NEET ANSWER KEY & SOLUTIONS

SUBJECT :- PHYSICS

CLASS :- 12th **PAPER CODE :- CWT-3**

CHAPTER :- CURRENT ELECTRICITY

ANSWER KEY

1.	(D)	**2.**	(D)	**3.**	(A)	**4.**	(B)	**5.**	(B)	**6.**	(C)	**7.**	(C)
8.	(C)	**9.**	(A)	**10.**	(B)	**11.**	(D)	**12.**	(B)	**13.**	(D)	**14.**	(A)
15.	(A)	**16.**	(D)	**17.**	(C)	**18.**	(A)	**19.**	(B)	**20.**	(B)	**21.**	(D)
22.	(D)	**23.**	(B)	**24.**	(A)	**25.**	(D)	**26.**	(C)	**27.**	(A)	**28.**	(D)
29.	(A)	**30.**	(A)	**31.**	(A)	**32.**	(A)	**33.**	(A)	**34.**	(C)	**35.**	(C)
36.	(C)	**37.**	(D)	**38.**	(A)	**39.**	(A)	**40.**	(A)	**41.**	(B)	**42.**	(D)
43.	(C)	**44.**	(A)	**45.**	(D)	**46.**	(A)	**47.**	(B)	**48.**	(A)	**49.**	(C)
50.	(B)												

SOLUTIONS

SECTION-A

1. (D)

Sol. $\frac{\rho_1}{\rho_2}=\frac{(1+\alpha t_1)}{(1+\alpha t_2)} \Rightarrow \frac{1}{2}=\frac{(1+0.00125\times 27)}{(1+0.00125\times t)}$

$\Rightarrow t = 854\,°C \Rightarrow T = 1127\,K$

2. (D)

Sol. Resistivity is the property of the material. It does not depend upon size and shape.

3. (A)

Sol. Because with rise in temperature resistance of conductor increase, so graph between *V* and *i* becomes non linear.

4. (B)

Sol. $\text{Volume} = Al = 3 \Rightarrow A = \frac{3}{l}$ Now

$R=\rho\frac{l}{A} \Rightarrow 3=\frac{\rho\times l}{3/l}=\frac{\rho l^2}{3} \Rightarrow l^2=\frac{9}{\rho}=\frac{3}{\sqrt{\rho}}$

5. (B)

Sol. $R \propto \frac{l}{A} \propto \frac{l}{d^2}$

$\Rightarrow \frac{R_1}{R_2}=\frac{l_1}{l_2}\times\left(\frac{d_2}{d_1}\right)^2=\frac{L}{4L}\left(\frac{2d}{d}\right)^2=1$

$\Rightarrow R_2 = R_1 = R$.

6. (C)

Sol. $v_d=\frac{i}{nAe}=\frac{1.344}{10^{-6}\times1.6\times10^{-19}\times8.4\times10^{22}}$

$=\frac{1.344}{10\times1.6\times8.4}=0.01\,cm/s=0.1\,mm/s$

7. (C)

Sol. $P = \frac{v^2}{R_{eq}}$ v = 10volt

$R_{eq} = \left(\frac{5R}{5+R}\right)$

P = 30W

$30 = \frac{(10)^2}{\left(\frac{5R}{5+R}\right)} \Rightarrow \frac{15R}{5+R} = 10$

$15R = 50 + 10R \Rightarrow 5R = 50 \Rightarrow R = 10\Omega$

8. (C)

Sol. $R=\rho\frac{l}{A}$

9. (A)

Sol. Since $R \propto l^2 \Rightarrow$ If length is increased by 10%, resistance is increases by almost 20% Hence new resistance $R' = 10 + 20\%$ of 10 $= 10+\frac{20}{100}\times10 = 12\,\Omega$.

10. (B)

Sol. $R \propto l^2 \Rightarrow$ If *l* doubled then *R* becomes 4 times.

11. (D)

Sol. Resistivity depends only on the material of the conductor.

12. (B)

Sol. *Ge* is semiconductor and *Na* is a metal. The conductivity of semiconductor increases and that of the metals decreases with the rise in temperature.

13. (D)

Sol. $R \propto \frac{l^2}{m}$

$\Rightarrow R_1 : R_2 : R_3 = \left(\frac{l_1}{m_1}\right)^2 : \left(\frac{l_2}{m_2}\right)^2 : \left(\frac{l_3}{m_3}\right)^2$

$=\frac{25}{1}:\frac{9}{3}:\frac{1}{5} = 25:3:\frac{1}{5} \Rightarrow 125:15:1$.

14. (A)

Sol. $i=\frac{ne}{t} \Rightarrow 16\times10^{-3}=\frac{n\times1.6\times10^{-19}}{1} \Rightarrow n=10^{17}$

15. (A)

Sol. $R=\frac{V}{i}=\rho\frac{l}{A} \Rightarrow \frac{2}{4}=\rho\frac{50\times10^{-2}}{(1\times10^{-3})^2}$

$\Rightarrow \rho = 1\times10^{-6}\,\Omega m$.

16. (D)

Sol. $l=\frac{R\pi r^2}{\rho}=\frac{4.2\times3.14\times(0.2\times10^{-3})^2}{48\times10^{-8}}=1.1\,m$

17. (C)

Sol. Same mass, same material *i.e.* volume is same or Al = constant

Also, $R = \rho \frac{l}{A} \Rightarrow \frac{R_1}{R_2} = \frac{l_1}{l_2} \times \frac{A_2}{A_1} = \left(\frac{A_2}{A_1}\right)^2 \left(\frac{d_2}{d_1}\right)^4$

$\Rightarrow \frac{24}{R_2} = \left(\frac{d}{d/2}\right)^4 = 16 \Rightarrow R_2 = 1.5\Omega$.

18. (A)

19. (B)

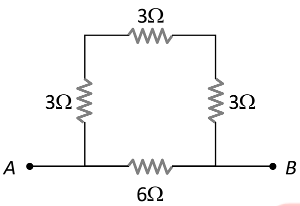
20. (B)

Sol. Resistance of parallel group $= \frac{R}{2}$

$\therefore$ Total equivalent resistance = $4 \times \frac{R}{2} = 2R$

21. (D)

Sol. The circuit reduces to



$R_{AB} = \frac{9 \times 6}{9+6} = \frac{9 \times 6}{15} = \frac{18}{5} = 3.6\Omega$

22. (D)

Sol. As resistance $\propto$ Length Resistance of each arm $= \frac{12}{3} = 4\Omega$

$\Rightarrow R_{\text{effective}} = \frac{4 \times 8}{4+8} = \frac{8}{3}\Omega$

23. (B)

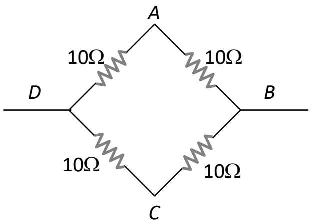
Sol. Because all the lamps have same voltage.

24. (D)

Sol. $R_{\text{series}} = R_1 + R_2 + R_3 + ...$

25. (A)

Sol. According to the problem, we arrange four resistance as follows



Equivalent resistance $= \frac{20 \times 20}{40} = 10\Omega$

26. (C)

Sol. $\frac{1}{R} = \frac{1}{1} + \frac{1}{1} + \frac{1}{1} = \frac{3}{1} \Rightarrow R = \frac{1}{3}\,ohm$

Now such three resistance are joined in series, hence total $R = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1\,ohm$

27. (A)

Sol. For same material and same length

$\frac{R_2}{R_1} = \frac{A_1}{A_2} = \frac{3}{2} \Rightarrow R_2 = 3R_1$

Resistance of thick wire $R_1 = 10\Omega$

$\therefore$ Resistance of thin wire $R_2 = 30\Omega$

Total resistance in series = 10 + 30 = 40 Ω

28. (D)

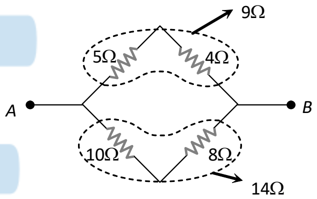
Sol. Two resistances in series are connected parallel with the third. Hence $\frac{1}{R_p} = \frac{1}{4} + \frac{1}{8} = \frac{3}{8} \Rightarrow R_p = \frac{8}{3}\Omega$

29. (A)

Sol. Given circuit is a balance Wheatstone bridge circuit.

30. (A)

Sol. Since the given bridge is balanced, hence there will be no current through 9Ω resistance. This resistance has no effect and must be ignored in the calculations.

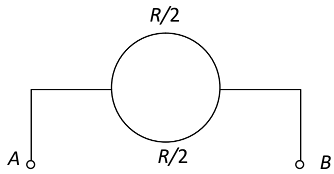


31. (A)

Sol. $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{2} + \frac{1}{4} + \frac{1}{5} = \frac{19}{20} \Rightarrow$

$R_{eq} = \frac{20}{19}\Omega$

32. (A)



Sol. $\Rightarrow R_{AB} = \frac{R/2}{2} = \frac{R}{4}$

33. (A)

Sol. Kirchhoff's first law is based on the law of conservation of charge.

34. (C)

Sol. $i = \frac{50}{R+r} \Rightarrow r = \frac{50}{4.5} - 10 = \frac{5}{4.5} = 1.1\Omega$

35. (C)

Sol The voltage across cell terminal will be given by

$= \frac{E}{R+r} \times R = \frac{2}{(3.9+0.1)} \times 3.9 = 1.95\,V$

SECTION-B

36. (C)

Sol. $E = 2.2\,volt, \quad V = 1.8\,volt, \quad R = 5R$

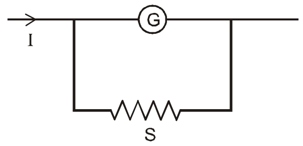
$$r = \left(\frac{E}{V} - 1\right)R = \left(\frac{2.2}{1.8} - 1\right) \times 5 = 1.1\Omega$$

37. (D)

38. (A)

39. (A)

Sol.



$$\frac{GS}{G+S} = \frac{V_G}{I} = \frac{25 \times 10^{-3}}{25}$$

$$\frac{GS}{G+S} = 0.001\ \Omega$$

Here S << G so

S = 0.001 Ω

40. (A)

41. (B)

Sol. $E = \frac{e}{(R + R_h + r)} \cdot \frac{R}{L} \times l$

$$\Rightarrow 10 \times 10^{-3} = \frac{2}{(10 + R + 0)} \times \frac{10}{1} \times 0.4$$

$\Rightarrow R = 790\Omega$

42. (D)

Sol. $i_g = \frac{i}{10}$

$\Rightarrow$ Required shunt $S = \frac{G}{(n-1)} = \frac{90}{(10-1)} = 10\ \Omega$

43. (C)

44. (A)

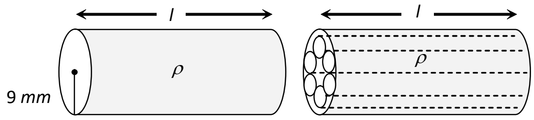
Sol. Initially : Resistance of given cable

$$R = \rho \frac{l}{\pi \times (9 \times 10^{-3})^2} \quad \text{... (i)}$$

Finally : Resistance of each insulated copper wire is

$R' = \rho \frac{l}{\pi \times (3 \times 10^{-3})^2}$ .Hence equivalent resistance of cable

$$R_{eq} = \frac{R'}{6} = \frac{1}{6} \times \left(\rho \frac{l}{\pi \times (3 \times 10^{-3})^2}\right) \quad \text{....(ii)}$$



On solving equation (i) and (ii) we get R_{eq} = 7.5 Ω

45. (D)

Sol. Current in the bulb $= \frac{P}{V} = \frac{4.5}{1.5} = 3A$

Current in 1 Ω resistance $= \frac{1.5}{1} = 1.5A$

Hence total current from the cell $i = 3 + 1.5 = 4.5A$ By using $E = V + ir$

$\Rightarrow E = 1.5 + 4.5 \times (2.67) = 13.5V$

46. (A)

47. (B)

Sol. When we move in the direction of the current in a uniform conductor, the potential difference decreases linearly. When we pass through the cell, from it's negative to it's positive terminal, the potential increases by an amount equal to it's potential difference. This is less than it's emf, as there is some potential drop across it's internal resistance when the cell is driving current.

48. (A)

Sol. Apply Kirchhoff's second law also called loop rule.

The algebraic sum of the changes in potential in complete transversal of a mesh (closed loop) is zero i.e, ΣV = 0

Here $\varepsilon_1 - (i_1 + i_2)R - i_1 r_1 = 0$

If there are n meshes in a circuit, the number of independent equation in accordance with loop law will be (n–1).

49. (C)

Sol. Ammeter is used to measure the current through the circuit.

50. (B)