WORKSHEET (NUMERICALS) : LEVEL - I

1. What happens to the power dissipation if the value of electric current passing through a conductor of constant resistance is doubled?

Ans……
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2. A cell of emf 2 V and internal résistance 0.1 Ω is connected to a 3.9 Ω external resistance. What will be the current in circuit?

Ans……
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3. Calculate the resistivity of a material of a wire 1 m long, 0.4 mm in diameter and having a resistance of 2 ohm.

Ans……
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4. A current is maintained in a conductor of cross-section $10^{-4}\ m^2$. If the number density of free electrons be $9 \times 10^{28}\ m^{-3}$ and the drift velocity of free electrons be 6.94×10^{-9} m/s, calculate the current in the conductor.

Ans……
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5. A silver wire has a resistance of 2.1 Ω at 27.5 ^{0}C, and a resistance of 2.7 Ω at 100 ^{0}C. Determine the temperature coefficient of resistivity of silver.

Ans……
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6. Three resistors 1 Ω, 2 Ω and 3 Ω are combined in series. (a) What is the total resistance of the combination? (b) If the combination is connected to a battery of emf 12 V and negligible internal resistance, determine the total current drawn from the battery.

Ans……
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7. (a) Three resistors 2 Ω, 4 Ω and 5 Ω are combined in parallel. What is the total resistance of the combination? (b) If the combination is connected to a battery of emf 20 V and negligible internal resistance and the total current drawn from the battery.

Ans……
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LEVEL - II

1. A cell of emf 2 V and internal résistance 0.1 Ω is connected to a 3.9 Ω external resistance. What will be the p.d. across the terminals of the cell?

Ans……
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2. Out of the two bulbs marked 25W and 100W, which one has higher resistance.

Ans……
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3. A cell of 6 V and internal resistance 2Ω is connected to a variable resistor. For what value of current does maximum power dissipation occur in the circuit?

Ans……
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4. What is the largest voltage you can safely put across a resistor marked 98 Ω - 0.5 W?

Ans……
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5. Two heater wires of the same dimensions are first connected in series and them in parallel to a source of supply . What will be ratio of heat produced in two cases?

Ans……
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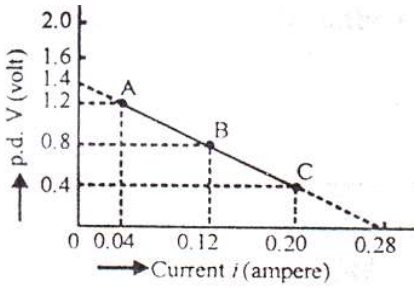
6. Using data given in graph determine (i) emf (ii) internal resistance of the cell.
   (iii) For what current, does maximum power dissipation occur in the circuit?



Ans…….....
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7. Two identical cells of emf 1.5V each are joined in parallel providing supply to an external circuit consisting of two resistors of 13Ω each joined in parallel . A very high resistance voltmeter reads the terminal voltage of the cells to be 1.4V. Find the internal resistance of each cell.
   Ans…….....
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8. Three cells of emf 2V, 1.8V and 1.5V are connected in series. Their internal resistances are 0.05Ω, 0.7Ω and 1Ω respectively. If this battery is connected to an external resistance of 4Ω, calculate :

(i) the total current flowing in the circuit. (ii) the p.d. across the terminals of the cell of emf 1.5V.

Ans…….....
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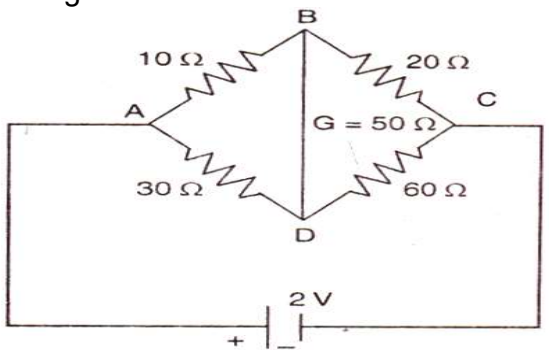
WORKSHEET (NUMERICALS): LEVEL - III

1. What is the current flowing in the arm BD of this circuit.



Ans…….....
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2. A cylindrical metallic wire is stretched to increase its length by 5%. Calculate the percentage change in its resistance.
   Ans…….....
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3. Two cells of EMF 1V, 2V and internal resistances 2Ω and 1Ω respectively are connected in (i) series, (ii) parallel. What should be the external resistance in the circuit so that the current through the resistance be the same in the two cases? In which case more heat is generated in the cells?

Ans…….....
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4. Calculate the temperature at which the resistance of a conductor becomes 20% more than its resistance at 27^0C. The value of the temperature coefficient of resistance of the conductor is 2×10^{-4} / K.

Ans…….....
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5. Two metallic wires of the same material have the same length but cross sectional area is in the ratio of 1:2. They are connected (i) in series and (ii) in parallel. Compare the drift velocities of electrons in the two wires in both the cases.

Ans……
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6. Two wires X, Y have the same resistivity but their cross-sectional areas in the ratio 2:3 and lengths in the ratio 1:2. They are first connected in series and then in parallel to a dc source. Find out the ratio of the drift speeds of the electrons in the two wires for the two cases.

   Ans……
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7. A room has AC run for 5 hours a day at a voltage of 220V. The wiring of the room consists of Cu of 1 mm radius and a length of 10m. Power consumption per day is 10 commercial units. What fraction of it goes in the joule heating in the wires? What would happen if the wiring is made of Al of the same dimensions? [ρ_{Cu} = 1.7 x 10^{-8} Ωm, ρ_{Al} = 2.7 x 10^{-8} Ωm]

Ans……
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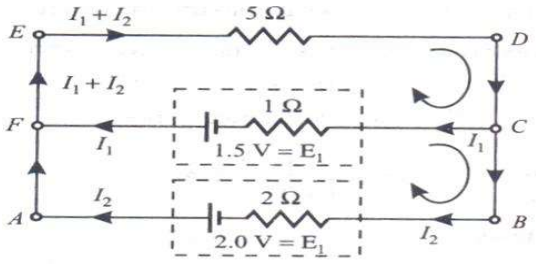
8. Two cells of emf 1.5 V and 2V and internal resistance 1 Ω and 2 Ω are connected in parallel to pass a current in the same direction through an external resistance of 5 Ω. (a) Draw Circuit Diagram. (b) Using Kirchhoff's laws, calculate the current through each branch of the circuit and p.d. across the 5 Ω resistor.



Ans……
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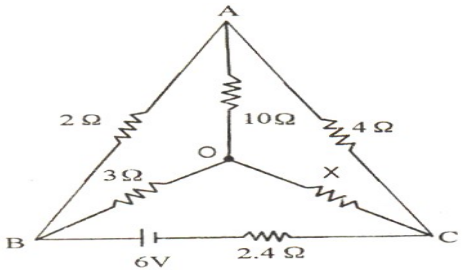
9. Find the value of the unknown resistance X in the circuit, if no current flows through the section AO. Also calculate the current drawn from the battery of emf 6V.



Ans…….....
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