Multiple Choice Questions [1 mark]

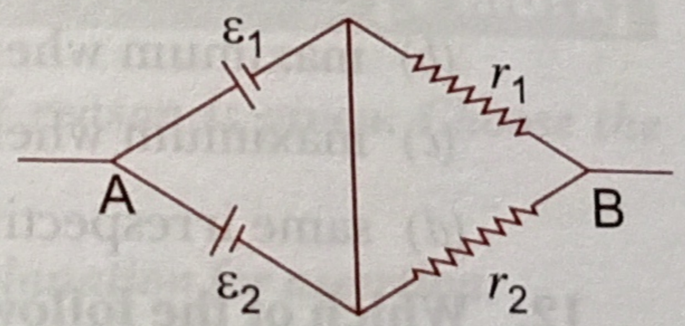
Choose and write the correct option(s) in the following questions.

1. **Consider a current carrying wire (current I) in the shape of a circle. Note that as the current progresses along the wire, the direction of j (current density) changes in an exact manner, while the current I remain unaffected. The agent that is essentially responsible for is** [*NCERT Exemplar*]

   (*a*) source of emf.
   (*b*) electric field produced by charges accumulated on the surface of wire.
   (*c*) the charges just behind a given segment of wire which push them just the right way by repulsion.
   (*d*) the charges ahead.

2. **Two batteries of emf ε_1 and ε_2 ($\varepsilon_2 > \varepsilon_1$) and internal resistances r_1 and r_2 respectively are connected in parallel as shown in Figure.** [*NCERT Exemplar*]

   (*a*) The equivalent emf ε_{eq} of the two cells is between ε_1 and ε_2, *i.e.* $\varepsilon_1 < \varepsilon_{eq} < \varepsilon_2$
   (*b*) The equivalent emf ε_{eq} is smaller than ε_1.
   (*c*) The ε_{eq} is given by $\varepsilon_{eq} = \varepsilon_1 + \varepsilon_2$ always.
   (*d*) ε_{eq} is independent of internal resistances r_1 and r_2.



3. **The drift velocity of the free electrons in a conducting wire carrying a current i is v. If in a wire of the same metal, but of double the radius, the current be $2i$, then the drift velocity of the electrons will be**

   (*a*) $v/4$ (*b*) $v/2$ (*c*) v (*d*) $4v$

4. **Assume that each atom of copper contributes one free electron. If the current flowing through a copper wire of 1 mm diameter is 1.1 A, the drift velocity of electrons will be (Density of Cu = 9×10^3 kg/m^3, At. wt. of Cu = 63, Avogadro number = 6.02×10^{26}/kg atom)**

   (*a*) 0.3 mm/s (*b*) 0.5 mm/s (*c*) 0.1 mm/s (*d*) 0.2 mm/s

5. **A resistance R is to be measured using a meter bridge. Student chooses the standard resistance S to be 100Ω. He finds the null point at $l_1 = 2.9$ cm. He is told to attempt to improve the accuracy. Which of the following is a useful way?** [*NCERT Exemplar*]

(*a*) He should measure l_1 more accurately.

(*b*) He should change S to 1000Ω and repeat the experiment.

(*c*) He should change S to 3Ω and repeat the experiment.

(*d*) He should give up hope of a more accurate measurement with a meter bridge.

6. **Two cells of emf's approximately 5V and 10V are to be accurately compared using a potentiometer of length 400 cm.** [*NCERT Exemplar*]

(*a*) The battery that runs the potentiometer should have voltage of 8V.

(*b*) The battery of potentiometer can have a voltage of 15V and R adjusted so that the potential drop across the wire slightly exceeds 10V.

(*c*) The first portion of 50 cm of wire itself should have a potential drop of 10V.

(*d*) Potentiometer is usually used for comparing resistances and not voltages.

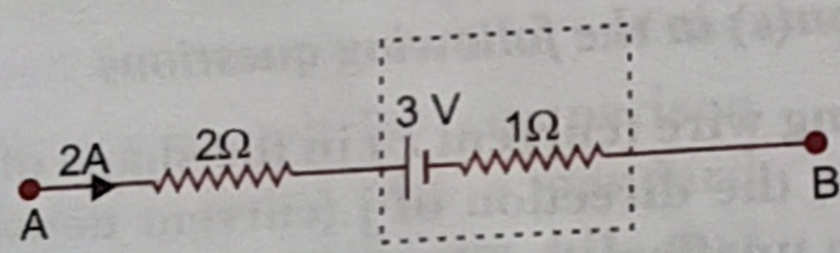
7. **If a copper wire is stretched to make it 0.1 % longer, the percentage increase in resistance will be**

(*a*) 0.2 (*b*) 2 (*c*) 1 (*d*) 0.1

8. **The resistivity of iron is 1×10^{-7} ohm-meter. The resistance of the given wire of a particular thickness and length is 1 ohm. If the diameter and length of the wire both are doubled the resistivity will be (in ohm-meter)**

(*a*) 1×10^{-7} (*b*) 2×10^{-7} (*c*) 4×10^{-7} (*d*) 8×10^{-7}

9. **Figure represents a part of a closed circuit. The potential difference between points A and B $(V_A - V_B)$ is**



(*a*) +9V (*b*) − 9V (*c*) +3V (*d*) + 6V

10. **A student connects 10 dry cells each of emf E and internal resistance r in series, but by mistake the one cell gets wrongly connected. Then net emf and net internal resistance of the combination will be**

(*a*) $8E, 8r$ (*b*) $8E, 10r$ (*c*) $10E, 10r$ (*d*) $8E, \frac{r}{10}$

11. **A metal rod of length 10 cm and a rectangular cross-section of 1cm × $\frac{1}{2}$ cm is connected to a battery across opposite faces. The resistance will be** [*NCERT Exemplar*]

(*a*) maximum when the battery is connected across 1 cm × $\frac{1}{2}$ cm faces.

(*b*) maximum when the battery is connected across 10 cm × 1 cm faces.

(*c*) maximum when the battery is connected across 10 cm × $\frac{1}{2}$ cm faces.

(*d*) same irrespective of the three faces.

12. **Which of the following characteristics of electrons determines the current in a conductor?** [*NCERT Exemplar*]

(*a*) Drift velocity alone

(*b*) Thermal velocity alone

(*c*) Both drift velocity and thermal velocity

(*d*) Neither drift nor thermal velocity.

13. **According to Joule's law, if potential difference across a conductor of material of resistivity remains constant, then heat produced in the conductor is directly proportional to**

(*a*) $\frac{1}{\sqrt{\rho}}$ (*b*) ρ (*c*) ρ^{-1} (*d*) ρ^2

14. **Two bulbs each marked 100 W, 220 V are connected in series across 220 V supply. The power consumed by them, when lit, is**

(*a*) 220 W (*b*) 100 W (*c*) 50 W (*d*) zero

15. **Two bulbs each marked 100 W, 220 V are connected in parallel across 220 V supply. The power consumed by them, when lit, is**

(*a*) 200 W (*b*) 100 W (*c*) 50 W (*d*) zero

16. **A 100 W, 200 V bulb is being operated at 160 V, the power dissipation is**

(*a*) 32 W (*b*) 64 W (*c*) 100 W (*d*) 160 W

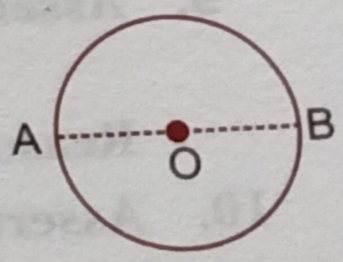
17. **A 5°C rise in temperature is observed in a conductor by passing a current. If the current is doubled, the rise in temperature of the conductor will be nearly**

(*a*) 10°C (*b*) 20°C (*c*) 40°C (*d*) 25°C

18. **Temperature dependence of resistivity ρ(T) of semiconductors insulators and metals is significantly based on the following factors.** [*NCERT Exemplar*]

(*a*) number of charge carriers can change with temperature T.
(*b*) time interval between two successive collision can depend on T.
(*c*) length of material can be a function of T.
(*d*) mass of carriers is a function of T.

19. **A wire of resistance 12Ω/m is bent to form a complete circle of radius 10 cm. The resistance between its two diametrically opposite points *A* and *B* as shown in figure is**



(*a*) 3 Ω (*b*) 6 πΩ (*c*) 6 Ω (*d*) 0.6 πΩ

[*NCERT Exemplar*]

20. **Kirchhoff's junction rule is a reflection of**

(*a*) conservation of current density vector.
(*b*) conservation of charge.
(*c*) the fact that the momentum with which a charged particle approaches a junction is unchanged (as a vector) as the charged particle leaves the junction.
(*d*) the fact that there is no accumulation of charged at a junction.