1. **A body of mass 2 *kg* slides down a curved track which is quadrant of a circle of radius 1 *metre*. All the surfaces are frictionless. If the body starts from rest, its speed at the bottom of the track is**

1*m*

1*m*

(a) 4.43 *m*/*sec*

(b) 2 *m*/*sec*

(c) 0.5 *m*/*sec*

(d) 19.6 *m*/*sec*

1. **A bullet of mass *m* moving with velocity *v* strikes a suspended wooden block of mass *M*. If the block rises to a height *h*, the initial velocity of the block will be**

(a)  (b)  (c)  (d) 

1. **A body of mass  moving with uniform velocity of 40 *m*/*s* collides with another mass  at rest and then the two together begin to move with uniform velocity of 30 *m*/*s*. The ratio of their masses  is**

(a) 0.75 (b) 1.33 (c) 3.0 (d) 4.0

1. **Six identical balls are lined in a straight groove made on a horizontal frictionless surface as shown. Two similar balls each moving with a velocity *v* collide elastically with the row of 6 balls from left. What will happen**

*v*

→

(a) One ball from the right rolls out with a speed 2*v* and the remaining balls will remain at rest

(b) Two balls from the right roll out with speed *v* each and the remaining balls will remain stationary

(c) All the six balls in the row will roll out with speed *v*/6 each and the two colliding balls will come to rest

(d) The colliding balls will come to rest and no ball rolls out from right

1. **A wooden block of mass *M* rests on a horizontal surface. A bullet of mass *m* moving in the horizontal direction strikes and gets embedded in it. The combined system covers a distance *x* on the surface. If the coefficient of friction between wood and the surface is , the speed of the bullet at the time of striking the block is (where *m* is mass of the bullet)**

(a)  (b)  (c)  (d) 

1. **A ball moving with speed *v* hits another identical ball at rest. The two balls stick together after collision. If specific heat of the material of the balls is *S*, the temperature rise resulting from the collision is**

(a)  (b)  (c)  (d) 

1. **A bag of sand of mass *M* is suspended by a string. A bullet of mass *m* is fired at it with velocity *v* and gets embedded into it. The loss of kinetic energy in this process is**

(a)  (b)  (c)  (d) 

1. **Two planets revolve round the sun with frequencies  and  revolutions per year. If their average orbital radii be  and  respectively, then  is equal to**

(a)  (b)  (c)  (d) 

1. **A weight is suspended from the ceiling of a lift by a spring balance. When the lift is stationary the spring balance reads *W*. If the lift suddenly falls freely under gravity, the reading on the spring balance will be**

(a) *W* (b) 2 *W* (c) *W*/2 (d) 0

1. **If a planet consists of a satellite whose mass and radius were both half that of the earth, the acceleration due to gravity at its surface would be (*g* on earth = 9.8 *m*/sec2 )**

(a)  (b)  (c)  (d) 

1. **At a given place where acceleration due to gravity is ‘*g*’ , a sphere of lead of density ‘*d*’  is gently released in a column of liquid of density . If , the sphere will**

(a) Fall vertically with an acceleration ‘*g*’ 

(b) Fall vertically with no acceleration

(c) Fall vertically with an acceleration 

(d) Fall vertically with an acceleration 

1. ** and  denote the acceleration due to gravity on the surface of the earth and another planet whose mass and radius are twice as that of earth. Then**

(a)  (b)  (c)  (d) 

1. **A body falls freely under gravity. Its speed is *v* when it has lost an amount *U* of the gravitational energy. Then its mass is**

(a)  (b)  (c)  (d) 

1. **Two identical satellites *A* and *B* are circulating round the earth at the height of *R* and 2*R* respectively, (where *R* is radius of the earth). The ratio of kinetic energy of *A* to that of *B* is**

(a)  (b)  (c) 2 (d) 

1. **The mean radius of the earth's orbit round the sun is . The mean radius of the orbit of mercury round the sun is . The mercury will rotate around the sun in**

(a) A year (b) Nearly 4 years (c) Nearly  year (d) 2.5 years

1. **The  X-rays arising from a cobalt (*z* = 27) target have a wavelength of 179 *pm.* The  X-rays arising from a nickel target (*z* = 28) is**

(a) > 179 *pm* (b) < 179 *pm* (c) = 179 *pm* (d) None of these

1. **If a voltage applied to an X-ray tube is increased to 1.5 times the minimum wavelength  of an X-ray continuous spectrum shifts by . The initial voltage applied to the tube is**

(a) ≈ 10 *kV* (b) ≈ 16 *kV* (c) ≈ 50 *kV* (d) ≈ 75 *kV*

1. **Light of wavelength 2475 Å is incident on barium. Photoelectrons emitted describe a circle of radius 100 *cm* by a magnetic field of flux density *Tesla*. Work function of the barium is (Given **

⊗ *B*

→

Barium

*e*–

(a) 1.8 *eV*

(b) 2.1 *eV*

(c) 4.5 *eV*

(d) 3.3 *eV*

1. **Five elements *A*, *B*, *C*, *D* and *E* have work functions 1.2 *eV*, 2.4 *eV*, 3.6 *eV*, 4.8 *eV* and 6 *eV* respectively. If light of wavelength 4000 *Å* is allowed to fall on these elements, then photoelectrons are emitted by**

(a) *A*, *B* and *C* (b) *A*, *B*, *C*, *D* and *E* (c) *A* and *B* (d) Only *E*

1. **If light of wavelength  is allowed to fall on a metal, then kinetic energy of photoelectrons emitted is . If wavelength of light changes to  then kinetic energy of electrons changes to . Then work function of the metal is**

(a)  (b)  (c)  (d) 

1. **If maximum velocity with which an electron can be emitted from a photo cell is , the stopping potential is (mass of electron = 9 × 10–31 *kg*)**

(a) 30 *volt* (b) 45 *volt* (c) 59 *volt* (d) Information is insufficient

1. **Monochromatic light of wavelength 3000 Å is incident on a surface area 4*cm*2. If intensity of light is 150 *mW/m*2, then rate at which photons strike the target is**

(a) 3 × 1010/*sec* (b) 9 × 1013/*sec* (c) 7 × 1015/*sec* (d) 6 × 1019/*sec*

1. **The energy level diagram for an hydrogen like atom is shown in the figure. The radius of its first Bohr orbit is**

*n* = ∞

*n* = 3

*n* = 2

*n* = 1

0 *eV*

– 6.04 *eV*

– 13.6 *eV*

– 54.4 *eV*

(a) 0.265 Å (b) 0.53 Å

(c) 0.132 Å (d) None of these

1. **How much work must be done to pull apart the electron and the proton that make up the Hydrogen atom, if the atom is initially in the state with *n* = 2**

(a)  (b)  (c) (d) 0

1. **A hydrogen atom emits a photon corresponding to an electron transition from *n* = 5 to *n* = 1. The recoil speed of hydrogen atom is almost (mass of proton ≈ 1.6 × 10-27*kg*).**

(a) 10 *ms*-1 (b) 2 × 10-2 *ms-*1(c) 4 *ms*-1 (d)8 × 102 *ms*-1

1. **Number of nuclei of a radioactive substance at time *t* = 0 are 1000 and 900 at time *t* = 2 *s*. Then number of nuclei at time *t* = 4 *s* will be**

(a) 800 (b) 810(c) 790 (d) 700

1. **The ratio between total acceleration of the electron in singly ionized helium atom and hydrogen atom (both in ground state) is**

(a) 1 (b) 8(c) 4 (d) 16

1. **If the series limit of Lymen series for Hydrogen atom is equal to the series limit of Balmer series for a hydrogen like atom, then atomic number o this hydrogen like atom will be**

(a) 1 (b) 2(c) 3 (d) 4

1. **The following diagram indicates the energy levels of a certain atom when the system moves from 4*E* level to *E*. A photon of wavelength *λ*1 is emitted. The wavelength of photon produced during it's transition from  level to *E* is *λ*2. The ratio  will be**

4 *E*



*E*

(a)  (b) 

(c)  (d) 