# BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

## School of Manufacturing Skills

**Session: 2020-21 (Winter Semester)**

**B. Voc. Program, III Semester,**

**1st In-Sem. Examination**

**Course Code: SMS1305** **Time: 1 Hour**

**Course Name: Material Science** **Max. Marks: 20**

**Instructions:**

1. Attempt all questions.
2. Use of Calculators is Prohibited.
3. Section A contains 05 Questions. Each question carries 1 Mark.
4. Section B contains 03 Questions. Each question carries 2 Marks.
5. Section C contains 03 Questions. Each question carries 3 Marks.

### Section – A

05X01 = 05 Marks

1. Which one is a natural material?
   a) Granite
   b) glass
   c) plastic
   d) pvc
2. Carbon percentage available in steel.
   a) 0-2 %
   b) 2-4%
   c) 4-6%
   d) 6-10%
3. Which one of these have lower density?
   a) Water
   b) Aluminum
   c) steel
   d) copper
4. Which one of these have lower melting point temperature?
   a) Tin
   b) lead
   c) copper
   d) steel
5. Which one is not an artificial material?
   a) Wood
   b) plastic
   c) ceramics
   d) glass

## Section – B

03X02 = 06 Marks

6. Define the followings
   (a) artificial material
   (b) natural material
7. Define the followings?
   (a) scaling
   (b) melting point temperature
8. Differentiate between elastic & plastic deformation?

## Section – C

03X03 = 09 Marks

9. Explain any three physical properties of metals?
10. Write down the classification of metals based on composition & properties?
11. Write down production properties of metals?

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Answer Key

**Section – A**

05X01 = 05 Marks

1. Which one is a natural material?
   a) Granite
2. Carbon percentage available in steel.
   a) 0-2 %
3. Which one of these have lower density?
   a) Water
4. Which one of these have lower melting point temperature?
   a) Tin
5. Which one is not an artificial material?
   a) Wood

**Section – B**

03X02 = 06 Marks

6. Define the followings
   (a) artificial material

- **Artificial materials:** This includes the large plastics group as well as glasses and ceramics. Plastics are light, non conducting and available in types ranging from rubber like to dimensionally stable and hard. They are extremely versatile and can be used in applications extending from materials for tyres through to components for compact gear units.

—Industrial ceramic materials are primarily used due to their hardness and wear resistance, e.g. as cutting plates, nozzles and sliding rings.

Granite test bench top Small plastic gears

(b) natural material

- **Natural materials:** These materials that are present in nature, such as rocks or wood. E.g. granite as a slab for a test bench.

7. Define the followings?
   (a) scaling

**Scaling resistance:**
It describes the reaction behaviour of materials at high temperatures.

(b) melting point temperature

**Melting point (melting temperature):** The melting point is the temperature at which a material starts to melt.
It is started in degrees Celsius (°C) or Kelvin (K). Pure metals have a specific melting point. Alloys, such as steels and CuZn alloys have a melting range.

8. Differentiate between elastic & plastic deformation?

**Elastic and plastic deformation:**
Different materials deform quite differently when placed under load.
For Example, a saw blade made from hardened tool steel can be bent and springs back to its original, straight form after the force is removed. This behaviour is referred to as elastic deformation or material elasticity.

By contrast, a lead bar generally remains deformed after it is bent. The deformation of this material is almost completely plastic. This property is referred to as the plasticity of the material.

**Section – C**

03X03 = 09 Marks

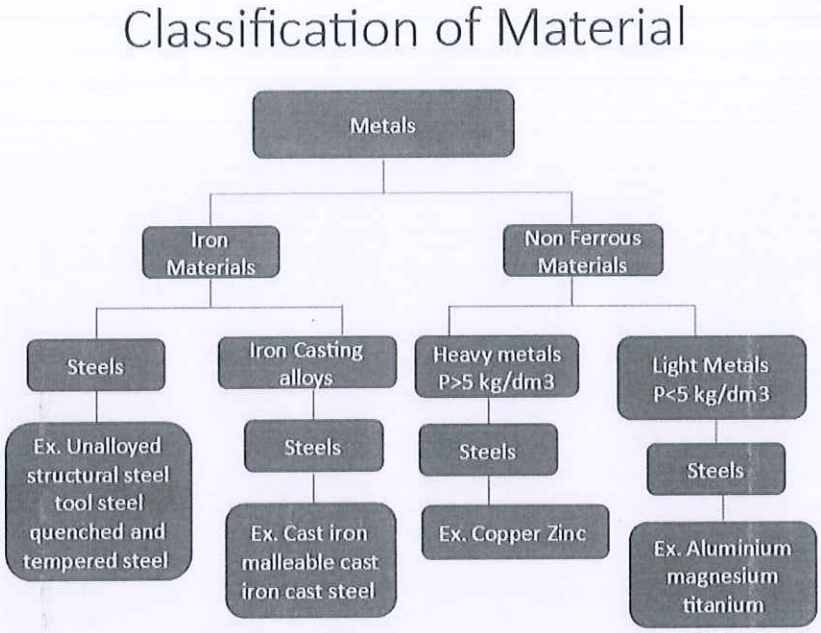
9. Explain any three physical properties of metals?

**Density:** The density of a material is equal to the mass of a body divided by its volume.
Density can be visualised as the mass of a cube with each edge having length 1 dm. Units of density include kg/dm$^3$, g/cm$^3$ or t/m$^3$ for solids and liquids as well as kg/m$^3$ for gases.

**Melting point (melting temperature):** The melting point is the temperature at which a material starts to melt.
It is started in degrees Celsius (°C) or Kelvin (K). Pure metals have a specific melting point. Alloys, such as steels and CuZn alloys have a melting range.

**Electric Conductivity:** Electric conductivity describes the ability of a material to conduct the electric current.
Silver, copper and aluminium are good electrical conductors. They are used as conductor materials. Substances that do not conduct electricity are referred to as insulators. These include plastics, ceramics and glass.

10. Write down the classification of metals based on composition & properties?




11. Write down production properties of metals?

**Castability:**
A material is castable if it forms a low viscosity melt that completely fills the mould and does not form any voids (shrinkage cavities) in the solidified material. The various types of cast iron, aluminium casting alloys, copper zinc and zinc casting alloys have good Castability.

**Formability:**
It is the ability of a material to be formed into a work-piece due to a plastic deformation when force is applied. Hot forming processes include hot rolling and forging, while cold forming processes include cold rolling, bending, folding and deep drawing.
Low carbon steels, soft iron and aluminium and copper wrought alloys exhibit high formability. Iron casting alloys are not formable.

**Machinability:**
It indicates whether and under which conditions a material can be manufactured using machining techniques, such as turning, milling and grinding. The surface quality of the machined surface, the machining conditions and the service life of the machine tools are quantifying parameters for the machinability.

**Weldability:**
It describes the suitability or unsuitability of a material for welding. Unalloyed and low alloy steels with a low carbon content have good welding properties. High alloy steels as well as aluminium and copper alloys can also be welded using special welding methods.