Applied Physics

BS Software Engineering/Information Technology

1st Semester

Lecture # 23

Presented By

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Multiple choice questions

MULTIPLE CHOICE

28-1 Potential Energy

28-2 Electric Potential Energy

28-3 Electric Potential

1. A negative point charge is moved from a to several possible final points b in Fig. 28-25. Which path requires the greatest amount of external work to move the particle?

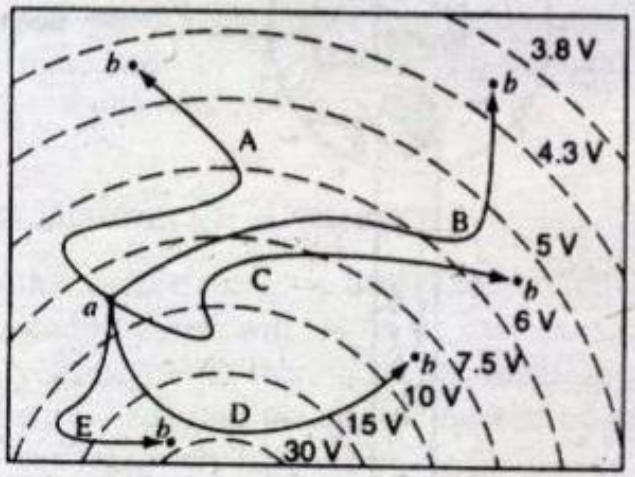


FIGURE 28-25. Multiple-choice question 1.

2. An electron is released from rest in a region of space with a nonzero electric field. Which of the following statements is true?
   (A) The electron will begin moving toward a region of higher potential.
   (B) The electron will begin moving toward a region of lower potential.
   (C) The electron will begin moving along a line of constant potential.
   (D) Nothing can be concluded unless the direction of the electric field in known.

28-4 Calculating the Potential from the Field

3. Inside a charged conductor under electrostatic conditions,
   (A) $V = 0$. (B) $\partial V/\partial x = 0$. (C) $\partial^2 V/\partial x^2 = 0$.
   (D) Two of (A), (B), or (C) must be true.
   (E) All three must be true.

4. The electric field lines are closer together near object A than they are near object B. We can conclude
   (A) the potential near A is greater than the potential near B.
   (B) the potential near A is less than the potential near B.
   (C) the potential near A is equal to the potential near B.
   (D) nothing about the relative potentials near A or B.

5. Figure 28-26 shows the electric field lines around three point charges, A, B, and C.
   (a) Which point corresponds to the highest potential?
   (A) P (B) Q (C) R
   (D) All three points are at the same potential.
   (b) Which point corresponds to the lowest potential?
   (A) P (B) Q (C) R
   (D) All three points are at the same potential.

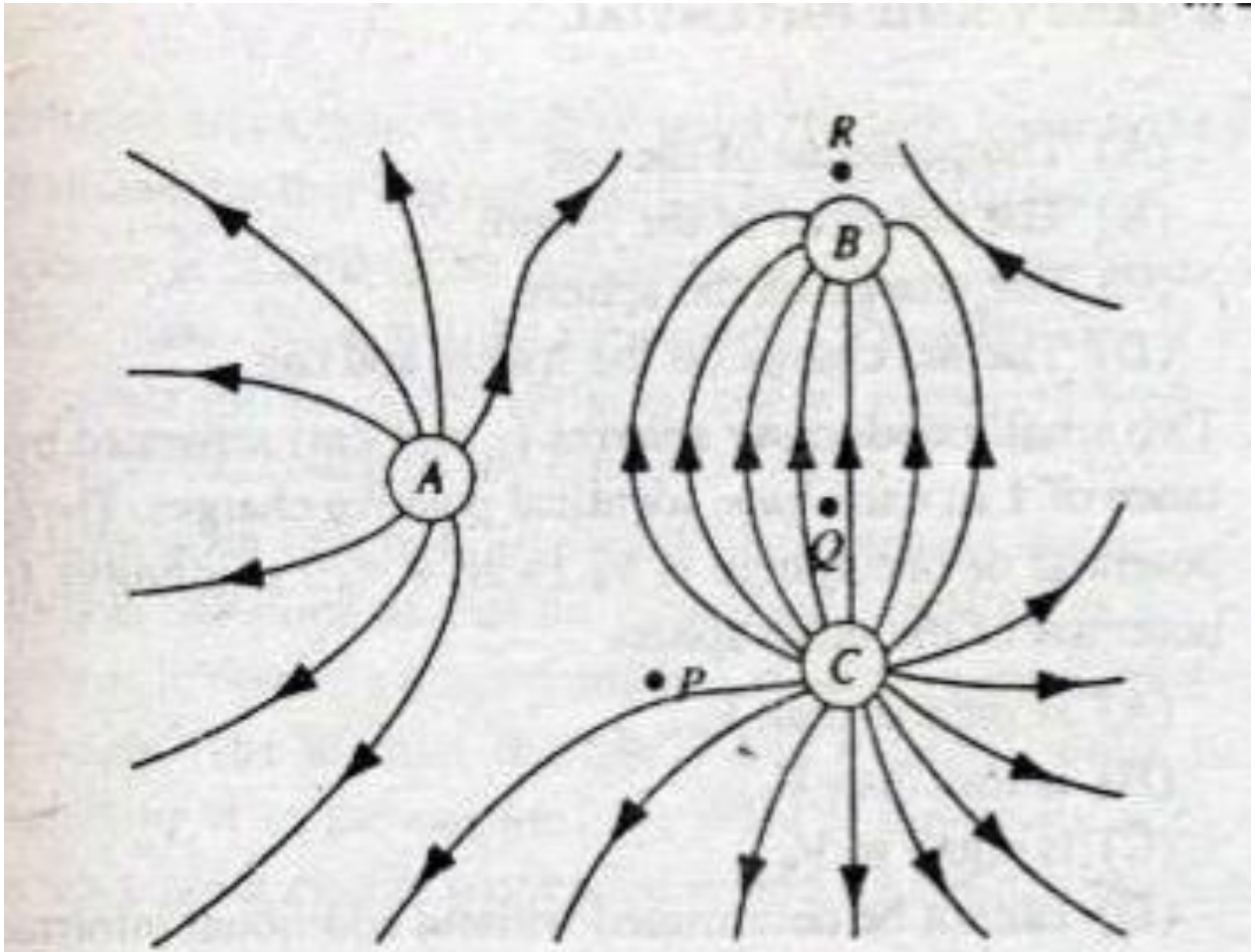


FIGURE 28-26. Multiple-choice question 5.

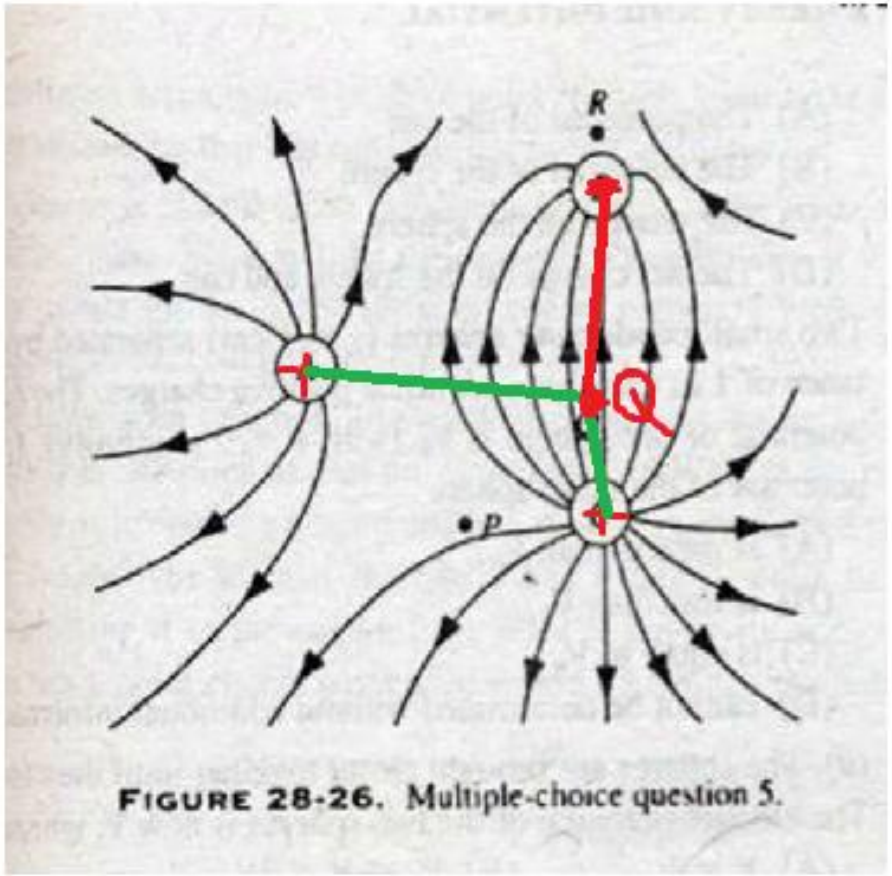


FIGURE 28-26. Multiple-choice question 5.

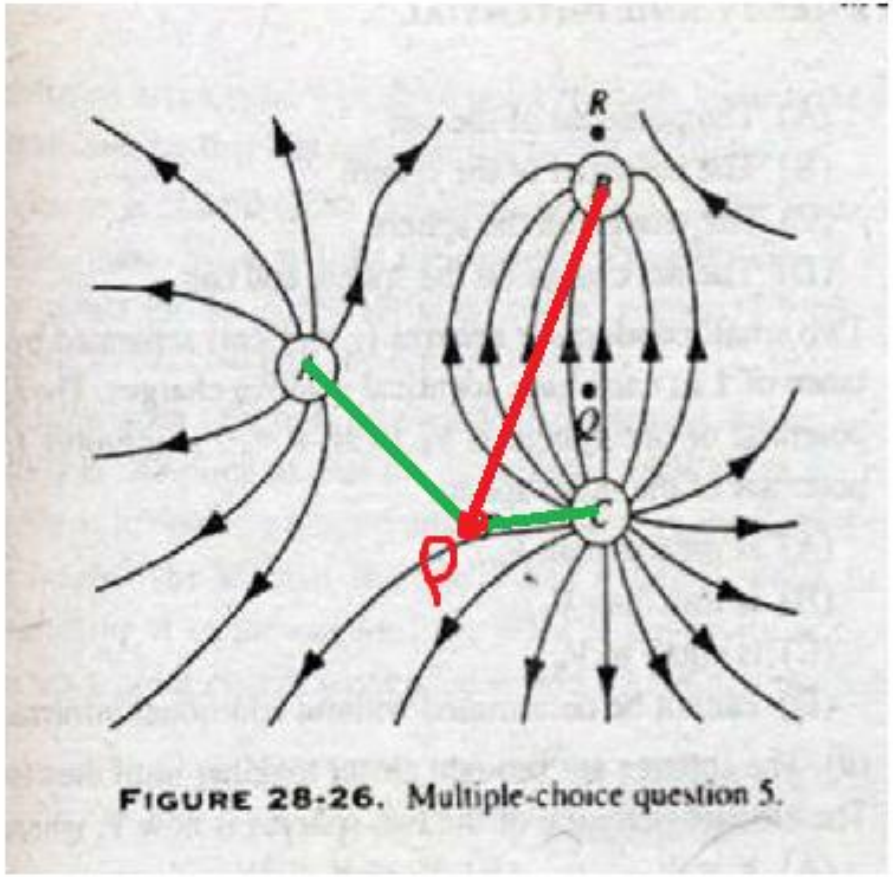


FIGURE 28-26. Multiple-choice question 5.

Both current and current density have directions associated with them. Are they vectors?

(A) Only current is a vector.
(B) Only current density is a vector.
(C) Both current and current density are vectors.
(D) Neither current nor current density is a vector.

A current flows through of a long cylindrical conductor. In which direction does the current flow?

(A) Toward the end with the higher potential
(B) Toward the end with the lower potential
(C) Neither (A) nor (B), since the surface of a conductor is an equipotential

A constant current flows through a conical conductor as shown in Fig. 29-16. End surfaces S_1 and S_2 are two different equipotential surfaces.

(*a*) Through which plane does the greatest current flow?

(A) 1 (B) 2 (C) 3 (D) 4

(E) The current is the same through all.

(*b*) Through which plane is the greatest electric flux?

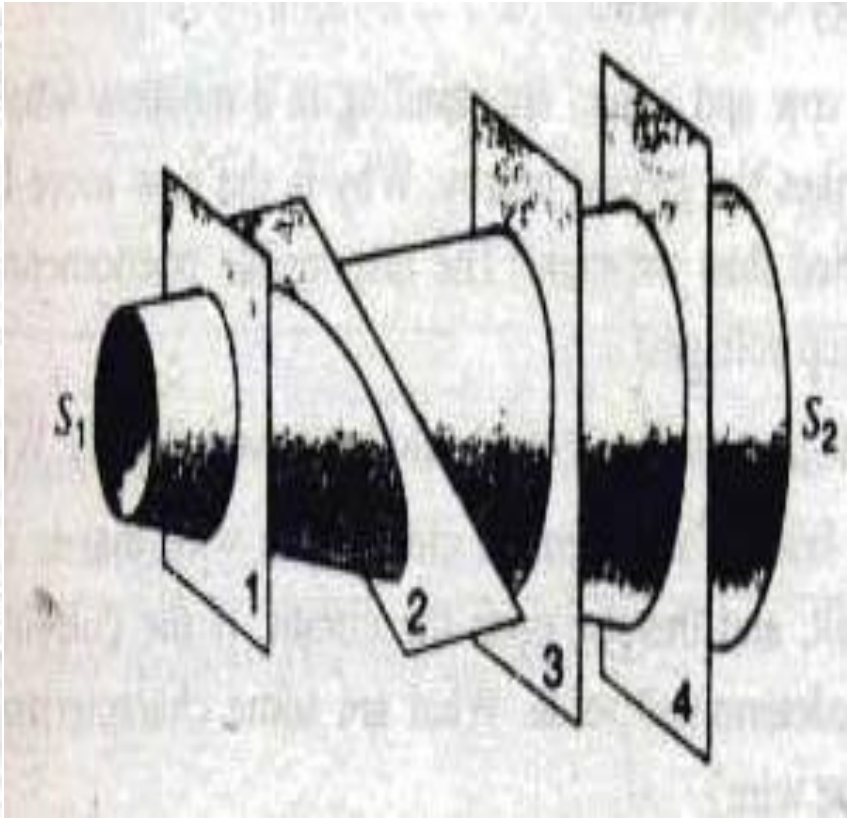
(A) 1 (B) 2 (C) 3 (D) 4

(E) The electric flux is the same through all.

(*c*) How does the magnitude of the electric field E vary along the central axis moving from S_1 to S_2?

(A) E is constant. (B) E increases.

(C) E decreases.



Two identically shaped wires, A and B, carry identical currents. The wires are made of different substances having differing electron densities, with $n_A > n_B$.

(*a*) Which wire will have the largest current density?

(A) A (B) B (C) The wires are the same.

(*b*) Which wire will have the larger drift speed for the electrons?

(A) A (B) B (C) The wires are the same.

(*c*) Which wire will have the larger electric field E in its interior?

(A) A (B) B (C) The wires are the same.

How does the resistance R of an ohmic substance depend on the magnitude E of the applied electric field?

(A) $R \propto E$ (B) ER = a constant

(C) $E + R$ = a constant (D) R is independent of E.

A steady current i_{in} flows through the wire that goes into a resistor. A steady current i_{out} flows through the wire that comes out the other end of the resistor.

(*a*) How do i_{in} and i_{out} compare?

(A) $i_{in} > i_{out}$ (B) $i_{in} < i_{out}$

(C) $i_{in} = i_{out}$ always (D) $i_{in} = i_{out}$ only if $R = 0$

How does the drift speed of electrons change as they move through a resistor?

(A) It increases.

(B) It decreases.

(C) It remains the same.

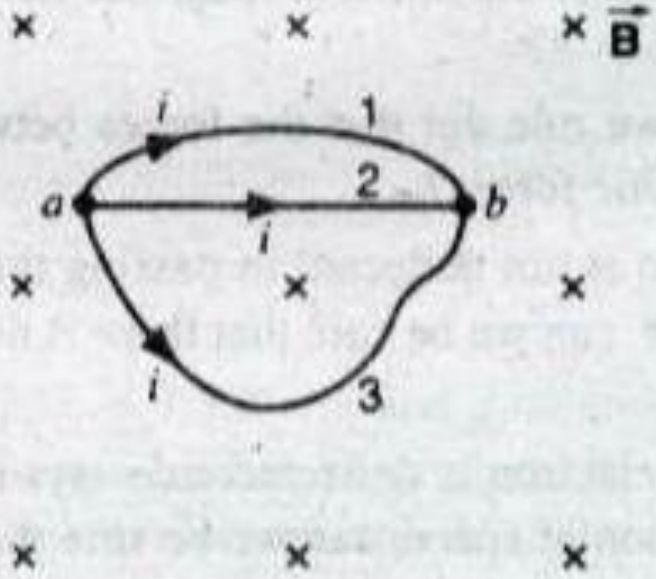
32-5 The Magnetic Force on a Current-Carrying Wire

12. Figure 32-30 shows several wire segments that carry equal currents from *a* to *b*. The wires are in a uniform magnetic field $\vec{B}$ directed into the page. Which wire segment experiences the largest net force?

(A) 1 (B) 2 (C) 3

(D) All experience the same net force.

(E) The question cannot be answered without additional information.



MULTIPLE CHOICE

33-1 The Magnetic Field due to a Moving Charge

1. Two positive charges q_1 and q_2 are moving to the right in Fig. 33-28.

(*a*) What is the direction of the force on charge q_1 due to the magnetic field produced by q_2?

(A) Into the page (B) Out of the page
(C) Up the page (D) Down the page

(*b*) What is the direction of the force on charge q_2 due to the magnetic field produced by q_1?

(A) Into the page (B) Out of the page
(C) Up the page (D) Down the page

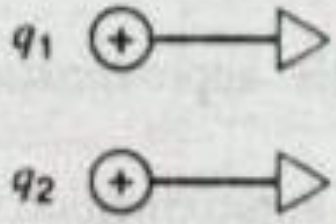
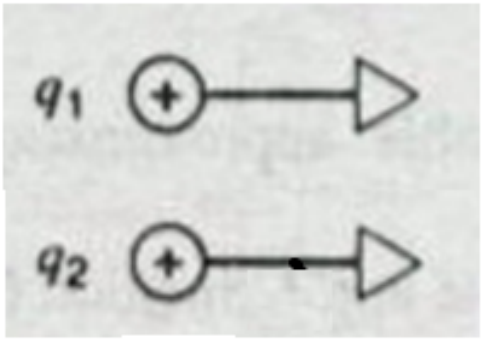
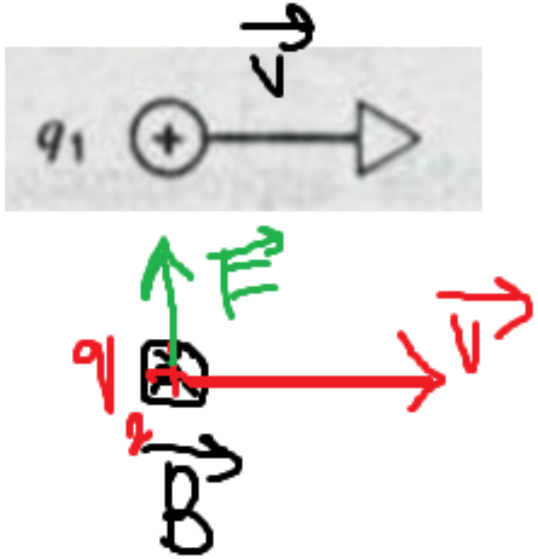
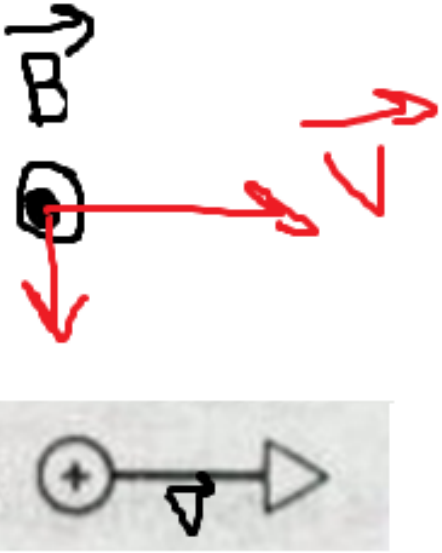
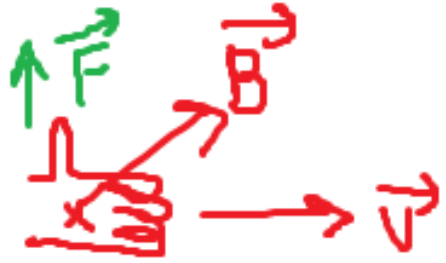


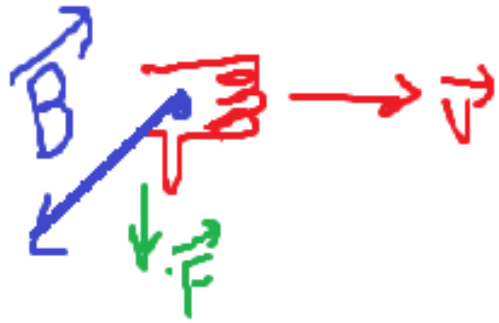
FIGURE 33-28. Multiple-choice question 1.


q_1
q_2


q_1
$\vec{v}$
$\vec{F}$
q
$\vec{B}$
$\vec{v}$


$\vec{B}$
$\vec{v}$
q_2


$\vec{F}$
$\vec{B}$
$\vec{v}$


$\vec{B}$
$\vec{v}$
$\vec{F}$