MECHANICAL ENGINEERING MATERIALS (67013)

AIMS: To identify and classify the materials used for manufacturing in mechanical engineering field. To recognize the sources of various engineering materials. To understand the characteristics of various engineering materials. Scope of materials application in mechanical engineering field.

SHORT DESCRIPTION: Aspects of engineering materials; Ferrous metals and alloys; Non-ferrous metals; Fundamental concept of aluminum; Bricks; Sand; Cement; Sound absorbing and heat insulating materials; Glass and ceramics, Paints and varnishes, Fire and water proofing materials; Fuels and lubricants; Plastic materials, Composite materials; Conducting magnetic materials and optical fiber.

DETAIL DESCRIPTION:

1 Understand engineering materials.

1.1 Define engineering materials.

1.2 Classify the engineering materials.

1.3 Characteristics of engineering materials.

2 Understand ferrous metals and alloys.

2.1 Mention types of ferrous metals used in industry.

2 Define mild steel and cast iron.

2.3 Describe and types of alloy steel.

2.4 State the use of steel.

3 Understand non-ferrous metals.

3.1 Define non-ferrous metals.

3.2 Classify non-ferrous metals in industrial used.

3.3 Describe the use of non- ferrous metals and alloys like copper, zinc, tin, lead, brass and bronze.

4. Understand the fundamental concept of aluminum.

4.1 Define aluminum.

4.2 State the important properties of aluminum.

4.3 State the use of aluminum.

5 .Understand brick as construction materials.

5.1 Define brick.

5.2 State manufacturing process of bricks.

5.3 Describe the process of brick drying.

5.4 Describe the methods of kiln burning of brick.

5.5 Draw the sketches Bull's trench kiln & Hoffman's kiln.

6. Understand the application of sand.

6.1 Mention the classification of sand according to their sources.

6.2 Mention the specifications of good sand.

6.3 Describe the purpose of grading of sand.

6.4 Mention the use of various grades of sand.

7 .Understand the application of cement.

7.1 Define cement.

7.2 Mention types of cement.

7.3 Explain the functions of various ingredients of cement.

7.4 Distinguish between wet process and dry process of manufacturing Portland cement.

7.5 Draw a flow diagram based on wet process of manufacturing of cement.

7.6 Mention the uses of cement as engineering material.

8 Understand sound absorbing and heat insulating materials.

8.1 Mention the functions of insulating materials.

8.2 List five natural heat insulating materials.

8.3 Mention the names of synthetic insulating materials.

8.4 Describe the sources of obtaining rubber, cork and ebonite.

8.5 Describe the uses of asbestos as insulating material.

8.6 List three natural and artificial sound absorbing materials.

8.7 Explain light weight concrete used in acoustic works.

9 .Understand fundamental concepts of glass and ceramics.

9.1 Define constituents of glass.

9.2 State properties of glass.

9.3 Describe uses of glass.

9.4 Mention the constituents of ceramics.

9.5 Classify ceramics.

9.6 Mention the properties of ceramics.

9.7 Explain the use of ceramics in engineering field.

10. Understand concepts of paints and varnishes.

10.1 Define paints and varnish with classification.

10.2 Define characteristics of paint.

10.3 Describe color code.

10.4 Mention the use of different types paint.

11. Understand the fundamental aspects of fire and water proofing materials.

11.1 Describe fire proofing materials and water proofing materials.

11.2 Mention the use of fire and waterproof materials.

11.3 Define characteristics of refractory materials.

11.4 Mention the use of refractory materials.

12. Understand the basic concepts of fuels and lubricants.

12.1 Discuss about fuel and lubricants.

12.2 State purposes of fuels with their classifications.

12.3 Mention different types of lubricants.

12.4 Explain characteristics of lubricating oils.

13 Understand plastic materials.

13.1 Define plastic.

13.2 List the names of raw materials for plastic.

13.3 Classify different types of plastic.

13.4 Mention the types of plastic molding.

13.5 Explain the use of plastic as engineering material.

14. Understand the concept of composite materials.

14.1 Define composite materials

14.2 Classify composite materials

14.3 Explain the application of composite materials

15. Understand basic knowledge of conducting magnetic materials and optical fiber

15.1 Define conducting, non-conducting and semi-conducting materials.

15.2 Describe the use of semi-conducting materials.

15.3 Name the types of soft and hard magnetic materials.

15.4 State the use of magnet in industrial field.

15.5 Mention the uses of optical fiber.