SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF MECHANICAL ENGINEERING

QUESTION BANK

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UNIT IV - FERROUS AND NON FERROUS METALS

PART-A

1. What are ferrous alloys?
Ferrous alloys (steels and cast irons) are those in which iron is the prime constituent.

2. What are the different plain carbon steels?
Low carbon steels – Those contain less than 0.25% carbon
Medium carbon steels – Those containing between 0.25 and 0.60% carbon High carbon steels – Those containing more than 0.60% carbon

3. What are different alloys steels?
Low alloy steels – Those contain up to 3 to 4% of alloying elements High alloy steels – Those contain more than 5% of alloying elements.

4. What are the effects of adding alloying elements on the mechanical properties of ferrous alloys?
The alloying elements are added to enhance properties such as increased strength, toughness, hardenability, corrosion and wear resistance, etc.

5. Mention some of the commonly used alloying elements.
Some of the commonly used alloying elements include Mn, Si, Cr, Ni, W, Mo, V, ti, Co, Cu and Pb.

6. What are stainless steels?
Stainless steels are alloys of iron, chromium and other elements that resist corrosion from many environments.

7. What are the classes of stainless steels?
There are three classes of stainless steels on the basis of their microstructure:
a) Austenitic stainless steels
b) Ferritic stainless steels and
c) Martensitic stainless steels

8. What are tool steels?
Tool steels are high-carbon alloys used to make tools and dies for cutting, forming or otherwise shaping a material into a component or part for a specific application.

9. What are HSLA steels?
High Strength Low Alloy steels also known as micro-alloyed steels are low carbon steels containing small amounts of alloying elements. Its primary purpose is reduced weight with increased strength.

10. What are maraging steels?
Maraging steels are low carbon, highly alloyed steels. They are used in applications where very high tensile strength is desired.

11. How can you specify a steel? What is the difference between 4140 steel and 4340 steel

The AISI/SAE designation for the steels is a four digit number: First two digits indicate the alloy content and the last two digits indicate the carbon concentration.

12. What are the effects of lead and sulphur on the machinability of steels?

Lead improves the machinability whereas sulphur reduces it.

13. Which alloy elements are basically (a) carbide formers (b) graphite promoters?

c.) Carbide formers: Cr, W, Ti, Mo, Nb, V and Mn. d.) Graphite promoter: Si, Co, Al and Ni.

14. Why do stainless steels lose their corrosion resistance when the chromium in solution drops below 12%?

When the weight percentage of chromium drops below 12%, the corrosion rate increases sharply. As the corrosion rate increases, the resultant chromium-oxide protective layer becomes unable to redard oxidation, rust or corrosion effectively.

15. What determines whether a stainless steel is austenitic, ferritic or martensitic?

The predominant phase constituent of the microstructure present in a stainless steel determines whether a stainless steel is austenitic, ferritic or martensitic.

16. What is meant by 18-4-1 high speed steel?

A widely used high-speed tool steel is 18-4-1 high speed steel. This steel contains 18% tungsten, 4% chromium and 1% vanadium. It is considered to be one of the best of all purpose tool steels.

17. What are heat resisting steels and free-machining steels?

Steels which can resist the creep and oxidation at high temperatures and retain sufficient strength are called heat resisting steels. Free-machining steels also known as free cutting steels, machine readily and form small chips so as to reduce the rubbing against the cutting tool and associated friction and wear.

18. What are the features that make cast iron an important material?

- Good mechanical rigidity and good strength under compression.
- Easy castability.
- Good machinability can be achieved when a suitable composition is selected.

19. What are the effects of carbon on the properties of cast iron?

If the cast iron contains more of the brittle cementite, then its mechanical properties will be poor.

20. What is the influence of cooling rate on the properties of a cast iron?

High rate of cooling results in a weak and brittle cast iron. Slow cooling rate results in tough and strong cast iron.