ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

SOLUTION TO WORK SHEET 12

Subject : PHYSICS

CLASS : XII

Date : 10.6.20

Chapter : Current Electricity

Topic : e.m.f. terminal voltage, lost volt, shunt.

Multiple Choice Question : **1 x 15 = 15**

1. Find the value of the shunt to be connected across a galvanometer of resistance 20 ohm so that 1% of the main current passes through the galvanometer.

(a) 2.02 ohm (b) 3.02 ohm (c) 0.202 ohm (d) 20.2 ohm

Ans : (c) 0.202 ohm

2. The resistance of an ammeter is *R*. Find the value of the shunt required to increase the range of the ammeter *n* times.

(a) $\frac{R}{n}$ (b) $\frac{R}{n-1}$ (c) $\frac{R}{n+1}$ (d) nR

Ans. : (b) $\frac{R}{n-1}$

3. Shunt resistance is always —

(a) greater than galvanometer resistance (b) smaller than galvanometer resistance

(c) equal to galvanometer resistance (d) none of these

Ans. : (b) smaller than galvanometer resistance

4. When a resistance of 12Ω is connected with a cell of emf 1.5 *V*, 0.1 *A* current flows through the resistance. Internal resistance of the cell is

(a) 1Ω (b) 3Ω (c) 5Ω (d) 1.5Ω

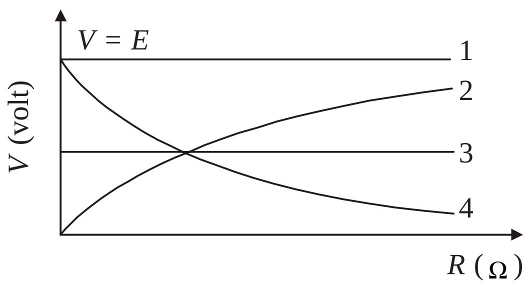
Ans. : (b) 3Ω

5. A current of 0.1 *A* flows through a 12Ω resistance when it is connected to a cell of emf 1.5 *V*. The internal resistance of the cell is

(a) 1Ω (b) 3Ω (c) 5Ω (d) 15Ω

Ans. : (b) 3Ω

6. A cell of emf *E* and internal resistance *r* is connected to an external resistance *R*. The variation of potential drop *V* across the resistance *R* as a function of *R* is shown by the curve marked as



(a) 4 (b) 1 (c) 2 (d) 3

Ans. : (c) 2

7. A shunt of resistance 1Ω is connected with a galvanometer of resistance 100Ω. What part of the main current will flow through the galvanometer?

(a) $\frac{1}{99}$ (b) $\frac{1}{100}$ (c) $\frac{1}{101}$ (d) $\frac{1}{98}$

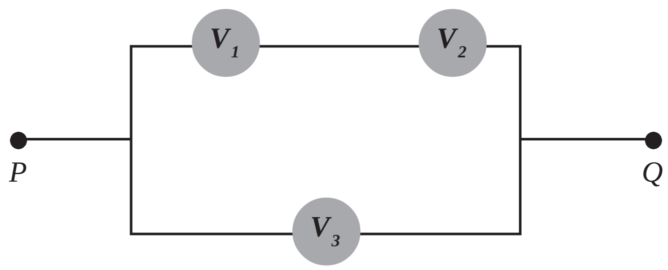
Ans. : (c) $\frac{1}{101}$

8. A galvanometer of resistance R is connected to an electric circuit. The main current in the circuit is k times the maximum current that the galvanometer can withstand. The maximum value of the shunt resistance that should be used across the galvanometer is

(a) kR (b) $(k-1)R$ (c) $\frac{R}{k}$ (d) $\frac{R}{k-1}$

Ans. : (d) $\frac{R}{k-1}$

9. Three voltmeters, all having different resistances, are joined as shown in figure. When some potential difference is applied across P and Q, their readings are V_1, V_2 and V_3 respectively. Then



(a) $V_1 = V_2$ (b) $V_1 \neq V_2 + V_3$ (c) $V_1 + V_2 = V_3$ (d) $V_1 + V_2 > V_3$

Ans. : (c) $V_1 + V_2 = V_3$

10. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10Ω is

(a) 0.2Ω (b) 0.5Ω (c) 0.8Ω (d) 1.0Ω

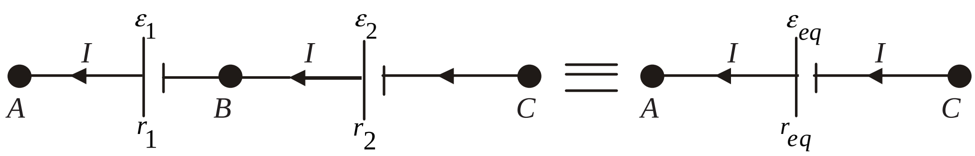
Ans. : (b) $0.5\varepsilon_1$

11. The cell has an emf of $2V$ and the internal resistance of this cell is 0.1Ω, it is connected of resistance of 3.9Ω, the voltage across the cell will be

(a) $1.95V$ (b) $1.5V$ (c) $2V$ (d) $1.8V$

Ans. : (a) $1.95V$

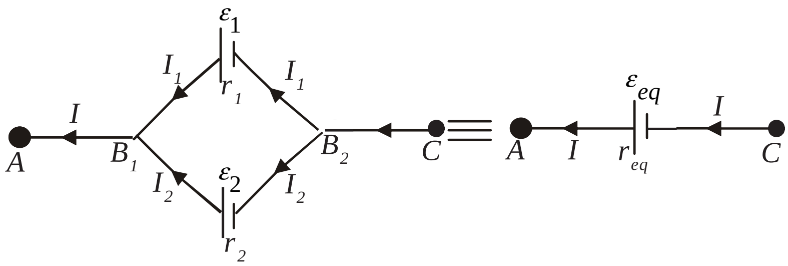
12. Consider first two cells in series as shown in figure the potential difference between the terminals A and C of the combination is



(a) $V_{AC} = \varepsilon_1 - Ir_1$ (b) $V_{AC} = \varepsilon_2 - Ir_2$ (c) $V_{AC} = \varepsilon_{eq} - Ir_{eq}$ (d) $V_{AC} = 2\varepsilon_{eq} - Ir_{eq}$

Ans. : (c) $V_{AC} = \varepsilon_{eq} - Ir_{eq}$

13. Consider a parallel combination of the cells in the figure.



The potential difference across its terminals B_1 and B_2

(a) $V = \varepsilon_{eq} - Ir_{eq}$ (b) $V = \varepsilon_2 - Ir_2$ (c) $V = 2\varepsilon_{eq} - Ir_{eq}$ (d) $V = \varepsilon_1 - 2Ir_1$

Ans. : (a) $V = \varepsilon_{eq} - Ir_{eq}$

14. Is it possible that any battery has some constant non-zero value of emf but the potential difference between the plates is zero?

(a) Not possible

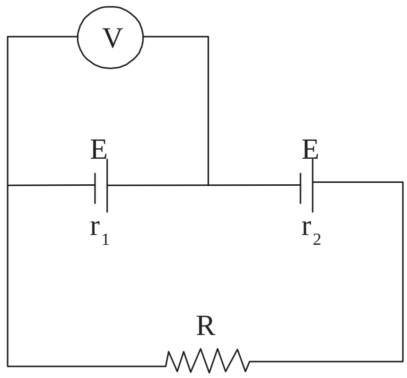
(b) Yes, if another identical battery is joined in series

(c) Yes, If another identical battery is joined in opposition

(d) Yes, possible, if another similar battery is joined in parallel

Ans. : (c) Yes, If another identical battery is joined in opposition

15. In the adjoining figure, the reading of an ideal voltmeter (v) is zero. Then the relation between R, r_1 and r_2 is :



(a) $R = r_2 - r_1$ (b) $R = r_1 - r_2$ (c) $R = r_1 + r_2$ (d) $R = \frac{r_1 r_2}{r_1 + r_2}$

Ans. : (b) $R = r_1 - r_2$

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