| Course Code: NS(1001) | Course Name: Applied Physics |
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| Instructor Name / Names   Rabia Tabassum | |
| Student Roll No& Section | Submission deadline 19-09-2023 |

## *Instructions for Submission:*

1. *Soft copy only*
2. *You are required to Submit Assignment in softcopy on Google classroom.*
3. ***Strictly follow the deadline***

1. An automobile travels on a straight road for 40 km at 30 km/h. It then continues in the same direction for another 40 km at 60 km/h. (a) What is the average velocity of the car during the full 80 km trip? (Assume that it moves in the positive $x$ direction.) (b) What is the average speed? (c) Graph $x$ versus $t$ and indicate how the average velocity is found on the graph.

2. An object is launched vertically upward with an initial velocity of 30 m/s. Calculate the time it takes for the object to reach its maximum height, and then calculate the total time it spends in the air before hitting the ground. (Assume g = 9.8 m/s²)

3. A car moving with constant acceleration covers a distance of 50m between two points in 5 sec. Its velocity as it passes the second point is 16m/sec. (a) What is its acceleration? (b) What was its velocity as it passed the first point?

4. The position of an object moving along an $x$ axis is given by
   $$X = 3t - 4t^2 + t^3,$$
   where $x$ is in meters and $t$ in seconds. Find the position of the object at the following values of $t$: (a) 1 s, (b) 2 s,(c) 3 s, and (d) 4 s. (e) What is the object's displacement between $t$ _ 0and $t$ _ 4 s? (f) What is its average velocity for the time interval from $t$ _ 2 s to $t$ _ 4 s? (g) Graph $x$ versus $t$ for 0 _ $t$ _ 4 s and indicate how the  answer for (f) can be found on the graph.
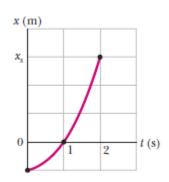
5. A particle moves along the x axis  according to the equation
   $$x = 21 t + 5 t^2,$$
   where x is in meters and t  is in  seconds. Calculate
   (a) the average velocity of the particle during the first 3 sec of its motion,
   (b) the instantaneous velocity of the particle at t = 3 sec, and
   (c) the instantaneous acceleration of the particle at t =3sec.

6. A particle rotates counterclockwise in a circle of radius 5 m with a constant angular speed of 12 rad/s. At t=0, the particle has an $x$ coordinate of 1.5m and is moving to the right. (a) Determine the $x$ coordinate as a function of time. Find the x component of particle's velocity and acceleration at any time 't'.

7. Figure depicts the motion of a particle moving along an $x$ axis with a constant acceleration. The figure's vertical scaling is set by $x_s$_6.0 m. What are the (a) magnitude and (b) direction of the particle's acceleration?



x (m)

8. An ion's position vector is initially
   $$r = 5i -6j +2k ,$$
   and 10 s later it is
   $$r = -2i+8j-2k ,$$
   all in meters. In unit vector notation, what is its velocity and acceleration during the 10 s?

9. The position :$r$ of a particle moving in an $xy$ plane is given
   $$r = (2t^3-5t) i - (6-7t^4)j$$

   with r in meters and t in seconds. In unit-vector notation, calculate (a) r, (b)v , and (c)a for $t$ 2.00 s. (d) What is the angle between the positive direction of the $x$ axis and a line tangent to the particle's path at $t$ 2.00 s?

10. A ball is shot from the ground into air . At a hieght of 9.1 m , its velocity is
    $$V = (7.6i + 6.1j )m/s$$

    with "i" horizontal and "j" upward. (a) To what maximum height does the ball rise? (b) What total horizontal distance does the ball travel? What are the (c) magnitude and (d) angle (below the horizontal) of the ball 's velocity just before it hits the ground?