DPP – 4

1. A battery has an open circuit potential difference of 6 V between its terminals. When a load resistance of 60Ω is connected across the battery, the total power dissipated by the battery is 0.4 W. What should be the load resistance R, so that maximum power will be dissipated in R.

(A) 10 Ω (B) 20 Ω (C) 30 Ω (D) 40 Ω

2. Two wires of same mass having ratio of lengths 1: 2, density 1: 3 and resistivity 2: 1. These are connected one by one to the same voltage supply. The rate of heat dissipation in the first wire is found to be 10 W. Find the rate of heat dissipation in the second wire.

(A) $\frac{5}{2}W$ (B) $\frac{5}{3}W$ (C) $\frac{9}{2}W$ (D) $\frac{11}{4}W$

3. A current passing through a resistance R decreases uniformly to zero in a time internal T and a total charge q passes through resistance. Find the total heat produced in resistance in this process.

(A) $\frac{4}{5}\frac{q^2R}{T}$ (B) $\frac{4}{3}\frac{q^2R}{T}$ (C) $\frac{q^2R}{3T}$ (D) Not

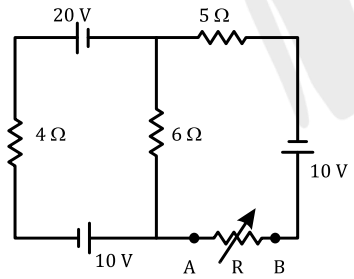
4. A bulb is marked 220 V, 100 W. What will be the current in the filament when connected to 200 V?

(A) 11 Amp (B) $\frac{25}{121}A$ (C) $\frac{50}{121}A$ (D) $\frac{75}{121}A$

5. A 500 W heater is designed to operate at 200 V potential difference. If it is connected across 160 V line, find the heat it will produce in 20 minute.

(A) 384 KJ (B) 38 KJ (C) 334 KJ (D) Not

6. In the circuit shown in figure find the value of resistance R at which the power transferred to this resistance will be maximum.

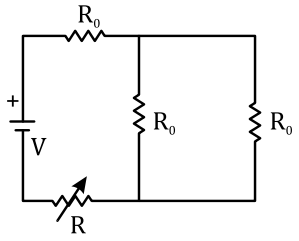


(A) 2 (B) 3 (C) 4 (D) 7.4

7. A storage battery with EMF E = 2.6 V loaded with and external resistance produces a current I = 1.0 A. In this case the potential difference between the terminals of the storage battery equals V = 2.0 V. Find the thermal power generated in the resistance.

(A) 200 W (B) 2 W (C) 20 W (D) 2.14 W

8. In the circuit shown in figure for what value of R the power dissipated in it will be maximum.



9. How much has a filament diameter decreased due to evaporation if the maintenance of the previous temperature required an increase of voltage by $\eta = 1.0\%$. The amount of heat transferred from the filament to surrounding space is assumed to be proportional to the filament surface area.

ANSWER KEY

1. (C) **2.** (B) **3.** (B) **4.** (C) **5.** (A) **6.** (D) **7.** (B)

8. $\left(\frac{3R_0}{2}\right)$ **9.** (2%)