1. (d) Average velocity 
2. (d) The relative velocity of policeman *w.r.t.* thief .

∴ Time taken by police to catch the thief =100 *sec*

1. (b) Let car *B* catches, car A after ‘*t*’ sec, then



⇒ ⇒ 

 

1. (b) Let the particle moves toward right with velocity 6 *m/s.* Due to retardation after time its velocity becomes zero.

# A

*B*

*u* =6 *m/s*

### t*1*

*O*

# C

1sec

From ⇒  ⇒ 

But retardation works on it for 4 *sec.* It means after reaching point *A* direction of motion get reversed and acceleration works on the particle for next one second.





  

Now velocity of the particle at point *B* in return journey



In return journey from *B* to *C*, particle moves with constant velocity 2 *m/s* to cover the distance 8*m.*

Time taken 

Total time taken by particle to return at point *0* is ⇒.

1. (b) The velocity of balloon at height *h,* 

When the stone released from this balloon, it will go upward with velocity *v* = (Same as that of balloon). In this condition time taken by stone to reach the ground

 



1. (b) For vertically upward motion, and for vertically down ward motion, 

 Total distance covered in *t* sec .

1. (d) Let height of tower is *h* and body takes *t* time to reach to ground when it fall freely.

  …(i)

In last second *i.e. sec* body travels = 0.36 *h*

It means in rest of the time *i.e.* in *sec* it travels



Now applying equation of motion for (*t* – 1) *sec*

** …(ii)

From (i) and (ii) we get,  and 

1. (a) For first marble, 

*t*=4*s*

*t*=0

*t*=1*s*

*t*=2*s*

*t*=3*s*

*h*2

*h*3

*h*1

*h*4

For Second marble, 

For third marble, 

For fourth marble, 

∴ = 35*m*.

and .

1. (b)
2. (c) Difference in K.E. = Difference in P.E. = 2*mgr*
3. (b) 
4. (b)  = 
5. (c) Equation of trajectory for oblique projectile motion



Substituting  and 



1. (c) Total time of flight 

Time to cross the wall = 3 *sec* (given)

Time in air after crossing the wall = (5 – 3) = 2 *sec*

∴ Distance travelled beyond the wall 



1. (b) Change in momentum==
2. (c) The vertical components of velocity of both the balls will be same if they stay in air for the same period of time. Hence vertical height attained will be same.
3. (a)  given

We know ⇒ 

From triangle we can say that ,

∴ Range of projectile 

1

2

√5

*θ*

 = .

1. (a) 

Number of protons = (*Z* = 13)

Number of neutrons = (*A* – 36) – (*Z* – 13) = (*A* – *Z* – 23)

∴ 

1. (a) You must remember that *t*1/2 is time in which substance decays half. Hence in *t*3/4 time substance decays .
2. (b) In 10 *sec,* number of nuclei has been reduced to one fourth (25% to 6.25%).

Therefore it’s half life is *T*1/2 = 5 *sec*.

∴ Mean life = 7.21 *sec.*

1. (b) By using 



⇒ *A* = 56 so *Z* = 56 – 30 = 26.

1. (c) The activity  ⇒ 

Taking the ratio of this expression for  to this same expression for 



*i.e.* the two samples contains equal number of nuclei.

1. (b) Because the neutron has no electric charge, it experience no electric repulsion from a *U*235 nucleus. Hence a slow moving neutron can approach and enter a *U*235 nucleus, thereby providing the excitation needed to trigger fission. By contrast a slow moving proton feels a strong repulsion from a *U*235 nucleus. It never get's close to the nucleus, so it cannot trigger fission.
2. (d) After one half life period, the activity of Tritium becomes 50%.

After 2 half life period 25%

After 3 half life period 12.5%

After 4 half life period 6.25%

After 5 half life period 3.12% ≈ 3%

It is 5 × 12.5 years + 7 years *i.e.* approximately 70 years only .

1. (d) Equivalent circuit can be redrawn as follows

12*k*Ω

10 *V*

*i*1

14*k*Ω

2*k*Ω

*i*2

*i*



*i*1 = 0

1. (c) In space charge limited region, the plate current is given by Child's law 

Thus, 

or = 10 × 8 *mA* = 80 *mA*.

1. (a) Use 

Now 

Therefore, 

1. (a) In sodium chloride the  and  ions both have noble gas electron configuration corresponding to completely filled bands. Since the bands do not overlap, there must be a gap between the filled bands and the empty bands above them, so *NaCl* is an insulator.
2. (b) Pure *Cu* is already an excellent conductor, since it has a partially filled conduction band, furthermore, *Cu* forms a metallic crystal as opposed to the covalent crystals of silicon or germanium, so the scheme of using an impurity to donate or accept an electron does not work for copper. In fact adding impurities to copper decreases the conductivity because an impurity tends to scatter electrons, impeding the flow of current.
3. (b) 

⇒ 15 = 7 + *IC* × 2 × 103 ⇒ *iC* = 4 *mA*

 ⇒ 