DAV Public School, Thermal Colony, Panipat
Assignment Chapter – 4 (Motion in a Plane)

Q1: A body is thrown horizontally from the top of a tower and strikes the ground after three sec. at an angle of 45^o with the horizontal. Find the height of the tower and the speed with which the body was projected. Ans: [29.4m/sec]

Q2: A bomb is dropped from an aeroplane when it is directly above a target at a height of 1000m. the aeroplane is moving horizontally with a speed of 500 km/hr. by how much distance will the bomb miss the target. Ans: [1984.13m]

Q3: Two tall buildings face each other and are at a distance of 180 m from each other. With what velocity must a ball be thrown horizontally from a window 55 m above the ground in one building, sothat it enters a window 10.9 m above the ground in the second building? Ans [60 m/sec.]

Q4: A balls rolls off the top of a stairway with a constant velocity u. if the steps are h meter high and w meter wide, show that the ball will just hit the edge of nth step if $n = 2hu^2/gw^2$.

Q5: A cricketer can throw a ball to a maximum horizontal distance of 100 m. how high above the ground can the cricketer throw the same ball? Ans: [50m]

Q6: The ceiling of a long hall is 25 m high . what is the maximum horizontal distance that a ball thrown with a speed of 40 m/sec. can go without hitting the celing of the hall. Ans:[150.7 m]

Q7: A bullet fired at an angle of 30^o with the horizontal hits the ground 3 km away. By adjusting the angle of projection, can one hope to hit a target 5 km away? Assume the muzzle speed to be fixed and neglect the air resistance. Ans:(3.46 km)

Q8: A projectile has a range of 50 m and reaches a maximum height of 10 m. calculate the angle at which the projectile is fired. Ans: (38.66)

Q9: Find the angle of projection for which the horizontal range and the maximum height are equal. Ans: (75.58)

Q10: A machine gun is mounted on the top of a tower 100 m high . at what angle should the gun be inclined to cover a maximum range of firing on the ground below? The muzzle speed of the bullet is 150 m/sec, take $g = 10$ m/sec^2. Ans: (43.7)

Q11: A body of mass 10 kg revolves in a circle of diameter 0.40 m, making 1000 revolutions per minute. Calculate its linear velocity and centripetal acceleration. Ans: $\frac{2000\pi^2}{9}$ m/s^2

Q12: A stone is tied to the end of a string 80 cm long is whirled in a horizontal circle with a constant speed. If the stone makes 14 revolutions in 25 sec, what is the magnitude and direction of acceleration of the stone? Ans:(88/25 rad/sec., 991.2 cm/ sec ^{2})

Q13: A cyclist is riding with a speed of 27 km/hr. As he approaches a circular turn on the road of radius 80 m , he applies brakes and reduces his speed at the constant rate 0.5 m/sec, what is the magnitude and direction of the net acceleration of the cyclist on the circular turn.Ans: (0.86 m/sec ^{2}, 54.28)

Q14: The radius of the earth's orbiting around sun is $1.5 * 10^{11}$ m . calculate the angular and linear velocity of the earth. Through how much angle does the earth revolve in 2 days. Ans:($1.99* 10^{-7}$ rad/sec, 2.99 m/sec., 0.0344 rad)

Q15: What will be the effect on maximum height of a projectile when its angle of projection is changed from 30^0 to 60^0, keeping the same initial velocity of projection?

Q16: What is the angle of projection for a projectile motion whose range R is n times the maximum height H?

Q17: Find the angle between the vectors A= I + 2j –k and B = -I +j-2k .

Q18: Prove that the vectors A = i+ 2j +3k and B = 2i –j are perpendicular to each other.

Q19: One of the rectangular component of a velocity of 80 km/hr is 40 km/hr. find the other component. Ans: 69.28 km/h

Q20: An aeroplane takes off at an angle of 30^o to the horizontal. If the component of its velocity along the horizontal is 250 km/hr, what is the actual velocity? Find also the vertical component. Ans: 288.67 km/h, 144.33 km/hr