1) Two satallites of masses 3M and M orbit the earth in a circular orbit of radius "r" and "3r" respectively, the ratio of their speed is

A) 1:1

B) $\sqrt{3}:1$

C) 3:1

D) 9:1

Solution

As orbital velocity does not depend upon mass of the satallite. But only depend radius of the planet. So

$$\frac{V1}{V2} = \sqrt{\frac{r2}{r1}}$$

$$\frac{V1}{V2} = \sqrt{\frac{3r}{r}}$$

$$\frac{V1}{V2} = \sqrt{\frac{3}{1}}$$

$$\frac{V1}{V2} = \sqrt{3}:1$$

Hence

Option B is correct

---

2) A wire can sustain the weight of 20kg before breaking. If the wire is cut into two equal parts, each part can sustain a weight of

A) 10 kg

B) 20 kg

C) 40 kg

D) 80 kg

Hint: If wire is cut into two equal parts then same weight will be sustain as by the original one. So

Option B is correct

---

3) Projectile is thrown in such a way that its maximum

height equal to its range, the angle of projection is
A) $Tan^{-1}(45°)$
B) $Tan^{-1}(60°)$
C) $Tan^{-1}(30°)$
D) None of the above
Solution:
Rtan@=4H
Now
R=H
Thus
tan@=4H/R
tan@=4H/H
tan@=4
@=tan^-1(4)
@=75.9°
So
Option D is correct

---

4) The electric field strength between a pair of plates is E. If the separation of the plates is double and potential difference between the plates is increased by factor of four, the new field strength is
A) E
B) 2E
C) 4E
D) 8E
Solution:
E'=V/d
E'=4V/2d
E'=2E
Hence
Option B is correct.

---

5) The angular acceleration of second hand of watch is
A) π rad/s2
B) 2π rad/s2
C) π/2 rad/s2
D) None of the above
Hint:
As angular velocity of second hand watch is constant so there is no angular acceleration.
Option D is correct.

---

6) An alpha particle accelerates through a potential difference of 10^6V, its K.E is
A) 1MeV
B) 2MeV
C) 4MeV
D) 8MeV
Solution:
V=1MV
e=2e
Thus
K.E=eV
K.E=2e × 1MV
K.E=2MeV
Option B is correct.

---

7) If there are "n" capacitors each of capacity C connected in parallel to "V" volts source, then the energy stored is equal to
A) CV
B) $\frac{1}{2}nCV^2$
C) CV^2

D) $\frac{CV^2}{2n}$

Solution:

$U=\frac{1}{2}CV^2$

Now for n number the formula will be

$U=\frac{1}{2}nCV^2$

Hence

Option B is correct

---

8) The dimension of electric dipole is

A) $[M^3L^2T^0A^1]$

B) $[M^0L^1T^1A^1]$

C) $[M^0L^1T^1A^0]$

D) $[M^2L^1T^2A^2]$

Solution:

D=qr

D=C m

As

C=As

Thus

D=A×s×m

A=A

s=T

m=L

So $[M^0L^1T^1A^1]$

Option B is correct

---

9) Newton-second is the unit of

A) Work

B) Angular momentum

C) Power

D) Linear momentum

Solution:

$\Delta P = F \times t$

$\Delta P = N \times s$

$\Delta P = Ns$

Option D is correct

---

10) The motional emf depends upon

A) Strength of magnetic field

B) Speed of the conductor

C) Length of the conductor

D) All of the above

Solution:

$E = Bvl$

As it clear from the motional emf formula that all are the dependant factors. So

Option D is correct.

---

11) The transverse nature of light is shown by

A) Interference of light

B) Refraction of light

C) Polarization of light

D) Dispersion of light

Hint: Tranverse nature of light will be check by polarization phenomena.

Option C is correct

---

12) The viscous drag on a small spherical body(moving with slow speed v) is proportional to

A) v

B) $\sqrt{v}$

C) $\frac{1}{\sqrt{v}}$

D) v^2

Solution:

When spherical body moving with small speed then drag force is directly proportional to speed. So
Option A is correct.

---

13) Which one of the following physical quantity does not have the dimension of force per unit area?
A) Stress
B) Strain
C) Young Modulus
D) Pressure
Solution:
As Stress, pressure and young modulus has same unit of force per unit area. But strain is unitless so
Option B is correct.

---

14) If velocity of the body becomes half, then the kinetic energy of the body becomes
A) One fourth
B) Double
C) Four times
D) Half
Solution:
As v=v/2
So

$$K.E' = \frac{1}{2}mv^2$$

$$K.E' = \frac{1}{2}m\left(\frac{v}{2}\right)^2$$

$$K.E' = \frac{1}{2}m\left(\frac{v^2}{4}\right)$$

$$K.E' = \frac{1}{4}\left(\frac{1}{2}mv^2\right)$$

$$K.E' = \frac{1}{4}K.E$$

Option A is correct

---

15) At what angle two forces 2F and √2 F must acts so that their resultant is F√10 ?

A) π/4

B) π/2

C) 2π

D) None of the above

Solution:

$$F = \sqrt{F1^2 + F2^2 + 2F1F2\cos@}$$

Take square on both sides so we get

$$F^2 = F1^2 + F2^2 + 2F1F2\cos@$$

$$\left(F\sqrt{10}\right)^2 = (2F)^2 + \left(\sqrt{2}\right)^2 + 2(2F)\left(\sqrt{2}F\right)\cos@$$

$$10F^2 = 4F^2 + 2F^2 + 4F^2\sqrt{2}\cos@$$

$$10F^2 = 6F^2 + 4F^2\sqrt{2}\cos@$$

$$10F^2 - 6F^2 = 4F^2\sqrt{2}\cos@$$

$$4F^2 = 4F^2\sqrt{2}\cos@$$

$$\frac{4F^2}{4F^2} = \sqrt{2}\cos@$$

$$1 = \sqrt{2}\cos@$$

$$\frac{1}{\sqrt{2}} = \cos@$$

$$@ = \cos^{-1}\frac{1}{\sqrt{2}}$$

@=45°

Now

180°=π

45°=X

Thus

X= π × 45/180

X=π/4

The correct option is A

---

16) Two blocks A and B having masses 3kg and 4kg are raised to the same height from earth surface, the ratio of

gravitational potential of A to that of B is
A) 3:4
B) 4:3
C) 1:1
D) None of the above
Solution:
As Gravitational potential does not depends on the mass of body.thats why ratio will be 1:1
Option C is correct.

---

17) In case of germinium, the voltage of potential barrier develops across the depletion region is
A) 0V
B) 0.3V
C) 0.7V
D) 0.9V
Option B is correct

---

18) If the wavelength of the transverse wave is 2cm and the period is 2 seconds then the wave speed in CGS is
A) 0.1 cm/s
B) 0.2 cm/s
C) 11 cm/s
D) 1 cm/s
Solution:
V= wavelength × frequency
V= wavelength × 1/Time period
V= 2 × 1/2
V= 1 cm/s
Option D is correct.

---

19) If A.B=1/2 AB then angle between A and B is
A) Zero
B) 30°

C) 60°
D) 90°
Solution:
A.B=ABcos@
1/2 AB=ABcos@
1/2=cos@
@=cos^-1(1/2)
@=60°
Option C is correct

---

20) Electron microscope makes practical use of the
A) Particle nature of electron
B) Wave nature of electron
C) Dual nature of electron
D) None of the above
Correct option is B

---

21) Car "X" is travelling at half speed of Car "Y" and mass of Car "X" is twice as compared to mass of Car "Y". Which of the following statement is correct?
A) Car "X" has half the K.E of Car "Y"
B) Car "X" has one quarter the K.E of Car "Y"
C) Car "X" has twice K.E of Car "Y"
D) The two Cars have same K.E
Solution:
Let
Speed of Car "Y" = 2V
Speed of Car "X" = V
Mass of Car "Y" = m
Mass of Car "X" = 2m
Now

$$\text{K.E of Car "X"} = \frac{1}{2}mv^2$$

$$\text{K.E of Car "X"} = \frac{1}{2}(2m)v^2$$

K.E of Car "X"= $2\left(\frac{1}{2}mv^2\right)$

K.E of Car "X"= 2K. E

NOW

K.E of Car "Y"= $\frac{1}{2}mv^2$

K.E of Car "Y"= $\frac{1}{2}m(2v)^2$

K.E of Car "Y"= $\frac{1}{2}m(4v^2)$

K.E of Car "Y"= $4\left(\frac{1}{2}mv^2\right)$

K.E of Car "Y"= 4K. E

K.E of Car "Y"= 2 × 2K.E

K.E of Car "Y"= 2 × K.E of Car " X"

OR

K.E of Car "X"= K.E of Car "Y"/2

Option A is correct

---

22) Time required by the projectile to reach the summit point is

A) $T = \sqrt{\frac{8H}{g}}$

B) $T = \sqrt{\frac{4H}{g}}$

C) $T = \sqrt{\frac{2H}{g}}$

D) $T = \sqrt{\frac{H}{g}}$

Solution:

Relation between Time of flight and Height is given below

$H = \frac{gT^2}{8}$

So

$$T = \sqrt{\frac{8H}{g}} \quad ----(1)$$

Here "T" is time of flight so we divide time of flight by 2 thus

T'=T/2 ----------(2)

Here " T' " is the time to reach the summit point. Now

T'= T/2

$$T' = \frac{\sqrt{\frac{8H}{g}}}{2}$$

$$T' = \frac{\sqrt{\frac{8H}{g}}}{\sqrt{2}\sqrt{2}}$$

$$T' = \frac{\sqrt{\frac{8H}{g}}}{\sqrt{4}}$$

$$T' = \sqrt{\frac{8H}{4g}}$$

$$T' = \sqrt{\frac{2H}{g}}$$

Option C is correct

---

23) Which of the following is not E.M waves?

A) Radio waves

B) X-rays

C) Light rays

D) Sound waves

Solution:

E.M waves are independent on the material medium. Sound waves are not E.M in nature because sound waves are medium dependent.

Option D is correct

---

24) A shell of mass "m" moving with velocity "v" suddenly breaks into two pieces. The part having mass

m/4 remains stationary. The velocity of the other shell will be

A) v

B) 2v

C) 3v/4

D) 4v/3

Solution:

Momentum of the system before breaking will be equal to momentum after breaking thus

Pi=Pf ----------(1)

As Pi=mv ---(a)

And

m1=m/4

v1=0

m2=3m/4

v2---????

Pf=Pf1 + Pf2

$$Pf = m1v1 + m2v2$$

$$Pf = \left(\frac{m}{4} \times 0\right) + \left(\frac{3m}{4} \times v2\right)$$

$$Pf = 0 + \frac{3mv2}{4}$$

$$Pf = \frac{3mv2}{4} - - - (b)$$

Put eq (a) and (b) in eq (1) so we get

mv=3mv2/4

v=3v2/4

v2=4v/3

Option D is correct

---

25) Heat and work are equivalent. This means:

A) When we supply heat to a body, we do work on it

B) When we do work on a body, we supply heat to it

C) The temperature of a body can be increased by doing work on it.

D) Heat and work are not interconvertable

Option C is correct

---

26) When 20J of work was done on a gas, 40J of heat energy was released. If the initial internal energy of the gas was 70J. What is the final internal energy?

A) 50J

B) 60J

C) 90J

D) 110J

Solution:

W=-20J

Q=-40J

U1=70J

U2—?????

So

$\Delta Q=\Delta U+\Delta W$

$\Delta U=\Delta Q-\Delta W$

$\Delta U=-40-(-20)$

$\Delta U=-40+20$

$\Delta U=-20$

U2-U1=-20

U2=-20+U1

U2=-20+70

U2=50J

Option A is correct

---

27) A system can be taken from the initial state P1V1 to the final state P2V2 by two different methods. Let ΔQ and ΔW represent the heat given to the system and work done by the system. Which of the following must be the same in both the methods?

A) ΔQ

B) ΔW

C) ΔQ+ΔW
D) ΔQ-ΔW
Solution:
As heat and work both are equivalents so internal energy in both cases will be the same.
ΔQ=ΔU+ΔW
ΔU=ΔQ-ΔW
Option D is correct

---

28) Two springs A and B (kA=2kB) are stretched by applying forces of equal magnitudes at the four ends. If the energy stored in A is E. That in B is
A) E/2
B) 2E
C) E
D) E/4
Solution:
E1=E
k1=kA=2kB
k2=kB
E2-----????
Now
E1/E2=k1/k2
E/E2=2kB/kB
E/E2=2/1
E2=E/2
Option A is correct

---

29) Two meter high tank is full of water, a hole is made in the middle of the tank, the speed of efflux is
A) 4.9 m/s
B) 9.8 m/s
C) 4.42 m/s
D) 3.75 m/s

Solution:

h=1m

$V=\sqrt{(2gh)}$

$V=\sqrt{(2\times9.8\times1)}$

V= 4.42 m/s

Option C is correct

---

30) A ball and a rain drop of same radius are released from same height, then rain drop will reach

A) Before the ball

B) After the ball

C) At the same time

D) None of the above

Option A is correct.
