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TN 10 std. – SCIENCE Physics (1- 6) 2 Marks

Unit - 1. Laws of Motion

1. ***Define inertia. Give its classification.***
   The inherent property of a body to resist any change in its state of rest or the state of uniform motion, unless it is influenced upon by an external unbalanced force, is known as **inertia or**
   Ability of a body to maintain its state of rest or motion is called Inertia.

2. ***Classify the types of force based on their application.***
   - Like parallel forces   • Unlike parallel forces

3. ***If a 5 N and a 15 N forces are acting opposite to one another. Find the resultant force and the direction of action of the resultant force***
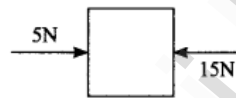   The two forces are unlike parallel forces
   Let P = 5N, Q = 15N
   Resultant force (R) = P – Q = 5 + (-15) = -10N
   R = -10N.
   The resultant force acting along the direction of "Q".

4. ***Differentiate mass and weight.***

Mass	Weight
The amount of matter present in it	The force with which the earth attracts it
It has magnitude but not direction	It has both magnitude and direction

5. ***Define moment of a couple.***
   Moment of a couple
   The product of any one of the forces and the perpendicular distance between the line of action of two. $M = F \times S$

6. ***State the principle of moments.***
   Principle of moments
   Moment in clockwise direction = Moment in anticlockwise direction
   $$F_1 \times d_1 = F_2 \times d_2$$

7. ***State Newton's second law.***
   The force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force.

8. ***Why a spanner with a long handle is preferred to tighten screws in heavy vehicles?***
   The long handled spanner requires less force is to tighten the screws in heavy vehicles.

9. ***While catching a cricket ball the fielder lowers his hands backwards. Why?***
   In cricket, a fielder pulls back his hands while catching the ball. He experiences a smaller force for a longer interval of time to catch the ball, resulting in a lesser impulse on his hands.

10. ***How does an astronaut float in a space shuttle?***
    Astronauts are not floating but falling freely around the earth due to their huge orbital velocity. They are under free fall condition. (R = 0).

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Unit - 2. Optics

1. *What is refractive index?*
   The ratio of speed of light in vacuum (c) to the speed of light in a medium (v) is called refractive index (μ)

   $$μ = c/v$$

2. *State Snell's law.*
   The ratio of the sine of the angle of incidence and sine of the angle of refraction is equal to the ratio of refractive indices of the two media. This law is also known as Snell's law.

   $$\frac{\sin i}{\sin r} = \frac{\mu_2}{\mu_1}$$

3. *Draw a ray diagram to show the image formed by a convex lens when the object is placed between F and 2F.*
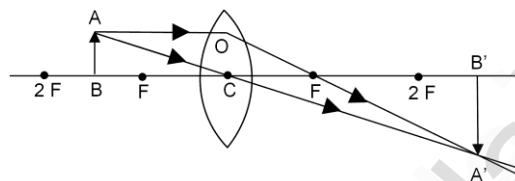
4. *Define dispersion of light*
   When a beam of white light or composite light is refracted through any transparent media such as glass or water, it is split into its component colours. This phenomenon is called as dispersion of light'.

5. *State Rayleigh's law of scattering*
   The amount of scattering of light is inversely proportional to the fourth power of its wavelength". Amount of scattering

   $$S \propto \frac{1}{\lambda^4}$$

6. *Differentiate convex lens and concave lens.*

Sl. No.	Convex Lens	Concave Lens
1.	It is thicker in the middle than at edges	It is thinner in the middle than at edges
2.	It is a converging lens	It is a diverging lens.
3.	It produces mostly real images	It produces virtual images
4.	It is used to treat hypermeteropia	It is used to treat myopia

7. *What is power of accommodation of eye?*
   The ability of the eye lens to change its focal length according to the distance of the object is called power of accommodation of the eye.

8. *What are the causes of 'Myopia'?*
   Myopia (Short sightedness)
   The causes of Myopia is due to

   - The lengthening of eye ball.
   - The focal length of eye lens is reduced

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9. ***Why does the sky appear in blue colour?***
When sunlight passes through the atmosphere, the blue colour (shorter wavelength) is scattered to a greater extent than the red colour (longer wavelength). This scattering causes the sky to appear in blue colour.

10. ***Why are traffic signals red in colour?***
The red colour has longer wavelength. So it is not scattered by dust, fog etc. It reaches the observer even in a long distance. So, red colour is used in traffic signals.

Unit - 3. Thermal Physics

1. ***Define one calorie.***
Calorie
The amount of heat energy required to rise the temperature of 1 gram of water through 1°C.

2. ***Distinguish between linear, ariel and superficial expansion.***

Linear expansion	Ariel and superficial expansion
In this expansion, length of a body increases	In this expansion, area of a body increases
Coefficient of linear expansion is different for different materials	Coefficient of ariel expansion is different for different materials
$$\frac{\Delta L}{L_0} = \alpha_L \Delta T$$	$$\frac{\Delta A}{A_0} = \alpha_A \Delta T$$

3. ***What is co-efficient of cubical expansion?***
The ratio of increase in volume of the body per degree rise in temperature to its unit volume is called as **coefficient of cubical expansion**. This is also measured in K^{-1}.

4. ***State Boyle's law***
When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure.
P α 1/V   or   PV = constant

5. ***State-the law of volume***
Law of volume (Charles's law)
When the pressure of gas is kept constant, the volume of a gas is directly proportional to the temperature of the gas.
V α T   or   V/T = Constant

6. ***Distinguish between ideal gas and real gas.***

	Real Gases	Ideal Gases
i)	Molecules are not perfectly Elastic	Molecules are perfectly Elastic
ii)	Gases that exist in nature in H_2, O_2, CO_2, N_2, He etc. are real gases	Practically, an ideal gas does not exist.
iii)	Real gases undergo liquefaction at low temperature when cooled and compressed	Ideal gases cannot be liquefied even at low temperature but continues to obey Charles's law an finally occupies zero volume at 0 K

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7.   *What is co-efficient of real expansion?*
     Coefficient of real expansion
     The ratio of the true rise in the volume of the liquid per degree rise in temperature, to its unit volume. The SI unit of coefficient of real expansion is K^{-1}.

8.   *What is co-efficient of apparent expansion?*
     Coefficient of apparent expansion
     The ratio of the apparent rise in the volume of the liquid per degree rise in temperature, to its unit volume. The SI unit of coefficient of apparent expansion is K^{-1}

Unit - 4. Electricity

1.   Define electric potential and potential difference.
     Electric Potential
     The amount of work done in moving a unit positive charge from infinity to that point against the electric force.
     Potential difference
     The amount of work done in moving a unit positive charge from one point to another point against the electric force.
     $$\text{Potential Difference (V)} = \frac{\text{Work Done (W)}}{\text{Charge (Q)}}$$

2.   *What is the role of the earth wire in domestic circuits?*
     i.   It provides a low resistance path to the electric current.
     ii. The Earth wire serves as a protective conductor, which saves us from electric shock.

3.   *State Ohm's law.*
     At a constant temperature, the steady current 'I' flowing through a conductor is directly proportional to the potential difference 'V' between the two ends of the conductor. $I \propto \mathbf{V}$
     V = IR   R - Constant

4.   *Distinguish between the resistivity and conductivity of a conductor.*

Sl. No.	Resistivity	Conductivity
1.	The resistance of a conductor of unit length and unit area of cross section	It is the reciprocal of electrical resistivity of a material
2.	Its unit is Ohm metre	Its unit is mho metre^{-1}
3.	It is the measure of resisting power of a specified material to the passage of an electric current	It is the measure of its ability to pass the current through it

5.   *What connection is used in domestic appliances and why?*
     In domestic appliances parallel connection is used.
     Because
     (i) to avoid short circuit and breakage.
     (ii) Each electric appliance gets an equal voltage.

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Unit - 5   ACOUSTICS

1. *Why does sound travel faster on a rainy day than on a dry day?*
   When humidity increases, the speed of sound increases. The air on a rainy day is more humid which means it has a lower density compared to dry air.

2. *Why does an empty vessel produce more sound than a filled one?*
   The intensity of sound is directly proportional to the square of the amplitude of vibration. $I \propto A^2$
   Since, the amplitude of vibration of air molecules (empty vessel) is greater than liquid molecules (filled vessel), therefore empty vessel produces a louder sound than the filled vessel.

3. *Air temperature in the Rajasthan desert can reach 46°C. What is the velocity of sound in air at that temperature? ($V_0 = 331$ ms^{-1})*
   Velocity of sound $V_0 = 331$ms^{-1}
   Air Temperature $T = 46^0$ C
   Velocity of sound in air temperature $V_T = (V_0 + 0.61 T)$ ms^{-1}
      $= 331 + (0.61 \times 46)$
      $= 331 + 28.06$
   $V_T = 359.06$ ms^{-1}

4. *Explain why, the ceilings of concert halls are curved.*
   The ceilings of concert halls are curved because sound will reflect evenly in all directions.

5. *Mention two cases in which there is no Doppler effect in sound?*
   (i)   When source (S) and listener (L) both are at rest.
   (ii)   When distance between source (S) and listener (L) remains constant.
   (iii)   When source (S) and listener (L) are moving in mutually perpendicular direction.

Unit - 6   NUCLEAR PHYSICS

1. *Write any three features of natural and artificial radioactivity.*

Natural radioactivity	Artificial Radioactivity
Alpha, beta and gamma radiations are emitted.	Mostly elementary particles such as neutron, positron, etc. are emitted.
It is a spontaneous process.	It is an induced process.
This cannot be controlled.	This can be controlled.

2. *Define critical mass.*
   The minimum mass of a fissile material necessary to sustain the chain reaction is called critical mass (m_c).

3. *Define one roentgen.*
   • The quantity of radioactive substance which produces a charge of 2.58×10^{-4} coulomb in 1 kg of air under standard conditions of pressure, temperature and humidity.

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4. *State Soddy and Fajan' s displacement law.*
   Soddy and Fajan' displacement Law (1913)
   (i) When a radioactive element emits an alpha particle, a daughter nucleus is formed whose mass number is less by 4 units and the atomic number is less by 2 units, than the mass number and atomic number of the parent nucleus.
   (ii) When a radioactive element emits a beta particle, a daughter nucleus is formed whose mass number is the same and the atomic number is more by 1 unit, than the atomic number of the parent nucleus.

5. *Give the function of control rods in a nuclear reactor.*
   Control rods are used to control the number of neutrons in order to have sustained chain reaction. Eg. Boron or cadmium rods

6. *In Japan, some of the new born children are having congenital diseases. Why?*
   Atom bombs were exploded in 1945 at Hiroshima and Nagasaki in Japan during the World War II. Hazardous radiation like γ rays released during the atom bombs explosion which adversely affect the living creatures.

7. *Mr.Ramu is working as an X - ray technician in a hospital. But, he does not wear the lead aprons. What suggestion will you give to Mr.Ramu?*
   A person who is exposed to radiations very closely or for a longer duration, is at a greater health risk and can be affected genetically. So he is advised to wear the lead aprons.

8. *What is stellar energy?*
   The stars like our Sun emit a large amount of energy in the form of light and heat. This energy is termed as the stellar energy.

9. *Give any two uses of radio isotopes in the field of agriculture?*

   (i)   The radio isotope of phosphorous (P-32) helps to increase the productivity of crops.
   (ii) Used to kill the insects and parasites and prevent the wastage of agricultural products.
   (iii) Cereals remain fresh beyond their normal life, enhancing the storage time.