TET – 2013

Physics material
Tamil and English Medium

PART-I

Types of Energies

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Types of energies

1. **Mechanical Energy**: two types are Potential energy and Kinetic energy.

2. **Heat**: a form of energy – by James Joule.

3. **Unit of energy is joule.**

4. **Chemical energy sources**: food, fuels, cells.

5. **Electric bulb**: electric energy into light energy.

6. **Electric fan**: electric into mechanical energy.

7. **Thermal power stations**: heat energy into electric energy.

8. **Wind mills**: wind energy (kinetic energy) into Electric energy.

9. **Loudspeakers**: electric into sound energy.

10. **Electric bell**: electric energy into sound energy.

11. **Torch light**: Chemical energy - Electric energy - light energy.

12. **Solar energy**: satellites and calculators.
13. Compressed spring – potential energy.

14. During photosynthesis, solar energy is converted into chemical energy.

15. In Kayathar and Aralvoimozhi – windmills produce electric energy.

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**LIGHT**

1. Galileo – Telescope (1609)
2. Year of Astronomy is 2009.
3. Time taken by the sunlight to reach the earth – 8 minutes 20 seconds.
4. Pin hole camera proves that light travels in a straight line.
5. Translucent objects – partially allow light to pass through them – tracing paper
6. The objects that allow light to pass through them – transparent objects – glass, pure water.
7. The objects that allow light to pass through them – transparent objects – stone, ball.
8. Eclipses are formed when the Sun, the Earth, and the Moon come in a straight line.
9. Lunar eclipse – when the shadow of the Earth falls on the Moon (Moon is hidden).
10. Solar eclipse – when the shadow of the Moon falls on the Earth (Sun is hidden).
11. Moon is a non-luminous body – it reflects the sunlight.
12. The bodies which emit light by itself – luminous bodies – Sun, Torch light.

13. When some objects are placed in the path of light, shadow is formed.

**15. LIGHT**

1. Light is a form of energy that gives us the sensation of vision.

2. The bouncing back of light from a surface is called reflection.

3. A mirror is a shining surface which reflects almost all the light falling on it.

4. When light is reflected, image is formed.

5. Image formed by a plane mirror

   - virtual and erect
   - sizes of the object and the image are equal
   - the image is laterally inverted
   - the distance of the object from the mirror is equal to the distance of the image from the mirror.

6. To see the full size image, the mirror should be at least half of the height of the object.

7. (1) To see the image exactly, the mirror should be at least half of the object.

   (2) To see the image exactly, the mirror should be at least half of the object.
Spherical mirrors
1. convex mirror - The mirror with the bulged reflecting surface.
2. concave mirror - the mirror with the hollow reflecting surface.
8. குவம் வளை - புளை வளைக்காட்சியுடன் வளை புளைக்கிடந்து
   Concave mirror - makes the light to meet at a point after reflection.
9. குவம் வளை - குவம் வளைக்காட்சியில் வளை வளைக்கிடந்து
   Concave mirror - makes the light to diverge from a point.
10. குவம் வளை - தெளிவு கண்டு கூறுவது புளை புளைக்கிடந்து
    The image formed on the paper or screen is called a real image.
11. குவம் வளை - புளைக்கிடந்து
    Concave mirror - Uses

(i) செல்கிற புளைப்பு விளக்கம் 1) reflectors in car head lamps
(ii) குவம் வளைப்பு விளக்கம் 2) reflectors in telescopes
(iii) குவம் வளைப்பு விளக்கம் 3) shaving mirrors
(iv) குவம் வளைப்பு விளக்கம் 4) solar cookers
12. குவம் வளை - புளைக்கிடந்து

(i) குவம் வளைப்பு விளக்கம் விளக்கம் விளக்கம் 1) reflectors in car head lamps
(ii) குவம் வளைப்பு விளக்கம் 2) reflectors in telescopes
Convex mirrors - Uses
1. Used as rear view mirrors in automobiles.
2. Used to watch over a large area.
13. White light - composition of various colours
14. Spectrum - band of colours (VIBGYOR)
15. Dispersion - the splitting up of white light into its seven constituent colours.
16. Newton’s disc - the device that proves seven colours can be mixed to give white light.
17. Largest reflector telescope in Asia is in Kavalur, Javadu Hills, Vellore Dt.

www.Padasalai.Net
1. **Reflection**: The bouncing of light from a surface of a body

2. **Ray**: the path taken by the light.

3. **Parallel beam**: the light rays are parallel

4. **Divergent beam**: the rays move away from a point

5. **A light ray which strikes the surface is called as an incident ray.**

6. **The light ray that comes out from the reflecting surface after reflection is called reflected ray.**

7. **Angle of incidence**: the angle between the incident ray and the normal.

8. **Normal**: The perpendicular line drawn to the surface at the point of incidence

9. **Angle of reflection**: the angle between the reflected ray and the normal.

10. **Laws of reflection**: 
    a) incident ray, reflected ray and the normal lie in the same plane. 
    b) angle of incidence is equal to the angle of reflection.

11. **Regular reflection**: Reflection from a polished surface.

12. **Irregular reflection**: Reflection from a rough surface.
13. Image formed by a single plane mirror - only one image.

14. Number of images = \( \left( \frac{360}{\text{angle} - 1} \right) \)

16. To get more images: mirrors should be parallel.

17. Instruments showing Multiple reflections: Periscope (2 plane mirrors) and Kaleidoscope (3 plane mirrors)

18. Refraction - When light rays pass from one medium to another medium the path of the ray will be changed. This is refraction.

19. The pencil looks bent when it is in the water. This is due to refraction.

20. When light travels from a rarer medium to a denser medium, it will be deviated towards the normal.

21. A swimming pool appears shallower than its actual depth.

22. First who discovered about the spectrum – Newton.

23. Dispersion – Splitting of white light into seven colours, when it is passed through a prism.

24. Critical angle - The angle of incidence for which the angle of refraction becomes 90°.

25. If the angle of incidence in the denser medium is greater than the critical angle, then total internal reflection is produced.
Conditions for total internal reflection:
1. The light must proceed from a denser medium to a rarer medium.
2. The angle of incidence in the denser medium must be greater than the critical angle.

Ciliary muscles stretches and relaxes to change the focal length of the lens. This is called as power of accommodation of an eye.

The least distance of an eye - The most comfortable distance at which one can read with a normal eye
- It is 25 cm.

Optical fibers:
1) based on the principle of total internal reflection.
2) Optical fibers are thin, flexible and transparent strands of glass
3) transmit communication signals.
4) are used in endoscope and laparoscopes.
1. Vibrating bodies produce sound.

2. Sound travels very much faster in solids than liquid and air.

3. For the propagation of sound, a medium is necessary.

4. Bell jar experiment proves that sound cannot pass through vacuum.

5. The vocal cords in men are about 20 mm long.

6. In women, these are about 15 mm.

7. “Ear drum” performs an important function in hearing.

8. A tuning fork is made of steel. Upper portion – prongs; lower portion - stem


10. Time period : The time taken by the vibrating body to complete one vibration or oscillation. Unit – s

11. Amplitude: Maximum displacement of the vibrating body from the mean position. Unit : metre.

12. The reciprocal of the time period is called frequency.

13. Important properties of sound – amplitude and frequency.
15. The loudness of the sound depends on its amplitude.

The audible frequency range of the human ear is 20 Hz to 20,000 Hz.

17. Inaudible frequency is less than 20 Hz. Ultrasonic waves have frequencies above 20,000 Hz.

Dogs can hear the sound of frequencies higher than 20,000 Hz.

Bats use ultrasounds for their flight.

The unpleasant sound is called as noise.

***** Best wishes *****

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(sound)

1. Robert Boyle proved that sound cannot pass through vacuum.

2. Particles of a medium vibrate in a direction, parallel to the direction of propagation of wave, it is called longitudinal wave.

3. Longitudinal waves - compressions and rarefactions.

4. Sound waves in air or gas - Longitudinal waves

5. Transverse wave - The particles of the medium vibrate perpendicular to the direction of propagation.

6. Transverse wave - crests and troughs.

7. Water waves, vibrations of stretched string

8. Wave velocity \( V = n \lambda \).
9. **Frequency** = 1 / time period.

10. velocity of light = 3 \( \times 10^8 \) m s\(^{-1}\).
    
    velocity of sound = 340 m s\(^{-1}\).

11. To hear echo, the barrier reflecting the sound should be least at a distance of 17 meters.

12. The repeated reflection that results in the persistence of sound is called reverberation.

13. Sound of frequencies below 20Hz are called infrasonic.

14. Hertz proved the existence of radio waves first.

15. Which one has large audible range? – seal.


17. The phenomenon of the apparent change in the frequency of the source due to relative motion between the source and the observer is called as Doppler’s effect.

18. Uses of Radar:
   
   1) to determine the velocities and movement of submarines and aircrafts.
   
   2) the speed of vehicles are detected.
   
   3) Bats detect the location, distance and movement of the prey by the Doppler shift.

19. The principle on which stethoscope – multiple reflection.

20. Sound of frequencies above 20 kHz are called ultrasonic.
Electricity and energy

1. The rate of flow of charge is called electric current.
2. The unit of current is ampere.
3. 1 C is the charge contained in nearly $6 \times 10^{18}$ electrons.
4. The unit of potential difference is volt.
5. The equation for Ohm's law is $V = IR$.
6. Resistors in series – Effective resistance $R_s = R_1 + R_2 + R_3$.
7. Resistors in parallel – $1/R_p = 1/R_1 + 1/R_2 + 1/R_3$
8. Joule's law of heating $H = I^2 R t$.
9. Fuse wire is an alloy. 37% lead and 63% tin.
10. The emf of the voltaic cell is 1.08 volt.
11. The emf of the leclanche cell is 1.5 volt.
12. In leclanche cell the electrolyte is dil H$_2$SO$_4$.
13. Radioactivity was discovered by Henry Becquerel in 1896.
14. Heavy elements having atomic number greater than 82 are called radioactive materials.
15. The equation for Nuclear fission is

$$^{92}\text{U} + {}^0\text{n} \rightarrow ^{56}\text{Ba} + ^{36}\text{Kr} + {}^3\text{n} + 200\text{MeV}.$$
16. The reaction is
\[ \text{He}^2 + \text{H}^3 \rightarrow \text{He}^4 + \text{H} + \text{n} \]

17. The energy produced when 1 kg of substance is fully converted into energy is \(9 \times 10^{16}\) J.

18. The unit of radioactivity is Roengen.

19. Safety limit of radioactivity is 250 mR per week.

20. One roentgen is defined as the quantity of radiation which produces \(1.6 \times 10^{12}\) pairs of ion in 1 gram of air.

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**Magnetic effect of electric current and Light**

1. Magnetic field is a vector quantity.

2. Magnetic line of force start from the north pole and terminate at the south pole.

3. From Fleming’s left hand rule, the thumb will point in the direction of motion or the force acting on the conductor.

4. Electric motor - electric energy \(\rightarrow\) mechanical energy

5. Electromagnetic induction discovered by Faraday (1831)

6. From Fleming’s right hand rule, the middle finger will show the direction of induced current.

7. Alternating Current generator - The current changes its direction after equal intervals of time.

8. Direct Current generator - The current flows in the same direction.

9. For spherical mirrors, \(R = 2f\).

   \[ \frac{1}{v} + \frac{1}{u} = \frac{1}{f} \]

10. Mirro formula is \(\frac{1}{v} + \frac{1}{u} = \frac{1}{f}\).
11. Snell’s law $\mu = \frac{\sin i}{\sin r} = \frac{c_a}{c_m}$.

Snell’s law is $\mu = \frac{\sin i}{\sin r} = \frac{c_a}{c_m}$.

12. Magnification $= \frac{\text{height of the image}}{\text{height of the object}}$.

13. Magnification $= 1 / \text{magnification}$.

Magnification $= \frac{\text{height of the image}}{\text{height of the object}}$.

14. Power of the lens $= \frac{1}{\text{focal length}}$. Unit: dioptre.

15. Myopia is near-sightedness. Elongation of the eyeball.

16. Hypermetropia is far-sightedness. Eyeball becomes shorter.

Presbyopia - The power of accommodation of the decreases with ageing.