

SOLVED BY ADIL ALVI

PHY101 CURRENT PAPERS FALL 2021

1) Calculate the energy, in joules, of a photon of green light having a wavelength of 562nm?

$$E = 3.54 \times 10^{-19} \text{ J}$$

$$E = hf = \frac{hc}{\lambda}$$

$$E = \frac{6.626 \times 10^{-34} \times 3.00 \times 10^8}{562 \times 10^{-9}} \text{ J}$$

$$E = 3.537 \times 10^{-19} \text{ J}$$

2) Find the difference between two waves which interfere constructively and destructively?

When two waves occupy the same point, superposition occurs. ... Constructive interference is when two waves superimpose and the resulting wave has a higher amplitude than the previous waves. Destructive interference is when two waves superimpose and cancel each other out, leading to a lower amplitude.

3) Similarity and difference of galvanometer and electric motor?

Galvanometers and electric motors are both based on the same basic principle of an external magnetic field exerting a force on a current carrying wire. The difference is in how far the device is allowed to move. ... Motors must be able to move freely and rotate through complete 360o turns.

4) How does the source make difference of gamma rays and x rays?

The key difference is the source: x-rays are emitted by the electrons outside the nucleus, and gamma rays are emitted by the excited nucleus itself. ... The gamma rays' wavelength is smaller than that of the x-rays'. Gamma-ray photons have the highest energy in the EMR spectrum and their waves have the shortest wavelength.

5) Difference between quantum mechanics and classical mechanics?

In classical mechanics, objects exist in a specific place at a specific time. However, in quantum mechanics, objects instead exist in a haze of probability; they have a certain chance of being at point A, another chance of being at point B and so on.

6) What will be happen when wavelength is small in interference?

A higher frequency corresponds to a shorter wavelength. Waves of shorter wavelength spread out (diffract) less after passing through the slits, and the short wavelength leads to a smaller angle at which constructive interference (one wavelength path difference between the two waves) will occur.

7) What is Alpha decay?

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Alpha decay is the nuclear decay process whereby the parent nucleus emits an alpha particle. The alpha particle, structurally equivalent to the nucleus of a helium atom and denoted by the Greek letter α , consists of two protons and two neutrons.

8) What is Motion?

In physics, motion is the change in position of an object with respect to its surroundings in a given interval of time.

7) What is Black-body radiation?

Black-body radiation is the thermal electromagnetic radiation within or surrounding a body in thermodynamic equilibrium with its environment, emitted by a black body (an idealized opaque, non-reflective body). It has a specific spectrum of wavelengths, inversely related to intensity that depend only on the body's temperature, which is assumed for the sake of calculations and theory to be uniform and constant

8) Difference between reflection and refraction?

Reflection involves a change in direction of waves when they bounce off a barrier. Refraction of waves involves a change in the direction of waves as they pass from one medium to another.

9) Magnetic flux and magnetic flux density and when flux is maximum and when it is zero?

Magnetic flux is a measurement of the total magnetic field which passes through a given area. Magnetic flux density (B) is defined as the force acting per unit current per unit length on a wire placed at right angles to the magnetic field. Magnetic flux through a coil is maximum when it is equal to zero. If there is no net charge within a closed surface then flux is zero

10) What is fundamental source of electromagnetic radiation?

A moving charge particle is the fundamental source of electromagnetic radiation.

11) What is coronavirus?

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-cov-2 virus.

12) Difference between potential energy and potential difference/

Potential energy, stored energy that depends upon the relative position of various parts of a system while the difference in potential between two points that represents the work involved or the energy released in the transfer of a unit quantity of electricity from one point to the other.

13) What is ampere?

The ampere is a measure of the amount of electric charge in motion per unit time

14) What is transverse waves and longitudinal waves?

Transverse waves cause the medium to move perpendicular to the direction of the wave. Longitudinal waves cause the medium to move parallel to the direction of the wave.

15) What is Greenhouse effect?

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The greenhouse effect is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without this atmosphere. Radiative active gases in a planet's atmosphere radiate energy in all directions.

13) What is Composition of sun?

Composition: 72% H, 25% He, rest is metals

14) Comparison of radio waves and light waves?

Both radio waves and light are electromagnetic waves; their main difference is their frequency. Radio waves are created by the acceleration of electrons in a radio antenna, and light waves are created by the oscillations of the electrons within atoms.

15) Why does reducing the temperature on the surface of cooker help me accelerate the reduction of pressure inside the cooker?

Cooling the surface will cause heat to flow through the metal from the inside wall. Water vapor will condense back to steam on the cooled parts of the inside wall, reducing the pressure.

16) Difference between resistance and resistivity?

Resistance is defined as the property of the conductor which opposes the flow of electric current. Resistivity is defined as the resistance offered by the material per unit length for unit cross-section. The SI unit of resistivity is Ohm.

17) Did $1/p + 1/q = 1/f$ or $m = -q/p$ apply on image which is formed by flat mirror?

Yes, the mirror equation and the magnification equation apply to plane mirrors. A curved mirror is made flat by increasing its radius of curvature without bound, so that its focal length goes to infinity. From $1/p + 1/q = 1/f$ we have $1/p = -1/q$. the magnification is $M = -q/p = p/p = 1$. The image is right side up and actual size.

18) Explain fusion reaction of sun?

In a fusion reaction, two light nuclei merge to form a single heavier nucleus. The process releases energy because the total mass of the resulting single nucleus is less than the mass of the two original nuclei.

19) Proton and electron have same wavelength according to de Broglie. Which is faster?

The de Broglie wavelength of a particle is inversely proportional to its momentum $p = m v$; since a proton is about 1800 times more massive than an electron, its momentum at the same speed is 1800 times that of an electron, and therefore its wavelength 1800 times smaller. The electron has the longer wavelength.

20) What is the major problem of specific heat while measuring the temperature of water above 100°C?

If the water boils you are losing information that you need. At boiling the heat is not causing a change in temperature but a change in Phase (liquid to vapor).

The heat of fusion (to make ice) for water at 0 °C is approximately 334 joules (79.7 calories) per gram, and the heat of vaporization at 100 °C is about 2,230 joules (533 calories) per gram.

So 2,230J/g at 100C are evaporating and leaving no trace.

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21) Why glass is transparent for visible light but not for infrared and ultraviolet?

Beyond the range of UV light (wavelength >400 nm), the energy of visible and infrared light are not enough to excite the electrons and most of the incident light gets transmitted. Thus glass appears transparent to visible and infrared light.

22) Why leaves shine green when light put on the petals look black?

Leaves reflect green part of sun light and absorb other color of sun light so leaves shine green and the same for petals, petals emit black and absorb other colors of sunlight

23) Is it true charges of proton and neutrons are different but they have same mass?

Protons and neutrons have approximately the same mass, about 1.67×10^{-24} grams. Scientists define this amount of mass as one atomic mass unit (amu) or one Dalton. Although similar in mass, protons are positively charged, while neutrons have no charge.

24) Define electric potential?

The electric potential is the energy of a unit charge in an electric field. So in our MKS units the unit of potential is $1\text{Joule/Coulombs}=1\text{Volt}$. Another useful unit is 1Electron Volt

25) A vessel is filled with gas at some equilibrium pressure and temperature. Can all gas molecules in the vessel have the same speed?

They can, as this possibility is not contradicted by any of our descriptions of the motion of gases. If the vessel contains more than a few molecules, it is highly improbable that all will have the same speed. Collisions will make their speeds scatter according to the Boltzmann distribution law.

26) If you hold water in a paper cup over flame, can you bring the water to boil, if then how?

Just fill a paper cup with water and start trying to burn it from the outside. The water will boil vigorously inside the cup, but the paper itself will not combust. ... The boiling water can't get above 212 degrees, and the paper is thin enough that this water keeps its temperature from climbing high enough to combust.

27) A 2000kg car is moving with a velocity of 20 m/s collides and locks with a 1500 kg car at rest a stop sign. Show the momentum is conserved.

A 2000-kg car moving with a speed of 20 m/s collides with and sticks to a 1500-kg car at rest at a stop sign. Show that because momentum is conserved in the rest frame, momentum is also conserved in a reference frame moving with a speed of 10 m/s in the direction of the moving car

28) In an analogy between traffic flow and electrical current, what would correspond to the charge Q? What would correspond to the current I?

The number of cars would correspond to charge Q. The rate of flow of cars past a point would correspond to current.

29) Two objects are identical except that one is hotter than the other. Compare how they respond to identical forces.

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Using what we know we can say that hotter object has more energy which by Einstein's equation $E=mc^2$ relates to more mass. Thus an object with more mass responds less to the same force than the object with less mass. Concluding that hotter object responds less to the same force.

30) In a cool room, a metal or marble table top feels much colder to the touch than does a wood surface even though they are at the same temperature. Why?

Because metal and stone conduct heat better than wood. Skin temperature is higher than room temperature, so when we touch metal, we give heat more quickly to the metal than wood. Another reason is that metal and stone store more energy than a like sized object of wood

31) What are the basics solar facts?

- A) Mass of sun 2×10^{30} kg = 333,000 Earth's
- B) Diameter of sun 1,392,000 km = 10 Earth's
- C) Age of sun 4.6 billion years
- D) Rotation Period = 25 days at equator, 36 at poles (surface)
- E) Temperature = 15 million K at core, 5770 K at surface
- F) Density = 8 x gold at the core, average is ~ 1.5 water
- G) Composition: 72% H, 25% He, rest is metals

32) What is Photosphere zone of the sun?

The photosphere is the deepest layer of the Sun that we can observe directly. It reaches from the surface visible at the center of the solar disk to about 250 miles (400 km) above that

33) What is Electromotive force (EMF)?

Electromotive force, abbreviation E or emf, energy per unit electric charge that is imparted by an energy source, such as an electric generator or a battery.

34) What is Volume density?

Volume density is the amount of a quantity (often mass) per unit of volume.
Density=Quantity/Volume.

35) Who discovered nucleus? Write the steps of explanation nucleus?

In 1911, Rutherford, Marsden and Geiger discovered the dense atomic nucleus by bombarding a thin gold sheet with the alpha particles emitted by radium.

36) What is Compton Effect?

Compton scattering, discovered by Arthur Holly Compton, is the scattering of a photon after an interaction with a charged particle, usually an electron. If it results in a decrease in energy of the photon, it is called the Compton Effect

37) A satellite in low-Earth orbit is not truly travelling through a vacuum Rather, it moves through very thin air. Does the resulting air friction cause the satellite to slow down?

Air resistance causes a decrease in the energy of the satellite-Earth system. This reduces the diameter of the orbit, bringing the satellite closer to the surface of the Earth. A satellite in a smaller orbit, however, must travel faster. Thus, the effect of air resistance is to speed up the satellite!

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PHY101 Numerical:

- 1) Step down transformer wala n_1 or n_2 deya howa tha us may say s1 maloom krna tha
- 2) Capacitor and current wala aik numerical tha
- 3) 2 numerical find momentum of photon and find force to move electric charges
- 4) Frequency find karni thi wavelength given thi
- 5) Potential energy maloom karni thi
- 6) Find wavelength by using formula of de Broglie's formula of de Broglie = $\lambda = h/mv$
- 7) Magnetic field key 2 numerical they
- 8) Resistance find karna tha
- 9) Capacitance of a capacitor figure di hui ti find krna ta
- 10) Find maximum current

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