i) painting: In this method the surface of iron is covered with a layer of suitable brusses or by means of spray guns.

ii) coal tarring: A coating of hot coal tar is applied on the iron surface which protects the surface from atmosphere.

iii) Electroplating: In this method a thin protective layer of copper, nickel, chromium laid on ferrous metal with the help of electrolysis process.

iv) metal spraying: In this method the ferrous metal surface is covered with spray of vaporized aluminium, tin, lead etc. this layer gives very good protection against corrosion.

* classification of electrical engineering materials.
i) conductor.
ii) Semi-conductor.
iii) Insulator.
iv) magnetic material.

* classification of solid materials according to it's energy gap.
i) conductor:- conductor are does substance which allow the electrical current passage through them.
ii) ~~Semi conductor~~
iii) Insulator:
iv) Semiconductor:

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b) High carbon steel: 12
⇒ This steel contain carbon varying from 0.7% to 1.5%.
⇒ properties of high carbon steel are given:
i) It has very high strength.
ii) It is more difficulty to forge and weld.
iii) It has more hardness and resistance to wear.
iv) It is more though, ductility and elastic than low carbon steel.

⇒ uses of High carbon steel:
i) It is used for making tools such as drills and chisels.
ii) It is used in masonry nails.
iii) It is also used in transmission line and microwave towers.

c) stainless steel:
⇒ It is produced by adding over 12% of chromium to low carbons steel.
⇒ properties of stainless steel
i) corrosion resistance.
ii) High tensile strength.
iii) very durable and attractive appearance.
iv) Temperature resistance, Environmentally friendly.
vi) Low-maintenance (long lastic)

⇒ uses of stain-less steel:
i) Food and catering.
ii) offshore technology.
iii) Seawater desalination plants.
iv) medical industry.
v) civil, Engineering, making, bridge, building etc.

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Q3 classification of magnetic material with respect to B-H curve. 4
⇒ They are two types of magnetic material.
i) Hard magnetic material:
⇒ The material which are easy to demagnitized are called hard magnetic material.

→ It has high coercivity and high retaintivity.
→ They have high permanent magnitization.
→ They have low intial permeability.
→ Hysteisis loss is highex.
→ Eddy current loss is more for metal.
→ B-H curve of this material is while & high.

→ such material are used for permanen magnets separators and magnetic detector.
ex: carbon steel, tungstan steel etc.
ii) Soft magnetic material:
⇒ The material which are easy to magnitized and demagnitized are called soft magnetic materials.
→ It has high coercivity and low retaintivity.
→ They have low permanent magnitization.
→ They have high intial permeability.
→ Hysteisis loss is lower.
→ Eddy current loss is less for metal.
→ B-H curve of this material is low & small.

→ such material are used for transformer cores, motors, generators, electromagnet etc.
ex: sleep, relay etc.

Q4 Electrical properties of magnetic materials? 2
⇒ magnetic materials are classified in two group
(i) Hard (permanent) magnetic material.
(ii) Soft magnetic material

⇒ characteristics of hard magnetic materials are.
i) High $(BH)_{max}$: $(BH)_{max}$ is the measurment of the storage and usable magnetic flux density.
ii) High maximum energy produce.
iii) High coercivity (H_C): High H_C measures the resistance of a ferromagnetic material to becomes demagnitized.
iv) High stability: The high stability againts external magnetic interference, temperature, humidity & other environmental factors.
v) High Bx and high Mx:
⇒ They are the measurment of magnetic field inside air gap of the permanent magnet.

⇒ characteristic of soft magnetic materials:
i) High saturation magnetic flux density:
⇒ It is easy to get high permeability (μ) and low coercive force, this can also increase magnetic flux density.
ii) Low magnetic and electrical losses:
⇒ This required low coercivity and high electrical resistivity.
iii) Low coercivity (H_C): That indicates the materials easy to magnitized and demagnitized by external magnetic field.
iv) High stability: High stability against changes of humidity, vibration and environment.

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Explain non-ferrous metal? and it's properties uses and electrical characteristics? 10
Ans: Non-ferrous metal:
⇒ The material which don't contain iron as main (component) called non-ferrous metal.
e.g: Aluminium, copper, zinc, lead etc.

Ans: properties or characteristic of Non ferrous metal.
i) Good thermal and electrical conductivity.
ii) High corrosion resistance.
iii) Low density (less mass).
iv) Non-magnetic.
v) Colourfull.
vi) Easy to fabricate.
vii) conductivity:
↳ It has great ability to conduct heat & electricity.
viii) malleability.
↳ can be hammered and prepared into shapes & size easily.
ix) Ductility:
↳ It can be drawn into fine wire.
Ans:
Ans: Uses of Non-ferrous metal.
i) High transmission line.
ii) Electrical hardware.
iii) medical application.
iv) making auto mobile bodies.
v) commercial application.
vi) used in aircraft.
vii) Iron & Steel industries.

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Q10 Explain the chemical corrosion characteristics of some commonly used non-ferrous metal? 8
⇒ characteristic of copper are given below:
i) High heat conductivity.
ii) High electrical conductivity.
iii) Good corrosion resistance.
iv) Good biofouling resistance.
v) Good machinability.
vi) High thermal conductivity.
⇒ Characteristics of Aluminium are given below:
i) Good heat and electrical conductor.
ii) Non-corrosive.
iii) Easily machined and cast.
iv) Lightweight and High ductility.
v) Non magnetic and Non sparking.
⇒ characteristic of lead are given below:
i) Lead is a bluish-white lustrous metal.
ii) It is very soft and highly malleable, ductile.
iii) Relative poor conductor of heat & electricity.
iv) It is very resistance to corrosion.

⇒ characteristic of tin are given below:
i) Tin is a soft, pliable, silvery-white metal.
ii) Tin is not easily oxidized and resist corrosion.
iii) Relatively poor conductor of electricity.
iv) It has good corrosion resistance.
⇒ characteristic of zinc are given below:
i) zinc is a bluish-silver, lustrous metal.
ii) It has good corrosion resistance.
iii) zinc is an alloying element.
iv) zinc is a moderately good conductor of electricity.

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Explain properties of conductive materials? 18
⇒ Electrical properties of conducting materials:
a) Conductivity (σ):
⇒ The conductivity is reciprocal of electrical resistivity of the material. It is the property of material due to which the electric current flows easily through the material. In other words it provides an easy path to the flow of electric current through the material.
⇒ This types of material having good conductivity of heat and electricity.
b) positive temperature coefficient:
⇒ The materials have positive temperature coefficient means when the value of resistance in any conducting materials increases then its temperature also increased and vice-versa ($R_T \propto T$)
⇒ This types of materials having good thermal conductivity.
c) Low Resistance:
⇒ This types of materials having low resistance but good corrosion resistance.
→ for any conducting materials they have low resistance then there will be large amount of free electron (charge) flow through the these materials.
⇒ Those material are known as conducting material.
⇒ These are the good conductor of heat and electricity.
→ The ability of material to oppose the flow of free electron (charge) are called resistance of this materials.

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Explain properties and use's of Silver? 16
Ans: Properties:
i) Good conductor of heat and electricity.
ii) Good corrosion resistance.
iii) It has highest electrical and thermal conductivity of all metal.
iv) It is a soft, white lustrous metal.
v) It is a very ductile and malleable metal.
vii) High melting and boiling point 961.78°c & 2160°c respectively. Density (g/cc) 10.5.
Ans: Application (use):
i) It is used in solar technology.
ii) It is used in soldering and brazing.
iii) It is used in medicine and water purification.
iv) It is used in electrical & electronics applimances.
v) It is also used in jewelry, coins and tableware.

Explain properties and uses of Gold?
Ans: properties:
i) Good conductor of heat and electricity.
ii) Good corrosion resistance.
iii) It is a soft, yellow metal.
iv) It is very ductile and malleable metal.
v) High melting and boiling point 1337°K and 3080°K respectively., Density (g/cc) 19.9.

Ans: Uses:
i) It is used for making jewellery, coin & medals.
ii) It is used in medicine and dentistry.
iii) Space exploration.
iv) electrical and electronics applimances.
v) cosmetic and beauty.
vi) computer and mobile phones.

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Explain the electrical and mechanic properties of iron in detail? 14
⇒ Ans: Electrical properties of Iron:
i) More conductivity:
⇒ It may be define as the electrical property of the metal by virtue of which allows the flow of electrical current.
⇒ It is also defined as the reciprocal of resistance.

ii) least Resistivity:
⇒ The resistivity may be define as the electrical property of metal by virtue of which resist the flow of electrical current.
⇒ It increases linearly with an increase in temperature.

iii) Temperature coefficient:
⇒ It has positive temperature cofficient. It means resistance increases with temperature and vice-versa.
⇒ Ans: mechanical properties of iron:
i) Hardness: The hardness is an important property of cutting tools, materials and the metalic component which have to resist wear while working.
ii) Toughness:
⇒ It is very important property that is considered while selecting the material for power press, press punch pneumatic, hammers etc.
iii) Stiffness:
⇒ It may be defined as the property by virtue of which the metal will not deform or deflect when the load is applied.
iv) Brightleness: The brittleness may be defined as the properties of metal by virtue of which it will fracture suddenly without any deformation.

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