Question Bank

Unit - 1 Fundamental Concepts of DC Circuits

Electricity

- 1. Define and state its unit
 - a. Current
 - b. Ampere
 - c. Electrical Potential
 - d. Potential Difference
- 2. Explain the difference between EMF and potential difference.

Resistance

- 1. Define and state its unit
 - a. Resistance
 - b. Resistivity
 - c. Temperature Coefficient of Resistance
 - d. Conductor
 - e. Insulator
- 2. Define and explain specific resistance.
- 3. Explain conductor, insulator and semi-conductor.
- 4. Explain conductance and conductivity. Write equation showing relation between them.
- 5. Derive the equation $R_2=R_1[1+\alpha_0(t_2-t_1)]$
- 6. Explain effect of temperature on resistance.

- 7. Explain effect of temperature on resistance of pure metal, semiconductor and insulator with graph.
- 8. List materials used as semiconductors and insulators.
- 9. Describe factors affecting resistance.
- 10. Explain conductance and conductivity. Write equation showing relation between them.

Work Power Energy

- 1. Define and state its unit
 - a. Work
 - b. Power
 - c. Energy

Laws

- 1. State and explain ohms law and give its limitations.
- 2. State and explain Kirchhoff's current law.
- 3. Describe Kirchhoff's Voltage Law in detail.
- 4. Describe Joules law of electric heating and state its applications.

Problems

- 1. Calculate resistivity of wire having 100m length, 200Ω resistance and 1mm diameter.
- 2. A resistance wire of 100Ω is stretched to double it's length, what will be its resistance now?
- 3. A length of wire has a resistance of 2.5Ω . find the resistance of another wire of same material, twice in length and five times big cross-sectional area.
- 4. If 1000 m long wire is made from a cube of copper having each side 1 cm, find diameter of wire.
- 5. Resistance of two conductors of equal length made of same material are 25Ω and 49Ω respectively. Find ratio of their diameters.
- 6. Resistors of 12Ω and 8Ω are connected in parallel and a resistance of $R\Omega$ is connected in series with it. When a 20V DC supply is given to this combination, 70W power is dissipated. Find value of R.
- 7. Calculate the resistance of 1500W, 230V heater.
- 8. Rating of electric iron is 500W, 230V. Find out current drawn by iron when it is connected to rated voltage? What will be the hot resistance of iron? If iron is used for 40 minutes daily, find out the energy bill for April month at 5.5Rs/Unit. What will be the energy bill if iron is connected to 200V instead of 230V?
- 9. A conductor has a resistance of 15Ω at 35 °C and it increases to a value of 16.5Ω when temperature is 70 °C. Determine the resistance at 0 °C and α at 35 °C.
- 10. A conductor has a resistance of 15Ω at $35^{\circ}c$ and it increases to a value of 16.5Ω when temperature is 70°C. Determine the resistance at 0°C and α at 35°C.

- 11. Resistance of two conductors of equal length made of same materials are 25Ω and 49Ω respectively. Find ratio of their diameters.
- 12. Calculate resistivity of wire having 500m length, 200Ω resistance and 2mm diameter.
- 13. A tungsten filament lamp has a temperature of 30°C and resistance of 40 Ω When taking normal current. Calculate resistance of filament when it has temperature of 60°C. Resistance temperature co-efficient at 0°C is 0.00427 Ω/Ω /°C.
- 14. The resistance of armature conductor of a machine is 1.2Ω at 270 C. The resistance of this armature becomes 2.4Ω , when this machine is run for 5 hours and the temperature becomes 540 C at that time. Calculate the temperature co-efficient of this material used for conductor.
- 15. A copper wire has a resistance of 8 Ω at 40°C and its increases to a value of 9.5 Ω when temperature is doubled. Determine the resistance at 0° C and α at 40°C.
- 16. A length of wire has a resistance of 1.5 Ω . Find the resistance of another wire of the same material, twice in length and three times big in cross-sectional area.
- 17. Resistance of a conductor is 25 Ω at 200C. Its resistance becomes 27.95 Ω when its temperature is raised by 300°C. Find the resistance temperature co- efficient of the conductor at 200°C.
- 18. A 200 W ,230 V lamp is given a supply of 230 V. Calculate the resistance of lamp and the current flowing through it. Also calculate the energy consumption and cost of energy consumption for the month of November , if the lamp is used for 7 hours daily. The rate per unit is 5 Rs.
- 19. 500 liters of water is raised to a height of 20 meters in ten minutes by a pump driven by an electric motor. Find the input power to the motor if the efficiency of pump and motor is 85% and 90% respectively.
- 20. An electric heater is rated at 1KW, 230V. If this heater takes 7.5 minutes to raise the temperature of 1Kg of water from 15°C to the boiling point, find the efficiency of heater.
- 21. The following are details of the load on a circuit connected through the supply meter.

- (i) Four lamps of 100 watt each working for 4 hrs./day
- (ii) Two fans of 100 watt each working for 10 hrs./day
- (iii) One fluorescent tube of 125 watt working for 4 hrs./day
- (iv) One refrigerator of 500 watt working for whole day

If each unit of energy costs Rs. 4.5, what will be the total cost in the month of May.