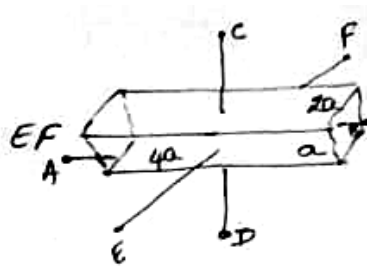
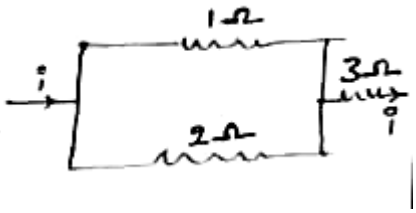
SINGLE CORRECT OPTION TYPE

1. A conductor with rectangular cross section has dimensions $(a \times 2a \times 4a)$ as shown in figure. Resistance across AB is 'x' across CD is 'y' and across EF is 'z', then



(A) $x = y = z$ (B) $x > y > z$
(C) $y > z > x$ (D) $x > z > y$

2. In the circuit shown in figure power developed across 1Ω, 2Ω and 3Ω resistances are in the ratio of



(A) 1:2:3 (B) 4:2:27
(C) 6:4:9 (D) 2:1:27

3. n identical cells are joined in series with two cells A and B with reversed polarities. EMF of each cell is E and internal resistance is r. Potential difference across cell A or B is $(n > 4)$.

(A) $\frac{2E}{n}$ (B) $2E\left(1-\frac{1}{n}\right)$ (C) $\frac{4E}{n}$ (D) $2E\left(1-\frac{2}{n}\right)$

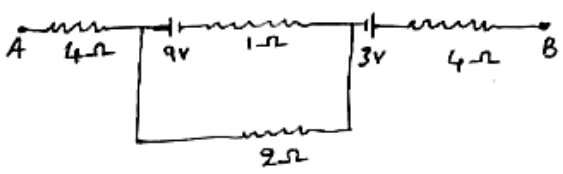
4. A galvanometer of resistance 20Ω gives a full scale deflection when a current of 0.04 A is passed through it. It is desired to convert it into an ammeter reading 20 A in full scale. The only shunt available is 0.05Ω resistance. The resistance that must be connected in series with the coil of the galvanometer is

(A) 4.95Ω (B) 5.94Ω (C) 9.45Ω (D) 12.62Ω

5. The length of a potentiometer wire is 'l'. A cell of EMF 'E' is balanced at a length $\frac{l}{3}$ from the positive end of the wire. If the length of the wire is increased by $\frac{l}{2}$. At what distance will the same cell give a balance point.

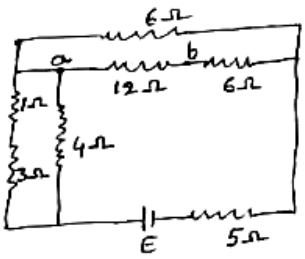
(A) $\frac{2l}{3}$ (B) $\frac{l}{2}$ (C) $\frac{l}{6}$ (D) $\frac{4l}{3}$

6. In the circuit shown in figure potential difference between points A and B is 16v. The current passing through 2Ω resistance will be



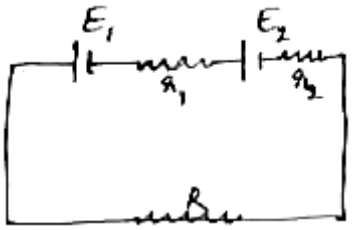
(A) 2.5A (B) 3.5A
(C) 4.0A (D) zero

7. In the circuit shown in figure, the potential difference between points a and b is $v_a - v_b = 4v$. Find the emf E of the battery.



(A) $\frac{46}{3}v$ (B) $\frac{46}{5}v$
(C) $\frac{23}{3}v$ (D) $\frac{23}{5}v$

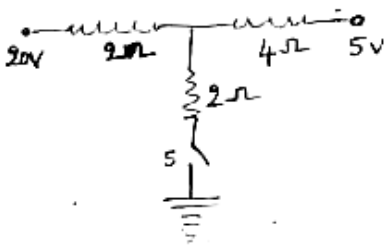
8. Under what conditions current passing through the resistance R can be increased by short circuiting the battery of emf E_2. The internal resistance of the two batteries are r_1 and r_2 respectively



(A) $E_2r_1 > E_1(R+r_2)$ (B) $E_1r_2 < E_2(R+r_1)$

(C) $E_2r_2 < E_1(R+r_2)$ (D) $E_1r_1 > E_2(R+r_1)$

9. As the switch 's' is closed in the circuit shown in figure. Current passed through it is _____.



(A) 4.5A (B) 6.0A

(C) 3.0A (D) zero

10. Two series of same dimension but resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity of the combination is _____.

(A) $\rho_1+\rho_2$ (B) $\frac{1}{2}(\rho_1+\rho_2)$ (C) $\sqrt{\rho_1\rho_2}$ (D) $2(\rho_1+\rho_2)$

11. An inductor coil stores energy 'u' when a current 'i' is passed through it and dissipates energy at the rate of 'p'. The time constant of the circuit when this coil is connected across a battery of zero internal resistance is

(A) $\frac{4u}{p}$ (B) $\frac{u}{p}$ (C) $\frac{2u}{p}$ (D) $\frac{2p}{u}$

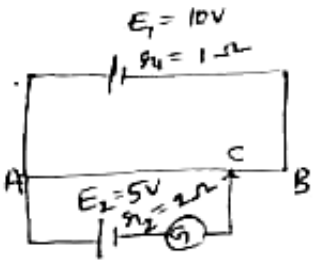
12. Temperature of a resistance at temperature $t°c$ is $R = R_0\left(1+at+bt^2\right)$. Here R_0 is the temperature at $0°c$. The temperature coefficient of resistance at temperature 't' is _____.

(A) $\frac{a+2bt}{1+at+bt^2}$ (B) $a+2bt$ (C) $\frac{1+at+bt^2}{a+2bt}$ (D) constant

13. A voltmeter with resistance 500Ω is used to measure the emf of a cell of internal resistance 4Ω. The percentage error in the reading of the voltmeter will be

(A) 0.2% (B) 0.8% (C) 1.4% (D) 2.2%

14. In the figure the potentiometer wire of length $l = 100cm$ and resistance 9Ω is joined to a cell of emf $E_1 = 10v$ and internal resistance $r_1 = 1\Omega$. Another cell of emf $E_2 = 5v$ and internal resistance $r_2 = 2\Omega$ is connected as shown. The galvanometer G will show no deflection when the length AC is

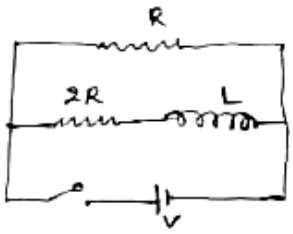


(A) 50 cm (B) 55.55 cm (C) 52.67 cm (D) 54.33 cm

15. Time constant of C-R circuit is $\frac{2}{\ln 2}$ second. Capacitor is discharged at time $t = 0$. The ratio of charge on the capacitor at time $t = 2s$ and $t = 6s$ is

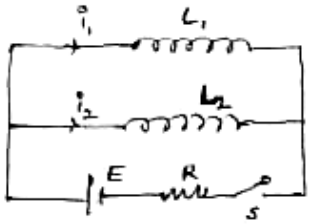
(A) 3:1 (B) 8:1 (C) 4:1 (D) 2:1

16. The ratio of the constants during charging and discharging of the circuit shown in figure is



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

17. In the circuit shown in figure. The steady state currents i_1 and i_2 in the coils after the switch 'S' is closed are



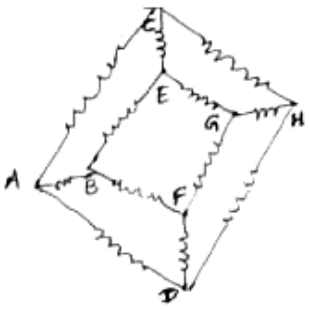
(A) $i_1 = \frac{EL_2}{R(L_1+L_2)}$ (B) $i_1 = \frac{EL_1}{R(L_1+L_2)}$

(C) $i_2 = \frac{EL_2}{R\sqrt{L_1L_2}}$ (D) $i_2 = \frac{E\sqrt{L_1L_2}}{RL_2}$

18. In the circuit shown in figure when switch S_1 is closed and S_2 is open, the ideal voltmeter shown a reading 18v. When switch S_2 is closed and S_1 is opened, the reading of voltmeter is 24v. When S_1 and S_2 both are closed the voltmeter reading will be

(A) 14.4v (B) 20.6v (C) 24.2v (D) 10.8v

19. Twelve resistors each of resistance 1Ω are connected in the circuit shown. Net resistance between points A and H would be



(A) $\frac{5}{3}\Omega$ (B) $\frac{1}{3}\Omega$

(C) $\frac{3}{4}\Omega$ (D) $\frac{7}{6}\Omega$

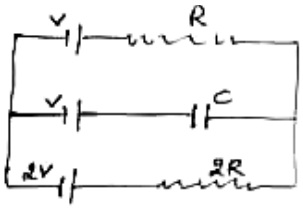
20. A resistance 'R' carries a current 'i'. The power lost to the surroundings is $\lambda(\theta-\theta_0)$. Here λ is a constant, θ is temperature of the resistance and 'θ_0' is the temperature of the atmosphere. If the coefficient of linear expansion is $\propto$. The strain in the resistance is _____.

(A) $\frac{\propto}{\lambda}i^2R$ (B) $\propto \lambda iR$ (C) $\frac{\propto i^2R}{2\lambda}$

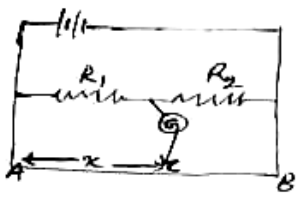
(D) proportional to the length of the resistance of wire

INTEGER TYPE

21. In the given circuit, with steady current, the potential drop across the capacitor must be $\frac{nv}{3}$. Find 'n'?



22. In the shown arrangement of the experiment of the meter bridge if AC corresponding to null deflection of galvanometer is nx. What would be the 'n' value if the radius of the wire AB is doubled?



23. An ideal gas is filled in a closed rigid and thermally insulated container. A coil is 100Ω resistor carrying current 1A for 5 minutes supplied heat to the gas. The change in internal energy of gas is $n(10kJ)$. Then 'n' value is _____.

24. A wire of length 'L' and three identical cells of negligible internal resistances are connected in series. Due to the current, the temperature of the wire is raised by ΔT in a time 't'. Number of similar cells are now connected in series with a wire of the same material and cross-section but of length 2 L. The temperature of the wire is raised by the same amount ΔT in the same time 't'. The value of 'N' is _____.

25. An ammeter reads upto 1A. Its internal resistance is 0.81 ohm to increase the range to 10A, the value of required shunt is $n(10^{-2}\text{ohm})$. The value of n is _____.

KEY

1.	D	**2.**	B	**3.**	A	**4.**	A	**5.**	B
6.	B	**7.**	A	**8.**	B	**9.**	A	**10.**	B
11.	C	**12.**	A	**13.**	B	**14.**	B	**15.**	C
16.	B	**17.**	A	**18.**	A	**19.**	C	**20.**	A
21.	1	**22.**	1	**23.**	3	**24.**	6	**25.**	9

✻ *Wish You all the Best* ✻