Physisc Interior Question and Answers (2019-2020)

Xth PHYSICS

L.No:1(Laws of motion)

1. *What is balanced force?* If the resultant force of all the forces acting on a body is equal to zero (F=0).
2. *What is unbalanced force?*
   If the resultant force is not equal to zero (F≠0)
3. *Define axis of rotation.*
   The axis of the fixed edge about which the door (object) is rotated is called as the axis of rotation.
4. *Define point of rotation.*
   The rod (object) will be turned about the fixed point is called as 'point of rotation'.
5. *Define Moment of the force (or) Define turning effect of force.*

Moment of the force:

* The product of the force (F) and the perpendicular distance (d) between the fixed point or the fixed axis and line action of the force.
* τ= F×d,
* It is vector quantity,
* Unit is N m.

6. *Define couple and give an example*.

Couple:

Two equal and unlike parallel forces applied simultaneously at two distinct points constitute a couple. The line of action of the two forces does not coincide

Eg: Turning a tap, winding or unwinding a screw, spinning of atop, etc..,

7. *What are the applications of torque?*

Application of torque:

*Gears (to change the speed of rotation of a wheel by changing the torque and helps to transmit power)

* Seasaw (It causes less amount of torque to act on it. This enables the lighter person to lift the heavier person)

*Steering Wheel (transferring a torque to the wheels with less effort)

8. *Define 1 newton*.

1newton (N):

The amount force required for a body of mass 1 kg produces an acceleration of 1 m s^{-2} ,1N= 1kg m s^{-2}

9. *Define 1 dyne.*

1 dyne:

The amount force required for a body of mass 1 gram produces an acceleration of 1 cm s^{-2} ,

1dyne= 1g m s^{-2} ; 1N=10^5dyne.

10. Define Unit of force:

Unit of force:

The amount of force required to produce an acceleration of 1 m s^{-2} in a body of mass 1 kg is called unit of force.

11. Define impulse.

Impulse:

* A large force acting for a very short interval of time is called as impulsive force
* The product of force and time is known as 'impulse' represented by 'J'

$$J=F\times t$$

* $J=\Delta P$
* Unit is kg m/s or N s.

12. What are the changes in momentum can be achieved.

The changes of momentum can be achieved two ways, they are:

*Large force acting for a short period of time.

*Smaller force acting for a longer period of time.

13. *State Newton's first law of motion* (or) *Newton's first law of motion also called as a law of inertia. Why?*

Newton's first law of motion.

Everybody continues to be in its state of rest or the state of uniform motion along a straight line unless it is acted upon by some external force.

14. *State Newton's third law of motion. Give an example.*

Newton's third law of motion:

* For every action there is an equal and opposite reaction.

$$F_A=-F_B$$

Eg: Swimming, firing a gun, rocket propulsion, birds flying

15. *State principles of conservation of linear momentum.*

Principles of conservation of linear momentum:

* There is no change in the linear momentum of a system of bodies as long as no net external force acts on them.
* The absence of an external force, the algebraic sum of the momentum after collision is numerically equal to the algebraic sum of the momentum before collision

16. *Write two principles that are used in rocket propulsion*.

1. Newton's third law of motion, 2.Conservation of linear momentum.

17. *State Newton's universal law of gravitation.*

Newton's universal law of gravitation:

Every particle of matter in this universe attracts every other particle with a force .This force is directly proportional to the product of their masses and inversely proportional to the square of the distance between the centers of these masses. The direction of the force acts along the line joining the masses.

$$F \propto \frac{m_1 m_2}{r^2}$$

18. *Define acceleration due to gravity (g).*

Acceleration due to gravity (g):

* The acceleration produced in a body due to earth gravitational force is called acceleration due to gravity.

* Mean value of g is 9.8 m s^{-2}

19. *How is varied acceleration due to gravity?*

* g depends on the geometric radius of the Earth ($g \propto \frac{1}{R^2}$)

*$R_{Maximum}$ =Equatorial region, $g_{maximum}$=polar region

* $R_{Minimum}$ = Polar region, $g_{minimum}$ = Equatorial region

* g=0(centre of the earth)

20. *How is formed apparent weight? Give one illustration.*

* The reaction force exerted by the surface'R', taken as apparent weight is acting vertically upwards.

Eg: a person of mass (m), travelling in lift

21. *What is weightlessness?*

Weightlessness:

Whenever a body or a person falls freely under the action of Earth's gravitational force alone, it appears to have zero weight .This state is referred to as 'weightlessness(R=0)'.

21. What is resultant force?

Resultant force:

When several forces act simultaneously on the same body, then the combined effect of the multiple forces can be represented by a single force, which is termed as 'resultant force'.

Eg: $F=F_{1+}F_{2+}F_3+\ldots,$

22. Define linear momentum.

Linear momentum (p):

* The product of mass and velocity of a moving body gives the magnitude of linear momentum. It acts in the direction of the velocity of the object.

* It is vector quantity

P=mv

*Unit is **kg m s^{-1}** (SI system), g cm s^{-1} (C.G.S system)

L.No:2(Optics)

1. Define scattering of light.

Scattering of light:

When sunlight enters the Earth's atmosphere, the atoms and molecules of different gases present in the atmosphere refract the light in all possible directions. This is called as 'Scattering of light

2. Comparison of elastic and inelastic scattering of light.

Elastic scattering	Inelastic scattering
If the **energy** of the **incident** beam of light and the **scattered** beam of light are **same**,	If the **energy** of the **incident** beam of light and the **scattered** beam of light are **not same**

3. Write the types of inelastic scattering of light.

* Rayleigh scattering
* Mie scattering
* Tyndall scattering
* Raman scattering

4. What is Mie scattering

Mie scattering:

Mie scattering takes place when the diameter of the scatterer is similar to or larger than the wavelength of the incident light.

5. What are the causes of Mie scattering?

Causes of Mie scattering:

Pollen, dust, smoke, water droplets, and other particles in the lower portion of the atmosphere.

6. Sun set and sun rises sky appears reddish colour.Why?

Reason:

*At sunrise and sunset, the light rays from the Sun have to travel a larger distance in the atmosphere than at noon.

*Hence, most of the blue lights are scattered away and only the red light which gets least scattered reaches us. Therefore, the colour of the Sun is red at sunrise and sunset.

7. Define Tyndall Scattering or Tyndall Effect.

Tyndall Scattering or Tyndall Effect:

The scattering of light rays by the colloidal particles in the colloidal solution is called Tyndall Scattering or Tyndall Effect.

8. Define Raman effect or Raman scattering

Raman effect or Raman scattering:

*The scattered light contains some additional frequencies (or wavelengths) other than that of incident frequency (or wavelength). This is known as Raman scattering or Raman Effect.

*The interaction of light ray with the particles of pure liquids or transparent solids, which leads to *a change in wavelength or frequency."*

9. Write the applications of concave lens.

Applications of concave lens:

* Eye lens of'Galilean Telescope'
* Wide angle spy hole in doors.
*They are used to correct the defect of vision called 'myopia

10. Write the applications of convex lens.

Applications of convex lens:

* Convex lenses are used as camera lenses
* They are used as magnifying lenses
*They are used in making microscope, telescope and slide projectors
* They are used to correct the defect of vision called hypermetropia

11. Define magnification.

Magnification:

*The ratio of the height of the image to the height of an object.

$*m = \frac{height\ of\ the\ image}{height\ of\ the\ object} = \frac{h'}{h}$

(or)

$*m = \frac{distance\ of\ the\ image}{distance\ of\ the\ object} = \frac{v}{u}$

12. Define power of lens

Power of lens:

*Power of a lens is numerically defined as the reciprocal of its focal length.

$* P = \frac{1}{f}$

*The SI unit of power of a lens is diopter.

*It is represented by the symbol D

13. Define persistence of vision.

Persistence of vision:

If the time interval between two consecutive light pulses is less than 0.1 second (or) 1/16 second, human eye cannot distinguish them separately. It is called persistence of vision.

14. Write the uses of simple microscope

Uses of simple microscope:

Simple microscopes are used

a) by watch repairers and jewellers.

b) to read small letters clearly.

c) to observe parts of flower, insects etc.

d) to observe finger prints in the field of forensic science

15. Write the advantage and disadvantage of telescope.

Advantage:

*Elaborate view of the Galaxies, Planets, stars and other heavenly bodies is possible.

*Camera can be attached for taking photograph for the celestial objects.

*Telescope can be viewed even with the low intensity of light.

Disadvantages:

*Frequent maintenances needed.

*It is not easily portable one.

16.Write a note on Cartesian sign convention.

c**artesian sign convention**,

1. The object is always placed on the left side of the lens.
2. All the distances are measured from the optical centre of the lens.
3. The distances measured in the same direction as that of incident light are taken as positive.
4. The distances measured against the direction of incident light are taken as negative.
5. The distances measured upward and perpendicular to the principal axis is taken as positive.
6. The distances measured downward and perpendicular to the principal axis is taken as negative.

L.No:3(Thermal Physics)

1. What is thermal equilibrium?

Thermal equilibrium:

Two or more physical systems or bodies are said to be in thermal equilibrium if there is no net flow of thermal energy between the systems.

2. What are the Characteristic features of heat energy transfer**?**

Characteristic features of heat energy transfer.

***Heat always flows from a system at higher temperature to a system at lower temperature.

* The mass of a system is not altered when it is heated or cooled.

* For any exchange of heat, the heat gained by the cold system is equal to heat lost by the hot system. *Heat gained = Heat lost.*

3. Define Kilocalorie**.**

Kilocalorie:

One kilocalorie is defined as the amount of heat energy required to rise the temperature of 1 kilogram of water through 1°C

4. What is cubical expansion?

Cubical expansion:

If there is an increase in the volume of a solid body due to heating, then the expansion is called **cubical or volumetric expansion.**

5. State Avogadro's law.

Avogadro's law:

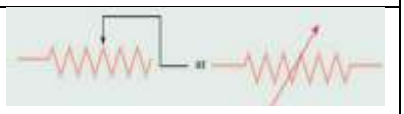
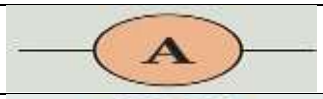
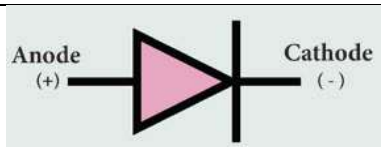
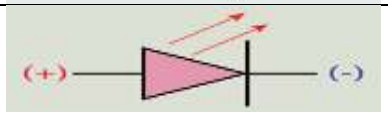
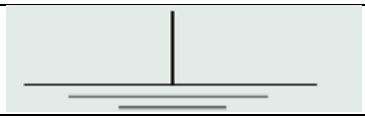
At constant pressure and temperature, the volume of a gas is directly proportional to number of atoms or molecules present in it.

$V \alpha n$

$\frac{V}{n}$ = constant

L.No:4(Electricity)

1. Write the uses of symbols and components.

Components	uses	symbol
Resistor	fi x the magnitude of the current through a circuit	
Variable resistor or Rheostat	select the magnitude of the current through a circuit	
Ammeter	measure the current	
Voltmeter	measure the potential difference	
Galvanometer	indicate the direction of current	
A diode	A diode has various uses, which you will study in higher classes	
Light Emitting Diode (LED)	A LED has various uses which you will study in higher classes.	
Ground connection	provide protection to the electrical components	

2. Define one volt

One Volt:

if one joule of work is done in moving one coulomb of charge from one point to another against the electric force.

$$1Volt = \frac{1\ joule}{1\ Coulomb}$$

3. Difference between series and parallel connection

CRITERIA	SERIES	PARALLEL
Equivalent resistance	More than the highest resistance.	Less than the lowest resistance
Amount of current	Current is less as effective resistance is more	Current is more as effective resistance is less
Switching ON/OFF	If one appliance is disconnected, others also do not work	If one appliance is disconnected, others will work independently

4. Alloy of Nickel and Chromium is used as the heating element. Why?
   *it has high resistivity,
   *it has a high melting point,
   *it is not easily oxidized.

5. Write the applications of heating Effect.

Applications of Heating Effect:

1. **Electric Heating Device:** electric iron, electric toaster, electric oven electric heater, Geyser

2. Fuse Wire: The fuse wire is made up of a material whose melting point is relatively low. When a large current passes through the circuit, the fuse wire melts due to Joule's heating effect and hence the circuit gets disconnected.

3. Filament in bulbs: The filament is made up of a material whose melting point is very high. When the filament is heated, it glows and gives out light.

6. Define Electric power.

Electric power:

* Rate of consumption of electrical energy
* Product of the electric current and the potential difference.

$$P = V I$$

* The SI unit of electric power is watt.

L.No:5(Acoustics)

1. Difference between the sound and light wave

sound	light
Medium is required for the propagation.	Medium is not required for the propagation
Sound waves are longitudinal	Light waves are transverse
Wavelength ranges from 1.65 cm to 1.65 m.	Wavelength ranges from 4×10^{-7}m to7×10^{-7}m.

Sound waves travel in air with a speed of about 340 m s^{-1} at NTP	Light waves travel in air with a speed of 3×10^8 m s^{-1}.

2. Comparison of Audible, Infrasonic and Ultrasonic waves

Audible wave	**Infrasonic Wave**	**Ultra sonic Wave**
a frequency ranging between **20 Hz and 20,000 Hz**	a frequency **below 20 Hz**	a frequency **greater than 20 kHz**
generated by vibrating bodies such as vocal cords, stretched strings etc	waves produced during earth quake, ocean waves, sound produced by whales, etc.	Mosquito, dogs, bats, dolphins can detect these waves. e.g., waves produced by bats.

3. What is particle velocity?

Particle velocity:

The velocity with which the particles of the medium vibrate in order to transfer the energy in the form of a wave is called particle velocity.

4. What are the Factors affecting velocity of sound?

Factors affecting velocity of sound :

* **Effect of density:** The velocity of sound in a gas is inversely proportional to the square root of the density of the gas $V \propto \sqrt{\frac{1}{\mathrm{d}}}$

* **Effect of temperature:** The velocity of sound in a gas is directly proportional to the square root of its temperature. $V \propto \sqrt{T}$

* **Effect of relative humidity:** When humidity increases, the speed of sound increases.

5. State laws of reflection.

Laws of reflection:

- The incident wave, the normal to the reflecting surface and the reflected wave at the point of incidence lie in the same plane.
- The angle of incidence ∠i is equal to the angle of reflection ∠r.

L.No:6(Nuclear physics)

1. Define fertile materials.

fertile materials.

Some radioactive elements, which can be converted into fissionable material. They are called as **fertile materials**.

E.g.: Uranium-238, Thorium-232, Plutonium-240.

2. What is Chain reaction?

Chain reaction:

A chain reaction is a self-propagating process in which the number of neutrons goes on multiplying rapidly almost in a geometrical progression.

3. Differentiate controlled and uncontrolled chain reaction.

Controlled chain reaction	Uncontrolled chain reaction
number of neutrons released is maintained to be one	number of neutrons multiplies indefinitely
It is used in a nuclear reactor	It is used in the atom bomb

4. Define Nuclear radio activity.

Nuclear radio activity:

The phenomenon of nuclear decay of certain elements with the emission of radiations like alpha, beta, and gamma rays is called 'radioactivity' and the elements, which undergo this phenomenon are called 'radioactive element.

5. Define Curie.

Curie:

The quantity of a radioactive substance which undergoes 3.7×10^{10} disintegrations in one second.

1 curie = 3.7×10^{10} disintegrations per second.

6. Define Rutherford.

Rutherford (Rd):

The quantity of a radioactive substance, which produces 10^6 disintegrations in one second.

1 Rd = 10^6 disintegrations per second.

7. Define Becquerel.

Becquerel (Bq) :

It is defined as the quantity of one disintegration per second.

8. Differentiate Nuclear fission and Nuclear fusion.

Nuclear fission	Nuclear fusion
1. The process of breaking up (splitting) of a heavy nucleus into two smaller nuclei.	1. Nuclear fusion is the combination of two lighter nuclei to form a heavier nucleus.
2.Can be performed at room temperature	2.Extremely high temperature and pressure is needed
3.Alpha, beta and gamma radiations are emitted	3.Alpha rays, positrons, and neutrinos are emitted
4. Fission leads to emission of gamma radiation. This triggers	4. Only light and heat energy is emitted.

the mutation in the human gene and causes genetic transform diseases.	

9. What are the precaution those who are working laboratory?

Precaution:

* Radioactive materials should be kept in a thick walled lead container.
* Lead coated aprons and lead gloves should be used while working with hazardous radioactive materials.
* You should avoid eating while handling radioactive materials.
* The radioactive materials should be handled only by tongs or by a remote control device.
* Dosimeters should be worn by the users to check the level of radiation.

10. Write the applications of Nuclear reactor.

Uses of a nuclear reactor:

* Nuclear reactors are widely used in power generation.
* They are also used to produce radio isotopes, which are used in a variety of applications.
* Some reactors help us to do research in the field of nuclear physics.
* Breeder reactors are used to convert non fissionable materials into fissionable materials.

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