

PNS School of Engineering & Technology

Nishamani Vihar, Marshaghai, Kendrapara

Internal Assessment Examination-2022(3rd Semester)

Subject : Th-4 -Electrical Engineering Material

Branch : Electrical Engineering

Time : $1\frac{1}{2}$ Hours

F.M. : 20

1. Answer the following questions (any Five). [2 x 5]
 - (a) What is ACSR ?
 - (b) Write the examples of any two alloys of copper.
 - (c) What is resistivity ?
 - (d) Write any two applications of super conducting material.
 - (e) Write the uses of aluminium.
 - (f) Write the composition of brass and bronze.

2. Answer the following question (any Two) [5 x 2]
 - (a) Write a short note on super conductivity.
 - (b) Explain the properties of high resistire material.
 - (c) Explain the uses and properties of platinum as a conducting material.



ANSWER

1(a) ACSR stands for Aluminium conductor steel-reinforced.

1(b) Two example of alloys of copper are Brass and Bronze.

1(c) Resistivity is defined as the resistance between opposite faces of a unit cube of that material. It is denoted by ρ .

1(d) Two application of superconducting material are

- These materials can perform a lifesaving function in the field of bio magnetic.
- These are used in magnetic levitation.

1(e) Two uses of aluminium are

- It is used in overhead transmission lines.
- It is used for making bus-bars

1(f) Brass - Copper and zinc.

Bronze - Copper and Tin

2(a) Superconductivity simply states that there is no resistance or almost zero resistance in the material or any object. A material or an object that shows such properties is known as a superconductor. The conductivity referred to here is the electrical conductivity of a material.

When the electrical conductivity is to the full potential facing almost to completely zero resistance in a material any of the magnetic flux fields are expelled from the material. The zero resistance is achieved by lowering the temperature of the material which leads to a decrease in the resistance of the material and an increase in the conductivity. In order to explain superconductivity, it is necessary to note that materials possess certain physical properties that cause resistance to electrical conductivity through the material. This characteristic of the material varies with temperature changes. If the temperature of the material is increased the resistance increases whereas if the temperature of the material is decreased the resistance decreases. This phenomenon is exploited for achieving the highest conductivity of the superconductor.

One of the important physical properties exhibited by a conducting material exhibiting superconductivity is that there is no magnetic flux field present in the material as the presence of magnetic flux fields leads to a loss in energy and an indication of the presence of resistance in the material. The use of superconductors in magnets is limited to one fact. When magnetic fields are super strong and above a certain critical value, it causes the superconductor to revert to its normal non-superconducting state, even when the material is kept well below the transition temperature. This varies from material to material used in superconductors. Normally when the temperature of a conductor is decreased there is an increase in conductivity as one moves to absolute zero temperatures. But superconductors are those special materials in which after a certain critical temperature the resistance drops to zero value and the conductivity thus reaches the maximum.

2(b) Properties of high resistive materials are

- High resistivity.
- High melting point.
- High mechanical strength.

- High ductility, so that can be drawn in the form of wire easily.
- High corrosion resistance mean free from oxidation.
- Low cost.
- Long life or durable.
- High flexibility.

2(c) Properties of Platinum

- Physically, platinum is a soft, lustrous, silver-coloured metal.
- It is highly dense (21.5 g/cc), malleable and ductile (there is an ongoing debate if it is the most ductile).
- It is also highly corrosion resistant and has a high boiling point (around 1700 degrees Celsius or 3220 degrees Fahrenheit).
- Chemically, platinum is one of the most stable elements in nature. It is often referred to as Noble metal because of its high stability.
- It is immune to nitric and hydrochloric acids but can be dissolved by aqua regia at a high temperature.
- It reacts with oxygen and fluorine but at very high temperatures.

Uses of Platinum

- It is used in laboratories for electrodes.
- Optical fibres, wires, and pacemakers also make use of platinum for better efficiency.
- Certain compounds of platinum are used in chemotherapy for treating cancer.
- Some watchmakers use platinum in their watches to make them exclusive.