
Subject Name- Basic Mechanical Engineering (BT-203)

Unit: I Important questions for main exam

Note: The questions which are very-very important are highlighted (bolded).

Theory:

- 1. Discuss the classification of engineering materials in brief.**
2. Compare properties of ferrous and non-ferrous metals.
3. What is cast iron? What are different types of cast iron? Discuss composition, properties and application(uses) of each type.
4. What is cast iron? State composition of cast iron. Discuss properties and uses of cast iron. Note: In question number 2 in composition of cast iron you have to write composition of all types cast iron that is composition of grey cast iron, composition of white cast iron, composition of malleable cast iron and nodular cast iron.
5. Discuss the effect of alloying element (carbon, silicon, phosphorous and Sulphur) on the properties of cast iron.
- 6. Explain steel.? What is carbon steel? What are different types of carbon steel? Discuss composition, properties and application (uses) of each type of carbon steel.**
- 7. What is carbon steel? Discuss composition, mechanical properties and uses of carbon steel.**
Note: In question number 3 in composition of carbon steel you have to write composition of all types of carbon steel that is composition of high carbon steel, composition of medium carbon steel and low carbon steel (mild steel).
- 8. Explain and discuss the iron -carbon equilibrium diagram**
Or
Draw the iron -carbon diagram for steel.
9. Explain the following reaction in relation to iron- carbon equilibrium diagram:
 1. Eutectic reaction (along with carbon percentage and temperature)
 2. Eutectoid reaction (along with carbon percentage and temperature)
 3. Peritectic reaction (along with carbon percentage and temperature)
- 10. What are alloy steels? Why alloying is done? Show the effect of adding alloying element such as manganese, tungsten, carbon, copper, aluminium, nickel and chromium.**
11. Explain two types of alloy steel (high speed steel and stainless steel)? Write the composition, properties and application of these two types of alloys. Also explain various types of high-speed steel.
- 12. Define stress and strain? Explain the following mechanical properties of engineering material:**
 - 1. Strength**
 - 2. Hardness**
 - 3. Ductility**
 - 4. Toughness**
 - 5. Fatigue**
 - 6. Machinability**
 - 7. Creep**

8. Elasticity

9. Plasticity

10. Stiffness

11. Malleability

12. Brittleness

13. Malleability

14. Resilience

15. Wear

13. What is the purpose of testing engineering materials? Write the 5 differences between malleability and ductility.

14. Explain the following terms:

1. Tensile strength

2. Hooke's law

3. Modulus of elasticity or young's modulus.

4. Experimental setup of tensile testing.

Or

Tensile testing of steel.

5. Write a short note on plastics giving its properties.

15. a. Draw and explain stress-strain diagram for an elastic material or mild steel or ductile material.

b. Draw and explain stress-strain diagram for brittle material

c. Write the difference between stress- strain curve and true stress- stain curve.

Define hardness? How it can be measured? Explain the testing procedure for determine hardness of engineering material.

Or

Write a short note on- Hardness testing.

In question number 14 explain methods of hardness measurement i.e. Brinell hardness test , Vickers hardness test and Rockwell hardness test.

16. Define impact strength. What do you mean by impact testing? Briefly explain the procedure of Izod impact testing and Charpy impact testing.

Numerical: -

1. A rod 150 cm long and diameter 2 cm is subjected to an axial pull of 20 kN. If modulus of elasticity of the material of the rod is $2 \times 10^5 \frac{N}{mm^2}$. Determine the stress, strain and the elongation of the rod.

2. Find the young's modulus of brass rod of diameter 25 mm and of length 250 mm which is subjected to a tensile load of 50 kN when the extension of rod is equal to 0.3 mm.

3. A rod 200 cm long and diameter 3 cm is subjected to an axial pull of 30 kN. If Young's modulus of the material of the rod is $2 \times 10^5 \frac{N}{mm^2}$. Determine the stress, strain and the elongation of the rod.