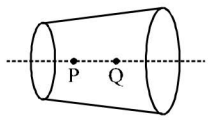
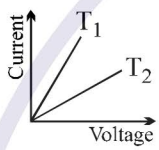
1. A wire has a non-uniform cross-section as shown in figure. A steady current flows through it. The drift speed of electrons at points P and Q is v_P and v_Q.



(1) $v_P = v_Q$ (2) $v_P < v_Q$
(3) $v_P > v_Q$ (4) Data insufficient

2. The current in a metallic conductor is plotted against voltage at two different temperatures T_1 and T_2. Which is correct



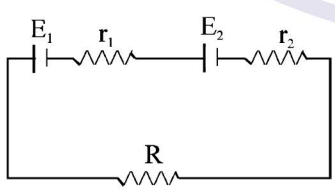
(1) $T_1 > T_2$ (2) $T_1 < T_2$
(3) $T_1 = T_2$ (4) none

3. Two resistances of equal magnitude R and having temperature coefficient α_1 and α_2 respectively are connected in parallel. The temperature coefficient of the parallel combination is, approximately

(1) $2(\alpha_1 + \alpha_2)$ (2) $\dfrac{\alpha_1\alpha_2}{\alpha_1 + \alpha_2}$

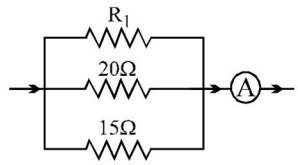
(3) $\dfrac{\alpha_1 - \alpha_2}{2}$ (4) $\dfrac{\alpha_1 + \alpha_2}{2}$

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



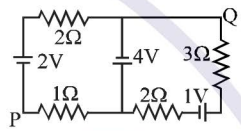
(1) $E_2r_1 > E_1 (R + r_2)$
(2) $E_1r_2 > E_2 (R + r_1)$
(3) $E_2r_2 > E_1 (R + r_2)$
(4) $E_1r_1 > E_2 (R + r_1)$

5. In the given circuit the current flowing through the resisitance 20 ohms is 0.3 ampere while the ammetre reads 0.8 ampere. What is the value of R_1?



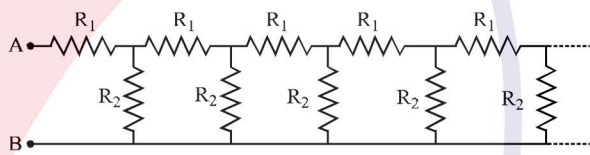
(1) 30 ohms (2) 40 ohms
(3) 50 ohms (4) 60 ohms

6. In the circuit shown, what is the potential difference V_{PQ}?



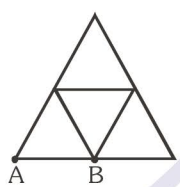
(1) + 3V (2) + 2V (3) –2V (4) none

7. Consider an infinte ladder network shown in figure. A voltage V is applied between the points A and B. This applied value of voltage is halved after each section.



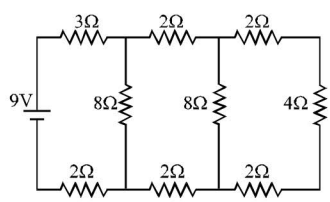
(1) $R_1/R_2 = 1$ (2) $R_1/R_2 = 1/2$
(3) $R_1/R_2 = 2$ (4) $R_1/R_2 = 3$

8. In the diagram resistance between any two junctions is R. Equivalent resistance across terminals A and B is



(1) $\dfrac{11R}{7}$ (2) $\dfrac{18R}{11}$ (3) $\dfrac{7R}{11}$ (4) $\dfrac{11R}{18}$

9. In the circuit shown in the figure, the current through:



(1) the 3Ω resistor is 0.50 A
(2) the 3Ω resistor is 0.25 A
(3) 4 Ω resistor is 0.50 A
(4) the 4Ω resistor is 0.25 A

10. Power generated across a uniform wire connected across a supply is H. If the wire is cut into n equal parts and all the parts are connected in parallel across the same supply, the total power generated in the wire is

(1) $\frac{H}{n^2}$ (2) n^2H (3) nH (4) $\frac{H}{n}$

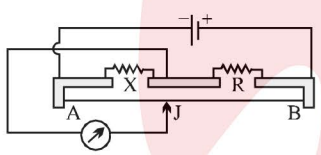
11. Two bulbs rated (25 W – 220V) and (100W – 220V) are connected in series to a 440 V line. Which one is likely to fuse?

(1) 25 W bulb (2) 100 W bulb
(3) both bulbs (4) none

12. If the length of the filament of a heater is reduced by 10%, the power of the heater will

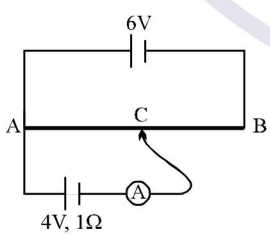
(1) increase by about 9%
(2) increase by about 11%
(3) increase by about 19%
(4) decrease by about 10%

13. The figure shows a metre-bridge circuit, with AB = 100 cm, X = 12Ω and R = 18Ω, and the jockey J in the position of balance. If R is now made 8Ω, through what distance will J have to be moved to obtain balance?



(1) 10 cm (2) 20 cm (3) 30 cm (4) 40 cm

14. A 6 V battery of negligible internal resistance is connected across a uniform wire of length 1 m. The positive terminal of another battery of emf 4V and internal resistance 1 Ω is joined to the point A as shown in figure. The ammeter shows zero deflection when the jockey touches the wire at the point C. The AC is equal to

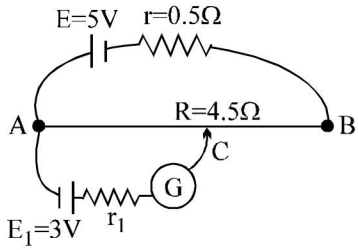


(1) 2/3 m (2) 1/3 m (3) 3/5 m (4) 1/2 m

15. A potentiometer wire has length 10 m and resistance 10Ω. It is connected to a battery of EMF 11 volt and internal resistance 1 Ω, then the potential gradient in the wire is

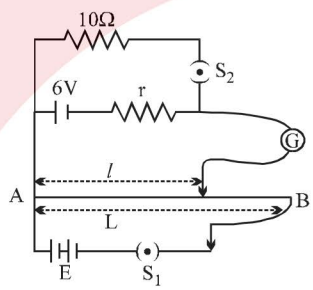
(1) 10 V/m (2) 1 V/m (3) 0.1 V/m (4) none

16. In the given potentiometer circuit length of the wire AB is 3 m and resistance is R = 4.5 Ω. The length AC for no deflection in galvanometer is



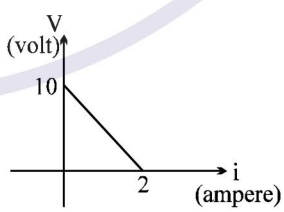
(1) 2 m (2) 1.8 m
(3) dependent on r_1 (4) none of these

17. In the arrangement shown in figure when the switch S_2 is open, the galvanometer shows no deflection for l = L/2. When the switch S_2 is closed, the galvanometer shows no deflection for $l = 5L/12$. The internal resistance (r) of 6 V cell, and the emf E of the other battery are respectively



(1) 3Ω, 8V (2) 2Ω, 12V
(3) 2Ω, 24V (4) 3Ω, 12V

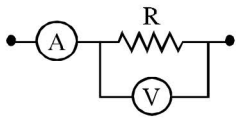
18. A battery of emf E and internal resistance r is connected across a resistance R. Resistance R can be adjusted to any value greater than or equal to zero. A graph is plotted between the current (i) passing through the resistance and potential difference (V) across it. Select the correct alternative(s).



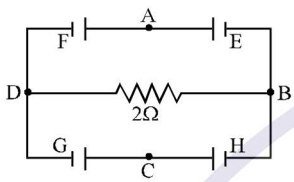
(1) internal resistance of battery is 5Ω
(2) emf of the battery is 20V
(3) maximum current which can be taken from the battery is 4A
(4) V- i graph can never be a straight line as shown in figure.

19. In the circuit shown the readings of ammeter and voltmeter are 4A and 20V respectively. The meters are non ideal, then R is :

(1) 5Ω
(2) less than 5Ω
(3) greater than 5Ω
(4) between 4Ω & 5Ω

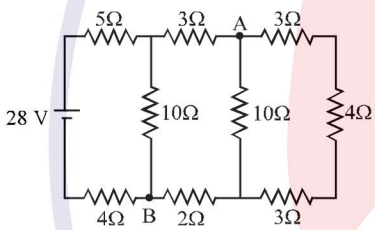


20. In the circuit shown E, F, G and H are cells of e.m.f. 2V, 1V, 3V and 1V respectively and their internal resistances are 2Ω, 1Ω, 3Ω and 1Ω respectively.



(1) $V_D - V_B = -2/13$ V
(2) $V_D - V_B = 2/13$ V
(3) $V_G = 21/13$ V = potential difference across G.
(4) $V_H = 19/13$ V = potential difference across H.

21. Consider the circuit shown in the figure



(1) the current in the 5 Ω resistor is 2 A
(2) the current in the 5 Ω resistor is 1 A
(3) the potential difference $V_A - V_B$ is 10 V
(4) the potential difference $V_A - V_B$ is 5 V

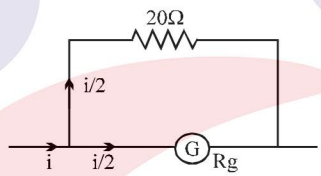
22. Two bulbs one of 200 volts, 60 watts & the other of 200 volts, 100 watts are connected in series to a 200 volt supply. The power consumed will be

(1) 37.5 watt (2) 160 watt
(3) 62.5 watt (4) 110 watt

23. The length of a potentiometer wire is ℓ. A cell of emf E is balanced at a length $\ell/3$ from the positive end of the wire. If the length of the wire is increased by $\ell/2$. At what distance will the same cell give a balance point.

(1) $\frac{2\ell}{3}$ (2) $\frac{\ell}{2}$ (3) $\frac{\ell}{6}$ (4) $\frac{4\ell}{3}$

24. In a galvanometer, the deflection becomes one half when the galvanometer is shunted by a 20Ω resistor. The galvanometer resistance is



(1) 5Ω (2) 10Ω
(3) 40Ω (4) 20Ω

25. A galvanometer has a resistance of 20Ω and reads full-scale when 0.2 V is applied across it. To convert it into a 10 A ammeter, the galvanometer coil should have a

(1) 0.01Ω resistor connected across it
(2) 0.02Ω resistor connected across it
(3) 200Ω resistor connected in series with it
(4) 2000 Ω resistor connected in series with it

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**2**	**4**	**2**	**4**	**2**	**2**	**4**	**4**	**2**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**1**	**2**	**2**	**1**	**2**	**4**	**2**	**1**	**3**	**1,3,4**
Que.	21	22	23	24	25					
Ans.	**1**	**1**	**2**	**4**	**2**					