Chhattisgarh Board Class 12, 2026 Physics Question Paper with Solutions

Time Allowed :3 Hours	Maximum Marks :100	Total questions :38

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The paper is divided into two sections – Section A (Compulsory) and Section B (Elective).
2. Section A is compulsory for all candidates and generally includes objective-type questions, short answer questions, and long answer questions from the prescribed syllabus.
3. In Section A, candidates are required to answer all questions. The questions will cover topics from ancient, medieval, and modern history as prescribed by the syllabus.
4. Section B consists of elective questions. Candidates are required to attempt questions from the chosen topic according to the provided options.
5. The questions in Section A will be in the form of multiple-choice, short answer, and essay-type questions.
6. Answers to all questions must be written in neat and legible handwriting. Candidates must adhere strictly to the word limit mentioned in the questions.
7. Use of unfair means or electronic devices during the examination is strictly prohibited.
8. Candidates must ensure that they write their answers in the correct format, following the instructions given for each section.

1. Write two differences between conductance and resistance.

Solution:

Definitions:

- **Resistance (R):** The opposition offered by a material to the flow of electric current. It measures how much a material resists the flow of electrons.
- **Conductance (G):** The ease with which electric current flows through a material. It measures how easily electricity passes through a material.

Mathematical Relationship:

$$G = \frac{1}{R}$$

where:

- G = Conductance (measured in Siemens, S)
- R = Resistance (measured in Ohms, Ω)

Differences between Conductance and Resistance:

Difference 1: Definition and Meaning

Resistance	**Conductance**
Resistance is the opposition to the flow of electric current.	Conductance is the ease or ability of a material to allow electric current to flow.
It indicates how difficult it is for current to pass through a conductor.	It indicates how easy it is for current to pass through a conductor.
Higher resistance means less current flow for a given voltage.	Higher conductance means more current flow for a given voltage.

Difference 2: Unit of Measurement

Resistance	**Conductance**
SI unit: **Ohm** (Ω)	SI unit: **Siemens** (S)
Named after German physicist Georg Simon Ohm.	Formerly known as ”mho” (ohm spelled backwards).
Symbol: Ω	Symbol: S or $\mho$ (inverted omega)

Additional Differences:

Difference 3: Formula

Resistance	Conductance
$R = \frac{V}{I}$ (Ohm's Law: Resistance = Voltage / Current)	$G = \frac{I}{V}$ (Conductance = Current / Voltage)
$R = \rho\frac{L}{A}$ where ρ = resistivity, L = length, A = cross-sectional area	$G = \sigma\frac{A}{L}$ where σ = conductivity, L = length, A = cross-sectional area

Difference 4: Nature of Relationship

Resistance	Conductance
Directly proportional to length of conductor	Inversely proportional to length of conductor
Inversely proportional to cross-sectional area	Directly proportional to cross-sectional area
Increases with increase in temperature (for most conductors)	Decreases with increase in temperature (for most conductors)

Difference 5: Physical Interpretation

Resistance	Conductance
Represents energy dissipation (heat loss) in a circuit.	Represents how well a material transmits electrical energy.
Related to collisions of electrons with atoms in the material.	Related to the availability of free electrons for conduction.

Summary Table:

Property	Resistance	Conductance
Symbol	R	G
SI Unit	Ohm (Ω)	Siemens (S)
Dimensional Formula	$[ML^2T^{-3}A^{-2}]$	$[M^{-1}L^{-2}T^3A^2]$
Formula	$R = V/I$	$G = I/V$
In Terms of Material	$R = \rho L/A$	$G = \sigma A/L$
Relationship	$R = 1/G$	$G = 1/R$
Nature	Opposition to current	Ease of current flow

Analogy:

Think of a water pipe:

- **Resistance** is like the friction that opposes water flow through the pipe.
- **Conductance** is like how wide/open the pipe is, allowing water to flow easily.

Final Answer:

Difference 1: Resistance is opposition to current flow, while Conductance is ease of current flow.

Difference 2: Resistance is measured in Ohms (Ω), while Conductance is measured in Siemens (S).

Quick Tip

Remember: Conductance (G) is simply the reciprocal of Resistance (R). $G = 1/R$. If resistance is high, conductance is low, and vice versa. The SI unit Siemens can also be written as Ω^{-1} (inverse ohm).

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2. Write three differences between axial position and equatorial position in a magnet.

Solution:

Step 1: Defining the Positions.

The axial position (End-on position) refers to a point located on the line passing through the two poles of the magnet. The equatorial position (Broadside-on position) refers to a point located on the perpendicular bisector of the magnetic axis.

Step 2: Analyzing Magnetic Field Direction.

At the axial position, the magnetic field direction is along the direction of the magnetic dipole moment (from South to North pole). At the equatorial position, the magnetic field direction is opposite to the direction of the magnetic dipole moment (from North to South pole).

Step 3: Comparing Field Magnitude.

For a short bar magnet at the same distance (r), the magnetic field strength at the axial position (B_{axial}) is exactly twice the strength of the field at the equatorial position ($B_{equatorial}$). Mathematically:

$$B_{axial} = 2 \times B_{equatorial}$$

Quick Tip

Remember the "2:1" rule: if you stay at the same distance from the center of a magnet, the magnetic "pull" is twice as strong at the tips (axial) as it is at the sides (equatorial).

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3. What is ultraviolet light? Write its two characteristics.

Solution:

Step 1: Defining Ultraviolet Light.

Ultraviolet (UV) light is a form of electromagnetic radiation with a wavelength shorter than that of visible violet light but longer than X-rays. It typically falls within the range of 10 nm to 400 nm in the electromagnetic spectrum.

Step 2: Characteristic 1 - Chemical and Biological Effects.

One primary characteristic of ultraviolet light is its high energy, which allows it to induce chemical reactions. For example, it helps the human body produce Vitamin D but can also cause sunburn or damage to DNA in living cells.

Step 3: Characteristic 2 - Fluorescence.

UV light has the ability to cause certain minerals and chemicals to fluoresce. When these materials are exposed to UV radiation, they absorb the invisible energy and re-emit it as visible light, causing them to ”glow.”

Quick Tip

While humans cannot see ultraviolet light, many animals like bees and birds can see UV patterns on flowers to help them find nectar.

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4. Write the names of the majority charge carriers in P-type semiconductor and N-type semiconductor.

Solution:

Semiconductors:

Semiconductors are materials with electrical conductivity between that of conductors and insulators. Their conductivity can be modified by adding impurities (doping) to create two types: P-type and N-type semiconductors.

Majority Charge Carriers:

Semiconductor Type	Majority Charge Carriers	Minority Charge Carriers
N-type	**Electrons** (-ve charge)	Holes (+ve charge)
P-type	**Holes** (+ve charge)	Electrons (-ve charge)

Detailed Explanation:

N-type Semiconductor:

- Formed by doping a pure semiconductor (like Silicon or Germanium) with **Pentavalent** impurities (atoms with 5 valence electrons), such as **Phosphorus (P), Arsenic (As), or Antimony (Sb)**.
- Pentavalent impurities are called **Donor impurities** because they donate extra electrons.

- Four of the five valence electrons form covalent bonds with neighboring silicon atoms, while the fifth electron becomes a **free electron** that can move freely.
- Since electrons are negatively charged and are the majority carriers, this type is called **N-type** (Negative-type).
- **Majority carriers: Electrons**
- **Minority carriers: Holes**

P-type Semiconductor:

- Formed by doping a pure semiconductor with **Trivalent** impurities (atoms with 3 valence electrons), such as **Boron (B), Aluminum (Al), or Gallium (Ga)**.
- Trivalent impurities are called **Acceptor impurities** because they create ”holes” that can accept electrons.
- With only three valence electrons, they cannot complete all four covalent bonds with neighboring silicon atoms, creating a **hole** (absence of electron) in the crystal structure.
- These holes act as positive charge carriers and can move through the crystal when electrons jump into them.
- Since holes are positively charged and are the majority carriers, this type is called **P-type** (Positive-type).
- **Majority carriers: Holes**
- **Minority carriers: Electrons**

Visual Representation:

N-type Semiconductor:

```
Si    Si    Si
 |     |     |
Si--P--Si--Si
 |     |     |
```

```
Si    Si    Si

P (Phosphorus) has 5 valence electrons
4 form bonds, 1 free electron (majority carrier)
```

P-type Semiconductor:

```
Si    Si    Si
 |     |     |
Si--B--Si--Si
 |     |     |
Si    Si    Si

B (Boron) has 3 valence electrons
Creates a "hole" (majority carrier)
```

Comparison Table:

Property	**N-type**	**P-type**
Doping Element	Pentavalent (5 valence electrons)	Trivalent (3 valence electrons)
Dopant Examples	Phosphorus, Arsenic, Antimony	Boron, Aluminum, Gallium
Dopant Type	Donor impurity	Acceptor impurity
Majority Carriers	**Electrons** (negative charge)	**Holes** (positive charge)
Minority Carriers	Holes	Electrons
Charge of Majority Carriers	Negative	Positive

Applications:

- Both N-type and P-type semiconductors are used together to form **PN junction diodes**, **transistors**, **solar cells**, **LEDs**, and various other electronic components.

- The junction between P-type and N-type materials creates a depletion region that is fundamental to modern electronics.

Final Answer:

$$\boxed{\text{P-type: Holes (majority carriers),} \quad \text{N-type: Electrons (majority carriers)}}$$

Quick Tip

Easy way to remember: **P** = Positive (holes are positively charged), **N** = Negative (electrons are negatively charged). Holes are majority in P-type, electrons are majority in N-type.

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5. What will be the effect on capacitance of capacitor, when dielectric substance is inserted between the plates of the capacitor?

Solution:

Definition of Capacitance:

Capacitance (C) is the ability of a capacitor to store electric charge. It is defined as the ratio of the charge (Q) stored on each plate to the potential difference (V) between the plates:

$$C = \frac{Q}{V}$$

For a parallel plate capacitor, the capacitance is given by:

$$C = \frac{\varepsilon_0 A}{d}$$

where:

- ε_0 = permittivity of free space (8.85×10^{-12} F/m)
- A = area of each plate
- d = distance between the plates

Effect of Inserting a Dielectric:

When a dielectric substance (insulating material) is inserted between the plates of a capacitor, the **capacitance increases** by a factor of κ (dielectric constant or relative permittivity).

$$C_{\text{with dielectric}} = \kappa \cdot C_{\text{without dielectric}} = \frac{\kappa \varepsilon_0 A}{d}$$

where κ (kappa) is the **dielectric constant** of the material ($\kappa > 1$ for all dielectric materials).

Why Does Capacitance Increase?

1. Reduction of Electric Field:

- When a dielectric is inserted, its molecules become polarized—positive charges align toward the negative plate and negative charges align toward the positive plate.
- This polarization creates an **induced electric field** (E_{induced}) that opposes the original electric field (E_0).
- The net electric field inside the capacitor becomes:

$$E_{\text{net}} = E_0 - E_{\text{induced}} = \frac{E_0}{\kappa}$$

2. Decrease in Potential Difference:

- Since $V = E \cdot d$ (for uniform field), a decrease in electric field leads to a decrease in potential difference between the plates.
- $V_{\text{with dielectric}} = \frac{V_0}{\kappa}$, where V_0 is the original potential difference.

3. Increase in Capacitance:

- From $C = \frac{Q}{V}$, if charge Q remains constant and V decreases, capacitance C increases.
- Alternatively, if the capacitor remains connected to a battery (constant V), more charge Q can be stored, again increasing capacitance.

Two Cases:

Case 1: Battery Disconnected (Constant Charge)

- Charge Q remains constant
- Potential difference V decreases ($V = V_0/\kappa$)
- Capacitance C increases ($C = \kappa C_0$)
- Energy stored decreases ($U = Q^2/2C$)

Case 2: Battery Connected (Constant Voltage)

- Potential difference V remains constant
- Charge Q increases ($Q = \kappa Q_0$)
- Capacitance C increases ($C = \kappa C_0$)
- Energy stored increases ($U = \frac{1}{2}CV^2$)

Dielectric Constants of Common Materials:

Material	**Dielectric Constant (κ)**
Vacuum	1.0000
Air	1.0006
Paper	3.7
Glass	5-10
Mica	5-7
Rubber	7
Distilled Water	80
Barium Titanate	1000-10000

Additional Effects of Dielectric:

- **Increased Breakdown Voltage:** Dielectrics allow capacitors to operate at higher voltages without breakdown (arcing between plates).
- **Mechanical Support:** Dielectric material provides physical separation between plates.
- **Energy Storage:** The energy stored in a capacitor with dielectric is:

$$U = \frac{1}{2}CV^2 = \frac{1}{2}\kappa C_0 V^2$$

Final Answer: Capacitance increases by a factor of dielectric constant when a dielectric is inserted.

$$\boxed{C_{\text{with dielectric}} = \kappa \cdot C_{\text{without dielectric}}}$$

Quick Tip

The dielectric constant κ is also called relative permittivity (ε_r). It represents how many times the capacitance increases compared to vacuum. Higher κ means better charge storage capacity.

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6. Name the apparatus that works on the principle of electromagnetic induction.

Solution:

Electromagnetic Induction:

Electromagnetic induction is the phenomenon of producing an electromotive force (EMF) or voltage across a conductor when it is exposed to a changing magnetic field. This principle was discovered by **Michael Faraday** in 1831.

Apparatus that work on Electromagnetic Induction:

1. Electric Generator (Dynamo):

- Converts mechanical energy into electrical energy.
- When a coil rotates in a magnetic field, the magnetic flux linked with the coil changes, inducing an EMF.
- Used in power plants, vehicles (alternators), and portable generators.

2. Transformer:

- Transfers electrical energy between two or more circuits through electromagnetic induction.
- Works on the principle of mutual induction.

- Used to step up or step down AC voltage in power transmission and electronic devices.

3. Induction Motor:

- Converts electrical energy into mechanical energy.
- The stator's rotating magnetic field induces current in the rotor, causing it to rotate.
- Widely used in industrial applications, fans, pumps, and appliances.

4. Induction Cooktop:

- Uses electromagnetic induction to heat cooking vessels.
- A coil beneath the cooking surface creates a changing magnetic field, inducing eddy currents in the metal pan, which generates heat.

5. AC Motor:

- Works on the principle of electromagnetic induction to produce rotational motion.
- Used in various applications from small appliances to heavy machinery.

6. Electrical Transformer:

- Specifically works on mutual induction between primary and secondary coils.
- Essential for power distribution systems.

7. Induction Coil:

- Used to generate high voltage pulses from a low-voltage DC supply.
- Early application in spark plugs and ignition systems.

8. Magnetic Flow Meter:

- Measures the flow of conductive liquids using electromagnetic induction.
- When a conductive liquid flows through a magnetic field, a voltage is induced proportional to its velocity.

9. Eddy Current Brakes:

- Used in trains and roller coasters for braking.

- When a conductor moves through a magnetic field, eddy currents are induced, creating a opposing force that slows down the motion.

10. Induction Furnace:

- Used for melting metals in industries.
- High-frequency alternating current in a coil induces eddy currents in the metal, generating heat through resistance.

11. Tape Recorder / Hard Drive Read Head:

- The read head in magnetic storage devices works on electromagnetic induction.
- As the magnetic medium moves past the head, the changing magnetic field induces a voltage that represents the stored data.

12. Wireless Charger:

- Uses electromagnetic induction (specifically inductive coupling) to transfer power wirelessly.
- A transmitter coil creates a changing magnetic field, which induces current in the receiver coil of the device.

Summary Table:

Apparatus	Type of Induction	Application
Electric Generator	Self-induction	Power generation
Transformer	Mutual induction	Voltage conversion
Induction Motor	Rotating magnetic field	Industrial machinery
Induction Cooktop	Eddy currents	Cooking
AC Motor	Electromagnetic induction	Converting electrical to mechanical energy
Magnetic Flow Meter	Electromagnetic induction	Flow measurement
Eddy Current Brakes	Eddy currents	Braking systems
Wireless Charger	Inductive coupling	Charging devices wirelessly

Final Answer:

Electric Generator, Transformer, Induction Motor, Induction Cooktop, AC Motor, etc.

Quick Tip

Any device that converts mechanical energy to electrical energy (generator) or electrical energy to mechanical energy (motor) typically works on electromagnetic induction. Transformers are pure examples of mutual induction without moving parts.

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7. Write the reason behind the shining of diamond.

Solution:

The shining of a diamond is primarily due to a phenomenon called **Total Internal Reflection (TIR)** combined with its high refractive index and proper cutting.

Main Reasons for Diamond's Shining:

1. Total Internal Reflection (TIR):

- This is the most important reason for diamond's brilliance.
- When light enters a diamond, it strikes the internal faces at angles greater than the **critical angle**.
- Instead of passing through, the light is **completely reflected back** inside the diamond.
- This multiple internal reflection causes the light to bounce around before finally exiting, creating maximum brilliance.

2. High Refractive Index:

- Diamond has an exceptionally high refractive index of **2.42** (compared to glass 1.5).
- Refractive index determines how much light bends when entering the material.
- Higher refractive index means:
  - More bending of light
  - Smaller critical angle
  - Greater chance of total internal reflection

3. Small Critical Angle:

- The critical angle for diamond is approximately **24.4**°.
- This is very small compared to other transparent materials (glass critical angle 42°).
- Because of this small critical angle, most light rays entering the diamond strike the internal surfaces at angles greater than 24.4°, causing total internal reflection.

4. Proper Cutting and Faceting:

- Diamonds are cut with multiple flat surfaces called **facets** (typically 58 facets in a brilliant cut).
- The precise angles and arrangement of facets are designed to:
  - Maximize total internal reflection
  - Allow light to enter easily

- Trap light inside through multiple reflections
- Release light in specific directions to create sparkle

- Poorly cut diamonds lose light through the bottom (called ”light leakage”) and appear dull.

5. Dispersion (Fire):

- Diamond has high dispersion, meaning it splits white light into its component colors (like a prism).
- This creates the colorful flashes (called ”fire”) that add to diamond’s brilliance.
- Dispersion in diamond is **0.044**, higher than most gemstones.

Mathematical Explanation:

Critical Angle Formula:

$$\sin C = \frac{1}{\mu}$$

where:

- C = critical angle
- μ = refractive index of diamond relative to air

For diamond ($\mu = 2.42$):

$$\sin C = \frac{1}{2.42} = 0.413$$
$$C = \sin^{-1}(0.413) \approx 24.4$$

Since the critical angle is small, most light rays entering the diamond hit the internal surface at angles ¿24.4°, causing total internal reflection.

Comparison with Other Materials:

Material	**Refractive Index**	**Critical Angle**
Diamond	2.42	24.4°
Glass	1.5	41.8°
Water	1.33	48.8°
Air	1.0	90°

Path of Light in a Diamond:

```
         Light enters
             ↓

    \           /
     \         /
      \       /
       \     /
        \   /
         \ /
          X         ← Multiple internal reflections
         / \
        /   \
       /     \
      /       \
     /         \
    /           \

             ↓
    Light exits (brilliance)
```

Factors Affecting Diamond's Shine:

- **Cut Quality:** Determines how well light is reflected internally
- **Clarity:** Inclusions can scatter light and reduce brilliance
- **Polish:** Smooth surfaces ensure proper reflection
- **Symmetry:** Precise facet alignment is crucial

Final Answer:

Diamond shines due to Total Internal Reflection (TIR) caused by its high refractive index (2.42) and sm

Quick Tip

The brilliance of a diamond depends on three optical properties: refractive index (determines light bending), critical angle (determines TIR condition), and dispersion (creates colorful fire). All three are exceptionally high in diamonds compared to other gemstones.

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8. How many electrons make one coulomb charge?

Solution:

Step 1: Understanding Quantization of Charge.

According to the principle of quantization of charge, the total charge (Q) on a body is always an integral multiple of the basic unit of charge (e), which is the charge of an electron. This is mathematically expressed by the formula:

$$Q = ne$$

Where Q is the total charge, n is the number of electrons, and e is the elementary charge of a single electron.

Step 2: Identifying Given Values.

In this problem, we are asked to find the number of electrons (n) that constitute a total charge of one coulomb. The values we have are:

- Total charge, $Q = 1$ C
- Charge of one electron, $e \approx 1.6 \times 10^{-19}$ C

Step 3: Calculating the Number of Electrons.

To find the value of n, we rearrange the quantization formula:

$$n = \frac{Q}{e}$$

Substituting the known values into the equation:

$$n = \frac{1 \text{ C}}{1.6 \times 10^{-19} \text{ C}}$$

$$n = 6.25 \times 10^{18}$$

Therefore, approximately 6.25×10^{18} electrons combine to make one coulomb of charge.

Quick Tip

The charge of an electron is extremely small (1.6×10^{-19} C), which is why it takes a massive number of electrons (over 6 quintillion) to form just one Coulomb.

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9. The minimum deviation angle obtained by a prism of refracting angle $60°$ is $30°$. Calculate the refractive index of the material of prism.

Solution:

Step 1: Identifying Given Data.

From the problem, we have the following parameters:

- Angle of the prism (Refracting angle), $A = 60°$
- Angle of minimum deviation, $\delta_m = 30°$

Step 2: Applying the Prism Formula.

The refractive index (μ) of the material of a prism is given by the prism formula:

$$\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\left(\frac{A}{2}\right)}$$

Step 3: Calculation.

Substituting the given values into the formula:

$$\mu = \frac{\sin\left(\frac{60°+30°}{2}\right)}{\sin\left(\frac{60°}{2}\right)}$$

$$\mu = \frac{\sin(45°)}{\sin(30°)}$$

Using trigonometric values ($\sin 45° = \frac{1}{\sqrt{2}}$ and $\sin 30° = \frac{1}{2}$):

$$\mu = \frac{1/\sqrt{2}}{1/2} = \frac{2}{\sqrt{2}} = \sqrt{2} \approx 1.414$$

The refractive index of the material of the prism is approximately 1.414.

Quick Tip

At the position of minimum deviation, the refracted ray inside the prism stays parallel to the base of the prism (if it is an isosceles or equilateral prism).

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10. Derive an expression for the capacitance of a parallel-plate capacitor when the medium between the plates is partially filled with a dielectric medium. What will be the effect on capacitance if it is completely filled by metallic strip?

Solution:

Step 1: Setting up the Parameters.

Consider a parallel-plate capacitor with plate area A and separation d. Let a dielectric slab of thickness t ($t < d$) and dielectric constant K be introduced between the plates. The electric field in the vacuum region is $E_0 = \frac{\sigma}{\epsilon_0}$, and the field inside the dielectric is $E = \frac{E_0}{K}$.

Step 2: Calculating Potential Difference.

The total potential difference V between the plates is the sum of the potential across the air gap and the potential across the dielectric:

$$V = E_0(d - t) + Et$$

$$V = E_0(d - t) + \frac{E_0}{K}t = E_0\left[(d - t) + \frac{t}{K}\right]$$

Substituting $E_0 = \frac{Q}{A\epsilon_0}$:

$$V = \frac{Q}{A\epsilon_0}\left[(d - t) + \frac{t}{K}\right]$$

Step 3: Deriving Capacitance.

Capacitance C is defined as $C = \frac{Q}{V}$. Substituting the expression for V:

$$C = \frac{Q}{\frac{Q}{A\epsilon_0}\left[(d - t) + \frac{t}{K}\right]} = \frac{A\epsilon_0}{(d - t) + \frac{t}{K}}$$

This is the required expression.

Step 4: Effect of a Metallic Strip.

If the space is completely filled with a metallic strip, then $t = d$. For a conductor, the dielectric constant $K \to \infty$. Substituting these into the formula:

$$C = \frac{A\epsilon_0}{(d - d) + \frac{d}{\infty}} = \frac{A\epsilon_0}{0} = \infty$$

The capacitance becomes infinite because the two plates are effectively short-circuited.

Quick Tip

Introducing a dielectric slab always increases the capacitance ($C > C_0$). The effective distance between the plates decreases from d to $(d - t + t/K)$, which makes the denominator smaller and the capacitance larger.

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11. Obtain an expression for fringe width in Young's double-slit experiment.

Solution:

Step 1: Experimental Setup.

Consider two coherent sources S_1 and S_2 separated by a distance d. Let D be the distance between the slits and the screen. A point P is located on the screen at a distance y from the central maximum O.

Step 2: Finding the Path Difference.

The path difference between the waves reaching P from S_1 and S_2 is $\Delta p = S_2P - S_1P$. For $D \gg d$, this path difference is approximately:

$$\Delta p = \frac{dy}{D}$$

For a bright fringe (constructive interference), the path difference must be an integral multiple of the wavelength (λ):

$$n\lambda = \frac{dy_n}{D} \implies y_n = \frac{nD\lambda}{d}$$

where y_n is the position of the n^{th} bright fringe.

Step 3: Calculating Fringe Width.

The fringe width (β) is the distance between two consecutive bright or dark fringes. It is calculated by subtracting the position of the n^{th} fringe from the $(n+1)^{th}$ fringe:

$$\beta = y_{n+1} - y_n$$

$$\beta = \frac{(n+1)D\lambda}{d} - \frac{nD\lambda}{d}$$

$$\beta = \frac{D\lambda}{d}$$

This expression shows that the fringe width is constant for a given experimental setup.

Quick Tip

To increase the fringe width (make the pattern more spread out), you can either increase the distance to the screen (D), use light with a longer wavelength (λ), or bring the two slits closer together (decrease d).
