

NEW Examination
POLICY

Annual 2026

پنجاب کے تمام بورڈز کے لیے

(Solved)

ولن ڈے فار مولا

Sure Short Guess

Physics

Intermediate Part-II

- * Most Imp. MCQs
- * Most Imp. Short Questions
- * Most Imp. Long Questions

اب فیل ہونا بھول جائیں

Physics

A⁺
Challenge

صرف 1 دن میں تیاری کر کے پڑھائی میں کمزور طلباء و طالبات شاندار کامیابی حاصل کر سکتے ہیں۔

(محمد قدیر رفیق)

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Physics-12th

One Day Formula

Multiple Choice Questions

S.	Question	(A)	(B)	(C)	(D)
1	SI unit of permittivity of free space are:	Nm^2C^{-2}	$N^{-1}m^2C^{-1}$	$C^2N^{-1}m^{-2}$ ✓	$C^2N^{-1}m^{-2}$
2	Electric field intensity at a point is defined by the relation:	$E = \frac{q}{F}$	$E = \frac{F}{q}$ ✓	$E = qF$	$E = \frac{F}{q^2}$
3	The concept of an electric field lines is introduced by:	Coulomb	Faraday ✓	Einstein	Joseph Henry
4	The direction of field lines around an isolated negative charge $-q$ is:	Radially inward ✓	Radially outward	Elliptical	Circular
5	Selenium is a:	Insulator	Photoconduct or ✓	Conductor	First insulator then conductor
6	Electric flux is expressed as:	$\phi_e = \vec{E} \times \vec{A}$	$\phi_e = \vec{E} \cdot \vec{Q}$	$\phi_e = \vec{E} \cdot \vec{A}$ ✓	$\phi_e = EA^2$
7	The electric flux through any close surface is depending on:	Shape of closed surface	Medium ✓	Size of close surface	Location of charge
8	The electric flux through closed surface depends upon:	Charge	Medium	Geometry	Charge and medium ✓
9	The statement $\Phi_e = \frac{Q}{\epsilon_0}$ was given by:	Faraday	Dersted	Gauss ✓	Coulomb
10	Electric intensity inside the hollow sphere is:	$\frac{\sigma}{\epsilon_0}$	$\frac{\sigma}{2\epsilon_0}$	$\frac{1}{\epsilon_0}$	Zero ✓
11	Which one of the following relation is correct?	Joule = volt × ampere	Joule = coulomb/volt	Joule = volt/ampere	Joule = coulomb × volt ✓
12	One electron volt is equal to:	1.6×10^{-19} Joule ✓	1.6×10^{-19} Coulomb	1.6×10^{-19} N	1.6×10^{18} Joule
13	The amount of energy equal to 1.6×10^{-19} J is called:	One volt	One milli volt	One electron volt ✓	One mega electron volt
14	In Millikan's oil drop experiment, a charged particle of mass m is in equilibrium in an applied electric field $\vec{E}$. If the direction of electric field is reversed then acceleration of the particle will be:	Zero	$g/2$	g	$2g$ ✓



199	A proton consists of quarks which are:	Two up, one down ✓	One up, two down	All up	All down
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Short Questions NO.2

Chapter 12: Electrostatics

1. Define Coulomb's Law and write its mathematical formula.

The electrostatic force of attraction or repulsion between two point charges is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance between them.

$$\text{Formula: } F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$$

2. Give the similarities and differences between Coulomb's electrostatic force and Gravitational force.

Similarities: Both obey the inverse square law ($F \propto 1/r^2$) and act along the line joining the centers.

Differences: Coulomb's force can be attractive or repulsive and is very strong. Gravitational force is purely attractive, much weaker, and does not depend on the medium between the masses.

3. What is the effect of the medium between charges upon Coulomb's force? Explain.

The presence of an insulating medium (dielectric) between the charges reduces the electrostatic force by a factor equal to its relative permittivity (ϵ_r).

$$\text{Formula: } F_{\text{medium}} = \frac{F_{\text{vacuum}}}{\epsilon_r}$$

4. Electric lines of forces never cross one another. Why?

Electric intensity (E) is a vector quantity that has a single unique direction at any given point. If two lines were to cross, E would have two different directions at the point of intersection, which is physically impossible.

5. Describe five properties of electric field lines.

1. They originate from positive charges and end on negative charges.
2. The tangent to a field line at any point gives the direction of the electric field.
3. Lines are closer where the field is strong and farther apart where it is weak.
4. No two field lines ever cross each other.
5. They are directed normal to the surface of a charged conductor.

6. What do you mean by xerography? Explain.

Xerography comes from the Greek words "xeros" (dry) and "graphos" (writing), meaning dry writing. It is an electrostatic copying process that uses static electricity to reproduce printed images on paper without liquid ink.

7. Define Xerography and photoconductor.

Xerography: The dry copying process based on electrostatic phenomena. **Photoconductor:** A material (like Selenium) that behaves as an insulator in the dark but becomes a conductor when exposed to light.

8. Describe the working of an inkjet printer briefly.

It produces a continuous spray of tiny ink drops. The print head is controlled by a computer. Uncharged drops fall straight onto the paper to form an image, while drops meant for blank areas are charged by an electrode and deflected by charged plates into a gutter.

9. What are the factors upon which electric flux depends?

Electric flux depends on the electric field intensity (E), the vector area (A), and the angle (θ) between the electric field lines and the vector area. **Formula:** $\Phi_e = E \cdot A = EA \cos\theta$

10. Is electric intensity E necessarily zero inside a charged rubber balloon if the balloon is spherical?

Yes, it is zero. According to Gauss's law, the flux through any closed surface is proportional to the enclosed charge. Since all the charge resides on the outer surface of the spherical balloon, the charge enclosed is zero ($q = 0$), making the electric intensity inside zero.

11. State and write the formula of Gauss's Law.

The total electric flux through any closed surface is equal to $\frac{1}{\epsilon_0}$ times the total charge enclosed by that surface.

$$\text{Formula: } \Phi_e = \frac{Q}{\epsilon_0}$$

12. Find the electric intensity of the field inside a hollow charged sphere.





Spontaneous Emission: An excited electron drops back to its lower energy state entirely randomly on its own, emitting a photon in a random direction. **Stimulated Emission:** An incoming photon forces an excited electron to drop early, causing the emission of a second "clone" photon that travels perfectly in phase and in the same direction as the first.

64. What are the advantages of laser light over ordinary incandescent light?

1. **Coherent:** All waves are perfectly in phase.
2. **Monochromatic:** It consists of one singular, pure wavelength (color).
3. **Directional:** The beam is intensely narrow and does not spread out over massive distances.

65. What is meant by normal population and population inversion?

Normal Population: The natural state where most atoms reside in the lower ground energy state rather than the excited state. **Population Inversion:** An artificially induced state where there are more atoms sitting in the excited state than in the ground state. It is a strict prerequisite for laser action.

66. Define a metastable state. Why is it absolutely necessary for laser production?

A metastable state is an excited energy level where an electron can pause and linger much longer than usual (e.g., 10^{-3} s instead of 10^{-8} s). Without this "waiting room," electrons would instantly drop back down, making population inversion mathematically impossible to achieve.

67. What is a Helium-Neon laser? What ratio of gases is used in it?

It is a continuously operating gas laser that produces a distinct red visible beam. The discharge tube is filled with a mixture of approximately **85% Helium and 15% Neon**.

68. Explain the difference between laser light and standard lightbulb light.

A lightbulb produces spontaneous emission: billions of atoms emitting a messy, multidirectional mix of all different colors (incoherent light). A laser produces stimulated emission: atoms emitting an organized, synchronized, unidirectional beam of a single pure color (coherent light).

69. Give any two critical uses of lasers in the field of medicine or surgery.

1. **Ophthalmology:** Precisely welding detached retinas back onto the back of the eye.
2. **Bloodless Surgery:** The intense localized heat of the laser acts as a scalpel that instantly cauterizes (seals) microscopic blood vessels as it cuts, preventing bleeding.

70. Can an electron reside inside the nucleus? Explain using the uncertainty principle.

No. The nucleus is tiny ($\Delta x \approx 10^{-14}$ m). If an electron were confined there, the uncertainty in its momentum ($\Delta p \approx \frac{h}{\Delta x}$) would be enormous. This means it would require an immense kinetic energy (≈ 20 MeV) to stay inside. Electrons emitted in beta decay only have 2 – 3 MeV, proving they are created at the moment of emission, not stored inside.

Long Questions

Chapter 12: Electrostatics

1. State and explain Coulomb's Law for electrostatic force. Discuss its vector form and show that $F_{12} = -F_{21}$.
2. State Gauss's law. Apply it to find the electric field intensity due to an infinite sheet of charge, pointing out the importance of the Gaussian surface.
3. Define absolute electric potential. Derive an equation for the absolute electric potential at a point due to a point charge.
4. Describe Millikan's oil drop experiment method in detail to find the charge on an electron.
5. What is a capacitor? Derive the formula for the energy stored in a charged capacitor and show that the energy density in the electric field is given by $\frac{1}{2} \epsilon_r \epsilon_0 E^2$.

Chapter 13: Current Electricity

1. Define resistance and resistivity. Explain their dependence upon temperature and derive the temperature co-efficient in terms of resistivity.

