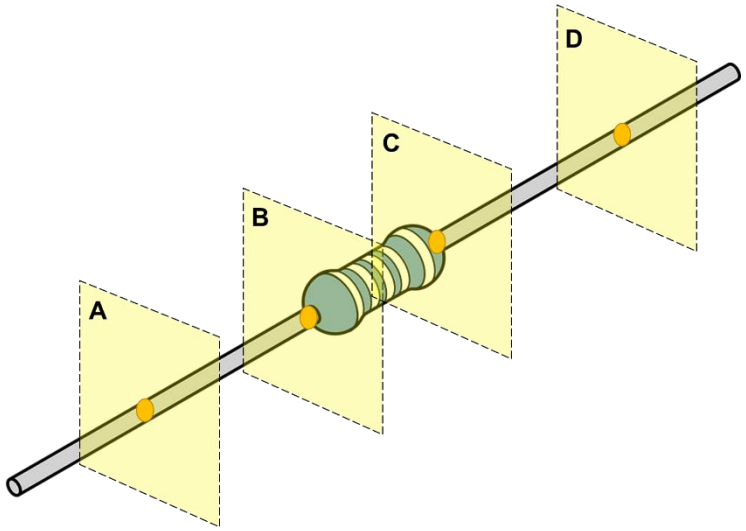
LECTURE 1 – FUNDAMENTALS OF ELECTRICAL ENGINEERING



Q1. There are 500 electrons flowing across the cross-sectional area of a copper wire every 5 seconds from A to B. What is the current in the copper wire from A to B?

Q2. In the above situation, what is the current flowing from B to C?

Q3. In the above situation, what is the current flowing from C to D?

Q4. In the above situation, what is the current flowing from B to D?

Q5. How many electrons would have to flow (and what direction) for there to be 5A of current flow from A to D?

Q6. Say we had to apply 10V at A with respect to D to have 5A of current flow in the resistor. How much is the resistance of the resistor?

Q7. The resistor is between B and C, the copper wire (between A and B, and between C and D) has zero resistance. What is the voltage between A and B?

Q8. What is the voltage at B with respect to D?

Q9. What is the power flow from C to B?

Q10. Is voltage an across variable or through variable? Why?

Q11. Is current an across variable or through variable? Why?

Q12. You have been presented with an inductor (above). There is 10A of current flowing through it, i.e., $I = 10A$. As you have not been told how long the current has been flowing, you should assume it has been flowing a long time. What happens if you suddenly open-circuit the inductor, i.e., stop any current flow through the inductor?

Q13. In the above situation (i.e., the moment when $I = 0A$ changed from $I = 10A$), would there be a voltage induced across the inductor? What would be the value of V (be careful about the polarity)?

Q14. Say we had an identical situation, but with a capacitor instead of an inductor, and you open-circuited the capacitor while there was 10A current flowing through it, what would happen? What would be the new value of V across the capacitor?

Q15. With the capacitor, what would have happened if you had short-circuited the capacitor (instead of open-circuit)?

Q16. When we "open-circuit an element", we are forcing (select option(s) from below) –

a. Current flowing through it to be zero
b. Current flowing through it to be infinity
c. Voltage across it to be zero
d. Voltage across it to be infinity

Q17. When we "short-circuit an element", we are forcing (select option(s) from below) –

a. Current flowing through it to be zero
b. Current flowing through it to be infinity
c. Voltage across it to be zero
d. Voltage across it to be infinity

Q18. In an inductor, the voltage across it is proportional to (select option(s) from below) –

a. Current through it
b. Rate of change of current through it

Q19. In a capacitor, the current through it is proportional to (select option(s) from below) –

a. Voltage across it
b. Rate of change of voltage across it