. Do the following vectors problem in Python coding.
2. A displacement vector in the xy plane is 7.3 m long and directed at angle of 30° in Fig.1. Determine (a) the x component and (b) the y component of the vector.

1. The two vectors a and b in Fig-2 have equal magnitudes of 10m and the angles are θ1= 30⁰ and θ1= 105⁰. Find the (a) x and y components of their vector sum r (b) the magnitude of r and (c) the angle r makes with the positive direction of the x axis.
2. Three vectors ***a , b*** and ***c*** each have a magnitude of 50 m and lie in an xy plane. Their directions relative to the positive direction of the x axis are 30°, 195°, and 315°, respectively. What are (i) the magnitude and the angle of the vector ***a+b+c*** , and (ii) the magnitude and the angle of ***a-b+c***? What are the (iii) magnitude and angle of a fourth vector ***d*** such that ***(a+b ) – (c+d) = 0*** ?
3. Find the angle between the vector A= 2i -3j+5k and the x, y,and z axes, respectively.
4. Calculate the angle between “r” and the positive z-axis. (c) Find the angle between “a” and “b”. where, a = 5i +4j -6k , b= -2i +2j+3k and c = 4i+3j+2k , r = a+b+c.