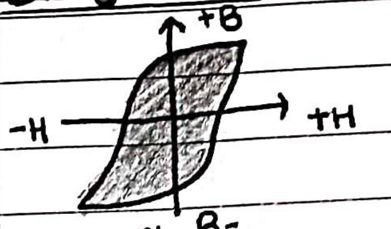
Q.No: 1 (Page 4/6)

→ REASON:

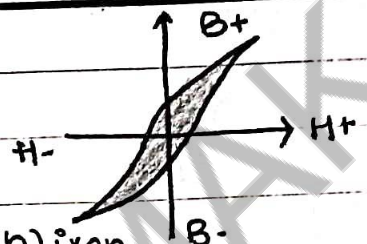
• Greater Retentivity of Steel:

Coercive force of steel is greater than iron because steel has greater retentivity. Steel retains greater magnetization 'B' even when external magnetizing force 'H' is reduced to zero.

Diagrams:



(a) steel



(b) iron

→ CONCLUSION:

Hence due to greater retentivity greater reverse external magnetizing force or coercive force is required to demagnetize steel as compared to iron.

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QNO:2 → MECHANICAL PROPERTIES:

Strength and stiffness are the mechanical properties of solids.

• Strength: "It is the general ability of a material to withstand an applied force. It is ability of material to remain unchanged by the applied force."

• Stiffness: "It is the ability of a material to resist bending"

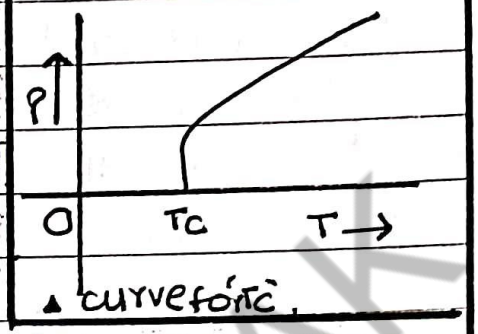
→ IMPORTANCE:

Both are of great significance.

- Designing a bridge, we must estimate the load or strength of the traffic it can withstand without breaking.
- When designing buildings, both strength and stiffness are taken in account so as to make it resistant to hazards.

Q NO 3 → SUPER CONDUCTIVITY: "Ability of certain materials to conduct electric current with practically zero resistance."

Graph:



- **Critical Temprature:** The temprature at which materials become super conductive. (Tc) It's different for different materials.
- **Heat losses:** These materials offer zero heat loss as current flows through them. as resistance offered by them is zero.
- **Drawback:** Superconductivity is achieved at very low tempratures generally with a few exceptions.

→ APPLICATIONS: (i) Magnetic Resonance Imaging (ii) Magnetic Levitation trains (iii) Fast computer chips (iv) Powerful and small motors.

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Q NO 4: CRYSTALINE | AMORPHOUS | POLYMER (SOLIDS)

(i) Arrangement of Molecules

CRYSTALINE	AMORPHOUS	POLYMER (SOLIDS)
→ Regularly arranged	→ Not regulaly arranged	→ Intermediate arrangement

(ii) Melting Points

→ Well defined due to ordered structure	→ Wide range of 'softening' points	→ Can have variable to distinct melting points

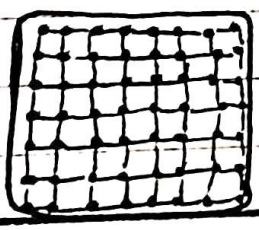
(iii) Also called as

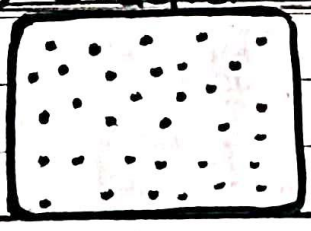
→ Crystals	→ glassy solids	→ simply 'polymers'

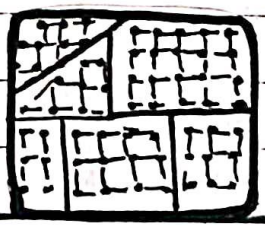
(iv) Examples

→ NaCl, diamond	→ glass, plastics	→ PE, PVC, nylon

(v) Diagrams


crystalline


Amorphous


Polymer solid

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Q NO 5 (pg 5/6)

ELASTIC DEFORMATION	PLASTIC DEFORMATION
(i) Process	
→ If a solid material returns back to its initial state after being deformed slightly then deformation is called elastic deformation.	→ If a solid material does not return to its initial state after being deformed slightly then deformation is called plastic deformation.
(ii) Change	
→ It is temporary change	→ It's permanent change
(iii) Required Force	
→ Smaller force is required for elastic deformation.	→ Plastic deformation requires higher force because plasticity appears above elastic limit

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Q NO 6:

PARAMAGNETIC	DIAMAGNETIC	FERROMAGNETIC
(i) Definition		
→ Orbital spin of es is so oriented that their field supports each other & atom behaves like a tiny magnet	→ orbits & spins of es are so oriented that their field cancels the effect of each other	→ Individual atom's acts like tiny magnets called magnetic domains. Interaction b/w them is so strong that even in absence of external, m-f they line up parallel
(ii) Behaviour in Response to applied field		
→ Substance is weakly magnetized in the direction of applied field.	→ Substance is weakly magnetized opposite to applied field.	→ Domain poles align entirely with an external applied field.
(iii) Response to permanent magnet		
→ weakly attracted	→ weakly repelled	→ Strongly attracted.
(iv) Examples		
→ Aluminum, Antimony, Li	→ Cu, Bi, Sb	→ Fe, Ni, Co, Alnico.

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Q NO 7 → SOFT MAGNETIC || HARD MAGNETIC MATERIALS

(i) Hysterisis Loop

SOFT MAGNETIC	HARD MAGNETIC
→ Narrow loop	→ Fat loop

(ii) Residual Magnetism

SOFT MAGNETIC	HARD MAGNETIC
→ Small amount	→ Large amount

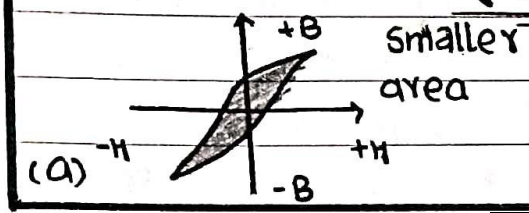
(iii) Magnetization & Demagnetization

SOFT MAGNETIC	HARD MAGNETIC
→ Eeasy to magnetize and demagnetize.	→ Difficult to magnetize and demagnetize

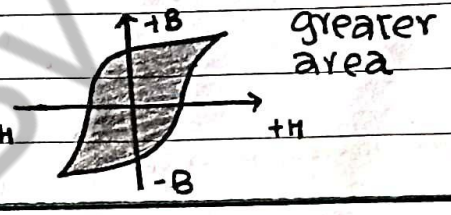
(iv) Example

SOFT MAGNETIC	HARD MAGNETIC
→ Silicon, Iron	→ Tungsten, Conife, Cobalt

(v) Diagram



smaller area



greater area

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Q NO 8

DUCTILE MATERIALS || BRITTLE MATERIALS

(i) Definition

DUCTILE MATERIALS	BRITTLE MATERIALS
→ Substances that undergo plastic deformation until they break are called duchile	→ Substances which break just after elastic limit is reached are called brittle substances.

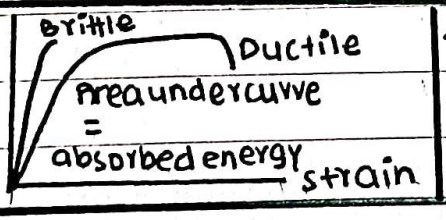
(ii) Affected by

DUCTILE MATERIALS	BRITTLE MATERIALS
→ Ductility is affected by temprature.	→ Brittleness is affected by pressure.

(iii) Example

DUCTILE MATERIALS	BRITTLE MATERIALS
→ Lead Copper	→ Glass, high carbon steel

(iv) Graph

DUCTILE MATERIALS	BRITTLE MATERIALS
stress 	→ Brittle materials fracture at low strains and absorb little energy. conversely, ductile materials fail after significant plastic strain and absorb more energy.

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Q No: 9: → INCREASING CONDUCTIVITY OF A SEMI CONDUCTOR:

(i) Doping: Introducing impurities in to semiconductors Doping with donor impurities (eg Phosphorous) increases electron concentration, enhancing conductivity while acceptor impurities (eg boron) create holes contributing to conductivity

(ii) Temprature: Raising temprature promotes electron mobility, improving conductivity.

(iii) Voltage: Apply a voltage. An external electric field can influence charge carriers.

(iv) Reducing defects: Minimizing crystal defects in the semiconductor material improves carrier mobility

→CONCLUSION: All above mentioned procedures can be used to enhance conductivity

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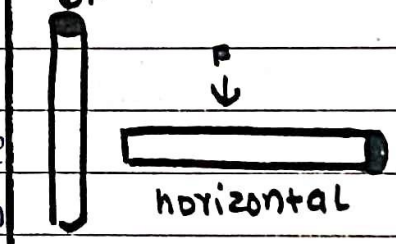
Q no 10: Yes, there will be a slight difference in length of a 20 meter steel grider while standing horizontally and vertically

Diagram



→EXPLANATION:

(i) In Vertical Position: Small area is subjected to stress. Stress will be large and it can cause slight decrease in length as compared to original length.

(ii) In Horizontal Position: Large area is subjected to stress. Thus stress will be so small that approximately no change occurs in its Length.

→Mathematically: $\text{stress} = \frac{\text{Force}}{\text{area}}$ or $\text{stress} = \frac{\text{weight}}{\text{area}}$.

$\uparrow \text{stress} \propto 1/\text{area} \downarrow$

→CONCLUSION: Stress causes change in length of grider.

Cutting Line

Q No 11:) → ADVANTAGE OF USING SUPERCONDUCTOR IN MRI:

(i) Magnetic Stability: Superconductors ensure a stable magnetic field enhancing precision and reliability of MRI

(ii) Energy Efficiency: Zero electrical resistance in super conductors minimizes energy consumption making MRI machines more energy-efficient and cost effective.

(iii) Improved Image Quality: Intense magnetic fields generated by superconductors enhance image clarity

(iv) Compact Designs: Superconducting magnets enable smaller and more mobile MRI machines

(v) Faster scan: Superconductors facilitate rapid adjustments in magnetic field strength reducing scan times

(vi) Technological Advancements: Superconductive materials drive ongoing innovations in MRI technology

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