

## VALUE BASED QUESTIONS

### Current electricity

1. Father and a son returned home completely drenched due to heavy rain. Father advised his son not touch any electrical units with wet hands for he may get a shock; In spite of this, on immediately entering the house, the son switches on the light (supply voltage is 220 V) and gets a severe shock; He was fortunate not to get electrocuted. Father, who is a Biologist, told that when the skin is dry, resistance of a human body is  $10^5 \Omega$ ; and when the skin is wet the body resistance is  $1500 \Omega$ .
  - a) What is the lesson learnt by you?
  - b) Calculate the current that flow thro' (i) a wet body and (ii) a dry body.
  - c) Dry skin or wet skin? - When will we have serious consequences and why?
2. Based on the previous knowledge learnt in the class,two students of class XII( A and B) were asked to conduct an experiment in the laboratory using a meter bridge-one is made of Nichrome and the other one is made of Copper, of same length and same diameter of constant potential difference. The student A could not give explanation for not achieving the result whereas student B, could get the result and was also able to explain.
  - a) What made student B to perform successfully?
  - b) Give the formula to calculate the rate of heat production.
3. An old woman who had suffered from a heart stroke was taken to the hospital by her grandson who is in class XII. The grandson has studied in Physics that, to save a person who is suffering from a heart stroke, regular beating of the heart is to be restored by delivering a jolt to the heart using a defibrillator, whose capacity is 70 microfarad and charged to a potential of 5000V and energy stored in 875J; 200J of energy is passed thro' a person's body in a pulse lasting 2 milliseconds. The old woman gets panicked and refuses to be treated by defibrillator. Her grandson then explains to her the process that would be adopted by medical staff and how the result of that would bring her back to normalcy. The woman was then treated and was back to normal
  - a) What according to you, are the values displayed by the grandson?
  - b) How much power is delivered to the body to save a person's life from heart attack?
4. Sachin had gone to meet his grandfather who was staying in a village. In the evening, they were both watching TV, when suddenly the lights went off. Grandfather told Sachin that the fuse must have blown up as all their neighbors had electricity. Luckily Sachin knew how to change a fuse. His grandfather was happy and told him that if he had been alone, he would have had to spend the night in the dark without a fan. Sachin felt and made up his mind to replace the fuse with a circuit breaker which uses a solenoid with a core so that his grandfather would not have any problems in future.

- c) What values did Sachin have?
  - d) The main power supply of a house is through a 5 ampere fuse. How many 100 watt bulbs can be used in the house simultaneously at 220 volts?
5. Rahul and Rohit bought an electric iron. They had a 2 pin plug. Rahul was keen to start using the new iron with the 2 pin plug. However, Rohit insisted that they buy a 3 pin plug before using it. Rahul got angry. Rohit patiently explained the importance of using a 3 pin plug and the earthing wire. He said that if the metallic body of the iron came in contact with the live wire at 220 volts, they would get an electric shock. If earthed, the current would go to the earth and the potential of the metallic body would not rise. The iron would then be safe to use. Hearing Rohit, Rahul calmed down and agreed.

What values did Rahul and Rohit have?

Which has greater resistance – 1 K watt electric heater or 100 watt electric bulb, both ?

6. RenuRitu and Kajal lived in a resettlement colony where they observed most houses stole power from transmission lines using hooks. They had learnt in school about fire caused due to electric short circuit. They decided to make people aware of the risks involved and also the importance of paying their electricity bills. They got all their friends and responsible elders together and with the help of the electricity board, succeeded in changing the situation.

What values did Renu, Ritu and Kajal have?

A low voltage supply from which one needs high currents must have a very low internal resistance, why?

A high tension supply of say 6 KV must have a very large internal resistance. Why