UNIT 3

Properties of Materials

Materials we can seearound us and those used in civil engineering have various

properties. The word “property” can be used in many different ways. We are going

to use it with the meaning of a quality or feature of something.

All the things we can see around us are made of some kind of material or, in most

cases, of a combination of various materials.

1. **Match the object with the best possible material it can be made of. There**

**are a few possibilities for some of the objects.**

Object Material

1. car a) plastic

2. window b) wood

3. electrical wire c) glass

4. bottle d) silver

5. cutlery e) concrete

6. telephone f) metal

7. table g) copper

8. pre-made building

blocks

We use particular materials to produce certain objects because of their properties.

How do we find out what the properties of some materials are? The answer is very

simple. We can see the materials or touch them; we can try lifting them or applying

force to them. The materials will perform in a certain way. When we touch the

material, we can feel if it is smooth or rough. Some vandals take a nail or other

sharp object and scratch walls or elevator booths to find out if the material they are

made of is soft or hard. We need a crane to lift a concrete block as it is really

heavy, but things we can lift with our hands are obviously light. We use concrete

blocks for building constructions because they are rigid. But car wheels should be

flexible; therefore, we use rubber for their production. We also have to mention

plasticity and elasticity. A rubber band is elastic, and modelling clay is a plastic

material. They behave differently when we apply force to them. We want to see

through windows, so we use glass to make them. Glass is transparent, but brittle,

so it can be easily broken. Glass is not tough at all. Plastics are tough, but they are

usually either translucent or opaque, so we cannot see clearly through objects

made from them. Another important property in the building industry is

combustibility. Materials can be combustible or non-combustible. We can also

say that materials are flammable or non-flammable. Fire-resistant material will not

burn in the process of combustion and that is the reason why fire-resistant doors in

office or residential buildings are made of non-combustible materials. Unfortunately,

most of the materials we have in our households or offices are combustible; in the

case of a fire, we can hardly save anything but our lives. Other important properties

are corrosion resistance, which means that materials are resistant against rust, and

conductivity, which means that materials are good or poor conductors of electric

current or heat. For building structures it is important to know if the material is

permeable or impermeable, as builders don’t want moisture or water vapour to pass

inside the building.

**B. Match the adjectives with their meanings.**

1. combustible a) not easily broken or made weaker

2. transparent b) hard and can easily break into pieces

3. elastic c) easy to press or shape, pleasant to touch, not rough or stiff

4. rough d) can be shaped into any shape and will keep that

shape

5. rigid e) clear and thin enough to see things through

6. translucent f) able to stretch or bend and then return to its original

shape

7. tough g) stiff, hard, and difficult to bend or move

8. soft h) clear enough for light to pass through but not completely clear

9. brittle i) a surface which is not smooth

10. plastic j) able to burn easily

1. **What are the opposite meanings of these adjectives?**

flexible \_\_\_\_\_\_\_\_\_\_\_\_\_\_

soft \_\_\_\_\_\_\_\_\_\_\_\_\_\_

rough \_\_\_\_\_\_\_\_\_\_\_\_\_\_

brittle \_\_\_\_\_\_\_\_\_\_\_\_\_\_

transparent \_\_\_\_\_\_\_\_\_\_\_\_\_\_

heavy \_\_\_\_\_\_\_\_\_\_\_\_\_\_

combustible \_\_\_\_\_\_\_\_\_\_\_\_\_\_

permeable \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**D. Choose the right answers.**

1. Why is glass used for windowpanes?

a) Because it is brittle.

b) Because it is transparent.

c) Because it is waterproof.

2. Why do we use chalk to write on a blackboard?

a) Because it is white.

b) Because it is brittle.

c) Because it is soft.

3. Why do we need a special drill to make holes in a concrete wall?

a) Because concrete is hard.

b) Because concrete is heavy.

c) Because concrete is rigid.

4. What kind of material should a fireproof door be made of?

a) Combustible material.

b) Non-combustible material.

c) Plastic material.

5. Why do builders need cranes to lift concrete panels?

a) Because concrete panels are square in shape.

b) Because concrete panels are rigid.

c) Because concrete panels are heavy.

6. Why will a glass break into pieces when we drop it?

a) Because it is brittle.

b) Because it is smooth.

c) Because it is tough.

7. Why is aluminium used to construct aircraft?

a) Because aluminium is soft.

b) Because aluminium is easy to shape.

c) Because aluminium is light.

1. **Choose the correct properties of the following materials**

glass: a) rigid b) permeable c) brittle

wood: a) combustible b) brittle c) transparent

lead: a) light b) hard c) heavy

concrete: a) flexible b) rigid c) combustible

chalk: a) rigid b) soft c) flexible

**F. You can form nouns from the adjectives that describe the properties of**

**building materials.**

Adjective Noun

Elastic elasticity

Soft softness

Fragile fragility

Transparent transparency

flexible

brittle

rough

plastic

combustible

tough

rigid

strong strenght

thick

permeable

weak

dense

hard

smooth

**H. Answer the following questions:**

1. Why is glass used for windowpanes?

2. Why is glass wool used in roof structures to keep heat in the attic?

3. Why is some steel covered with a thin layer of zinc? Corrosion, rust

4. Why is concrete used for the columns of a building structure?

5. Why is steel used in concrete as reinforcement? Reinforced concrete

1. **Complete the sentences with the correct properties:**

1. Various coatings are applied to protect iron from chemical reaction. This

means that iron becomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. A wooden house burnt down, but the windows remained undamaged, i.e.,

wood is \_\_\_\_\_\_\_\_\_\_ and glass is \_\_\_\_\_\_\_\_\_\_\_\_.

3. We need a special drill to make a hole in a concrete wall. This means

concrete is \_\_\_\_\_\_\_\_\_\_\_.

4. Electric repairmen use leather gloves, because leather is \_\_\_\_\_\_\_\_\_\_.

5. Concrete panels are lifted by a crane, which means that a concrete panel is

\_\_\_\_\_\_\_\_\_.

6. Vertical blinds are used in modern offices to prevent sunrays from penetrating

into the room, i.e., blinds are \_\_\_\_\_\_\_\_\_\_\_\_\_.