

SOLUTIONS MANUAL ELECTRICITY AND MAGNETISM NAYFEH

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Solutions Manual for Electricity and Magnetism by Nayfeh

Question: Find the electric field inside a spherical shell of radius R carrying a uniform surface charge σ .

Answer: Using Gauss's theorem, we integrate the electric field over a spherical surface of radius $r < R$:

$$\oint \mathbf{E} \cdot d\mathbf{A} = q_{\text{enclosed}} / \epsilon_0$$

where $q_{\text{enclosed}} = \sigma \cdot 4\pi r^2$. Since the field is radial and uniform, we have:

$$E \cdot 4\pi r^2 = \sigma \cdot 4\pi r^2 / \epsilon_0$$

$$E = \sigma / \epsilon_0$$

Therefore, the electric field inside the shell is constant and given by $E = \sigma / \epsilon_0$.

Question: A cylindrical capacitor consists of two coaxial cylinders of radii a and b , with the inner cylinder carrying a charge $+Q$ and the outer cylinder carrying a charge $-Q$. Find the capacitance per unit length.

Answer: The potential difference between the cylinders is:

$$V = \int \mathbf{E} \cdot d\mathbf{l} = \int (Q / 2\pi\epsilon_0 r) dr$$

where r is the distance from the axis of the cylinders. From this, we obtain:

$$C = Q / V = 2\pi\epsilon_0 / \ln(b/a)$$

Thus, the capacitance per unit length is $C = 2\pi\epsilon_0 / \ln(b/a)$.

Question: A long solenoid of length L and radius R carries a current I . Find the magnetic field inside the solenoid.

Answer: Using Ampère's law, we integrate the magnetic field around a circular path of radius $r < R$ inside the solenoid:

$$\oint \mathbf{B} \cdot d\mathbf{l} = \mu_0 I$$

where μ_0 is the permeability of vacuum. Since the field is tangential and uniform, we have:

$$B \cdot 2\pi r = \mu_0 I$$

$$\oint \mathbf{B} = \mu_0 I / (2\pi r)$$

Therefore, the magnetic field inside the solenoid is proportional to r and is given by $B = \mu_0 I / (2\pi r)$.

Question: A transformer consists of two coils wound on a common core. The primary coil has N_1 turns and the secondary coil has N_2 turns. When an alternating current is passed through the primary coil, an alternating voltage is induced in the secondary coil. Find the turns ratio of the transformer.

Answer: The turns ratio is the ratio of the number of turns in the secondary coil to the number of turns in the primary coil:

$$\text{turns ratio} = N_2 / N_1$$

The turns ratio determines the ratio of the voltage induced in the secondary coil to the voltage applied to the primary coil.

Question: A particle with charge q and mass m moves in a circular path of radius r in a magnetic field B . Find the angular frequency of the particle's motion.

Answer: The centripetal force on the particle is provided by the magnetic force:

$$mv^2 / r = qvB$$

where v is the particle's speed. Substituting $v = r\omega$, where ω is the angular frequency, we obtain:

$$\omega = \frac{qB}{m}$$

Therefore, the angular frequency of the particle's motion is proportional to the magnetic field strength and inversely proportional to the particle's mass.

Technical English 2 Audio CD Workbook: Questions and Answers

1. What is the purpose of the Technical English 2 Audio CD Workbook?

The Technical English 2 Audio CD Workbook is a supplementary resource designed to enhance the learning experience for students of Technical English 2. It provides additional practice and reinforcement of the vocabulary, grammar, and communication skills introduced in the textbook.

2. What does the workbook include?

The workbook includes a variety of listening and speaking exercises that cover a range of technical topics, such as engineering, computer science, and manufacturing. It features audio recordings of native English speakers in realistic situations, such as meetings, presentations, and workplace conversations.

3. How can students benefit from using the workbook?

By working through the exercises in the workbook, students can improve their technical English listening comprehension, pronunciation, and fluency. They can also gain practice in using technical vocabulary and grammar in a variety of professional contexts.

4. Is the workbook suitable for all levels of learners?

The workbook is primarily designed for intermediate-level learners of Technical English who have a basic understanding of the language. However, it can also be used by advanced learners who wish to refine their skills and expand their technical vocabulary.

5. How can students access the audio recordings?

The audio recordings for the workbook are available online or on CD. Students can download or stream the recordings and listen to them on their computers, smartphones, or other devices.

Verlyn Klinkenborg: A Master of Concise Writing

Verlyn Klinkenborg, an acclaimed American essayist and novelist, is renowned for his remarkable ability to convey complex ideas in a concise and engaging manner. Here are several short sentences about his writing:

1. Poetic Simplicity:

Klinkenborg's writing evokes poetry with its simplicity and emotional depth. His sentences are often short and to the point, yet they resonate with a lyrical quality.

2. Clarity and Precision:

Despite the brevity of his sentences, Klinkenborg's writing is remarkably clear and precise. He chooses words carefully to convey his meaning exactly, leaving no room for ambiguity.

3. Attention to Sensory Detail:

Klinkenborg's prose is rich in sensory detail, allowing readers to experience the world through their own senses. His vivid descriptions evoke the sights, sounds, and textures of the natural world.

4. Thoughtful Exploration:

While his sentences may be short, Klinkenborg's essays are thoughtful and nuanced. He delves deeply into complex topics, exploring different perspectives and challenging conventional wisdom.

5. Lasting Impact:

Despite the brevity of his sentences, Klinkenborg's writing has a lasting impact. His essays invite contemplation and inspire readers to reflect on their own experiences and beliefs.

Frequently Asked Questions

- **Why is Klinkenborg's writing considered concise?** His sentences are short and to the point, eliminating unnecessary words and phrases.
- **How does his simplicity enhance his writing?** Simplicity allows him to focus on essential ideas and convey them more effectively.
- **What is the significance of sensory detail in his work?** Sensory details immerse readers in the world he describes, making his writing more vivid and engaging.
- **How does Klinkenborg's conciseness impact his overall message?** It ensures that his ideas are communicated clearly and without distraction, leaving a lasting impression on readers.
- **What sets Klinkenborg's writing apart from others?** His unique combination of poetic simplicity, clarity, sensory detail, thoughtful exploration, and lasting impact makes his writing highly distinctive.

The Tetrapod Reptiles of Ceylon, Vol. I: Testudinales and Crocodilians Reprint

Overview

The Tetrapod Reptiles of Ceylon, Vol. I: Testudinales and Crocodilians is a comprehensive study of the reptile species found in Sri Lanka. This reprint edition presents the original work by researchers P. E. P. Deraniyagala, published in 1939.

Question 1: What types of reptiles are covered in this volume?

Answer: The first volume of The Tetrapod Reptiles of Ceylon focuses exclusively on testudinales (turtles and tortoises) and crocodilians.

Question 2: What is the significance of this publication?

Answer: This volume is considered a seminal work in the field of herpetology in Sri Lanka. It provides detailed descriptions, illustrations, and distribution maps for each species, establishing a baseline for the study of reptiles in the region.

Question 3: What are the key features of the turtles and tortoises discussed in this volume?

Answer: The volume describes seven species of turtles and tortoises found in Sri Lanka, including marine turtles, freshwater turtles, and land tortoises. It highlights their unique adaptations, nesting behaviors, and conservation status.

Question 4: What information is provided about the crocodilians?

Answer: The volume covers two species of crocodilians: the mugger crocodile (*Crocodylus palustris*) and the estuarine crocodile (*Crocodylus porosus*). It discusses their distribution, habitat preferences, feeding habits, and interactions with humans.

Question 5: Why is this reprint edition valuable?

Answer: The reprint edition of *The Tetrapod Reptiles of Ceylon* provides access to this important historical work that is scarce in its original form. Herpetologists, conservationists, and anyone interested in the reptiles of Sri Lanka can benefit from the wealth of information contained within its pages.

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