

Exercise - II

(Multiple Correct Problems)

1. A battery is of emf E is being charged from a charger such that positive terminal of the battery is connected to terminal A of charger and negative terminal of the battery is connected to terminal B of charger. The internal resistance of the battery is r.

(A) Potential difference across points A and B must be more than E

(B) A must be at higher potential than B

(C) In battery, current flows from positive terminal to the negative terminal

(D) No current flows through battery

2. 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 differ ence (V) across it. Select the

correct alternative (s).



(A) internal resistance of battery is 5Ω

(B) emf of the battery is 20V

(C) maximum current which can be taken from the battery is 4A

(D) V-i graph can never be a straight line as shown in figure.

3. Which of the following quantities do not change when a resistor connected to a battery is heated due to the current?

- (A) drift speed (B) resistivity
- (D) number of free electrons. (C) resistance

4. A metallic conductor of irregular cross-section is as shown in the figure. A constant potential difference is applied across the ends (1) and (2). Then :



(A) the current at the cross-section P equals the current at the cross-section Q

(B) the electric field intensity at P is less than that at Q.

(C) the rate of heat generated per unit time at Q is greater than that at P

(D) the number of electrons crossing per unit area of cross-section at P is less than that at Q.

5. A current passes through a wire of nonuniform cross section. Which of the following quantities are independent of the cross-section?



- (B) drift speed
- (C) current density
- (D) free-electron density

6. A simple circuit contains an ideal battery and a resistance R. If a second resistor is placed in parallel with the first.

- (A) the potential across R will decrease
- (B) the current through R will decreased
- (C) the current delivered by the battery will increase
- (D) the power dissipated by R will increased.

7. 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.



$$(A) V_{D} = V_{B} = -2/13 V_{C}$$

(^)) /

(B) $V_D - V_B = 2/13 \text{ V}$ (C) $V_G = 21/13 \text{ V} = \text{potential difference across G}$. (D) $V_H = 19/13 \text{ V} = \text{potential difference across H}$.

8. Consider the circuit shown in the figure

$$28 \vee \begin{bmatrix} 5\Omega & 3\Omega & 3\Omega \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ &$$

(A) the current in the 5 Ω resistor is 2A

- (B) the current in the 5Ω resistor is 1A
- (C) the potential difference $V_A V_B$ is 10 V (D) the potential difference $V_A V_B$ is 5V

9. The equivalent resistance of a group of resistances is R. If another resistance is connected in parallel to the group, its new equivalent becomes R, & if it is connected in series to the group, its new equivalent becomes R₂ we have

(A)
$$R_1 > R^2$$
 (B) $R_1 < R$
(C) $R_2 > R$ (D) $R_2 < R$

10. The value of the resistance R in figure is adjusted such that power dissipated in the 2Ω resistor is maximum. Under this condition



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(A) R = 0

 $(B) R = 8\Omega$

(C) power dissipated in the 2 Ω resistor is 72 W

(D) power dissipated in the 2Ω resistor is 8 W

11. A bulb is connected to a battery of emf 10 V so that the resulting current is 10 mA. When the bulb is connected to 220 V mains, the current is 50 mA. Choose the correct alternative (s)

(A) In the first case, the resistance of the bulb is $1k\Omega$ and in second case, it is 4.4 $k\Omega$

(B) It is not possible since ohm's law is not followed

(C) the increase in resistance is due to heating of the filament of the bulb when it is connected to 220 V mains

(D) None of these

12. A galvanometer may be converted into ammeter or voltmeter. In which of the following cases the resistance of the device will be the largest ? (Assume maximum range of galvanometer = 1mA)

(A) an ammeter of range 10A

(B) a voltmeter of range 5 V

(C) an ammeter of range 5A

(D) a voltmeter of range 10 V.

13. Mark out the correct options.

(A) An ammeter should have small resistance.

(B) An ammeter should have large resistance.

(C) A voltmeter should have small resistance.

(D) A voltmeter should have large resistance.

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



(A) 5Ω

(C) greater than 5Ω

(B) less than 5Ω (D) between $4\Omega \& 5\Omega$

15. A micrometer has a resistance of 100Ω and a full scale range of $50\mu A$. It can be used as a voltmeter or a higher range ammeter provided a resistance is added to it. Pick the correct range and resistance

combination(s). (A) 50 V range with 10 k Ω resistance in series

(B) 10 V range with 200 k Ω resistance in series

(C) 5 mA range with 1 Ω resistance in parallel

(D) 10 mA range with 1 k Ω resistance in parallel.

16. By mistake, a voltmeter is placed in series and an ammeter is parallel with a resistance in an electric circuit, with a cell in series.



(A) If the devices are ideal, ammeter will read zero current and voltmeter will read the emf of cell.

(B) If the devices are ideal, a large current will flow through the ammeter and it will be damaged.

(C) The main current in the circuit will be very low and practically all current will flow through the ammeter, if resistance of ammeter is much smaller than the resistance in parallel.

(D) The devices may get damaged if emf of the cell is very high and the meters and nonideal.

17. In the given potentiometer circuit, the resistance of the potentiometer wire AB is R_0 . C is a cell of internal resistance r. The galvanometer G does not give zero deflection for any position of the Jockey J. Which of the following cannot be a reason for this?



(A) $r > R_0$

(C) emf of C > emf of D

(D) The negative terminal of C is connected A.

18. In a potentiometer arrangement. E_1 is the cell establishing current in primary circuit. E_2 is the cell to be measured. AB is the potentiometer wire and G is a galvanometer. Which of the following are the essential condition for balance to be obtained.

(A) The emf of E_1 must be greater than the emf of E_2 (B) Either the positive terminals of both E_1 and E_2 or the negative terminals of both E_1 and E_2 must be joined to one end of potentiometer wire.

(C) The positive terminals of E_1 and E_2 must be joined to one end of potentiometer wire.

(D) The resistance of G must be less than the resistance of AB.

19. In a potentiometer wire experiment the emf of a battery in the primary circuit is 20V and its internal resistance is 5Ω . There is a resistance box in series with the battery and the potentiometer wire, whose resistance can be varied from 120Ω to 170Ω . Resistance of the potentiometer wire is 75Ω . The following potential differences can be measured using this potentiometer.

A) 5V	(B) 6V
C) 7V	(D) 8V

20. Two indentical fuses are rated at 10A. If they are joined

(A) in parallel, the combination acts as a fuse of rating 20A $\,$

(B) in parallel, the combination acts as a fuse of rating 5A

(C) in series, the combination acts as a fuse of rating 10A

(D) in series, the combination acts as a fuse of rating 20A

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