***Choose the correct answer or answer:***

1. You are given two wires with the same diameter and length. One is wrought and the other is cast:

a. Cast wire has the greatest percentage elongation.

b. Wrought wire has the greatest percentage elongation.

c. Cast wire has the highest tensile strength.

2. If dislocations during movement along slip planes are impeded:

a. Plastic deformation is inhibited.

b. Modulus of elasticity is increased.

c. proportional limit and yield strength are increased.

d. Ductility is increased.

e. a and c.

3.. Coarse grain structure can be obtained by:

a. Using mould of low thermal conductivity.

b. Heating the metal to just above its melting temperature.

c. Addition of nucleating agent.

4. Grain size is:

a. Inversely related to strength.

b. Directly related to grain number.

c. Directly related to nucleating agent.

d. Inversely related to grain boundary.

5. Coarse grain structure can be obtained by:

a. Rapid cooling of molten metal.

b. Addition of nucleating agent.

c. Using moulds of higher thermal conductivity.

d. Over heating or prolonged heating of the metal during melting.

6. If the movement of the dislocation is easy:

* 1. Plastic deformation is inhibited.
  2. Modulus of elasticity is decreased.
  3. Proportional limit and yield strength are increased.
  4. Ductility is increased.

7. Metals are characterized by high melting point because of:

* 1. Their cast structure.
  2. The presence of dislocations.
  3. The strength of interatomic bonding within the crystalline solid.
  4. None of the above.

8. In grain boundaries, there is:

* + - 1. Less accumulation of impurities.
      2. More tarnish and corrosion resistance.
      3. Enough surface energy to start the formation of new set of grains.
      4. Less atomic diffusion.

9. When all slip possible has occurred:

a. Ductility is increased.

b. Strength is increased.

c. The movement of dislocation is easy.

d. Fracture of metal occurs.

10. When shaping a structure by sintering:

a. It becomes cold worked.

b. It becomes in powder form.

c. Strong cohesion between particles occurs.

d. Melting of solid particles is essential.

11. Wrought wires are:

a. Highly stressed structures.

b. Plastically formed structures.

c. Fibrous structures.

d. A and c.

e. All of the above.

12. Wrought wires have:

1. High strength properties.
2. Higher toughness than cast structures.
3. Higher modulus of elasticity than cast structures.
4. Higher ductility than cast metal.
5. Non of the above.

13. Dislocation movement is easy in metals because:

1. Metals have less slip.
2. Metals have many slip planes.
3. Metals have wrought structure.
4. Metals have grain structure.

14. The heating of a metal after plastic deformation to relieve stresses within the grain without changing the shape of the grain is called:

1. Recrystallizatin.
2. Recovery.
3. Aging.
4. Restoration.

15. Wrought metals are:

1. Cast structure.
2. Fibrous structure.
3. Cold worked structure.
4. Electroformed structure.

16. A substitutional solid solution is obtained only when the constituent atoms:

1. Have no chemical affinity towards each other.
2. Have difference in atomic size less than 15%
3. Have the same type of space lattice.
4. All of the above.

17. The super-lattice Au-Cu formed in the gold-copper system is preferred than the super-lattice Au-Cu3 because:

1. It has more strengthening effect.
2. It has lower coefficient of thermal expansion.
3. It can resist corrosion.
4. It is face centered cubic

.

18. A homogeneous, mechanically, separable, distinct part of a system is called:

a) State b) Matrix c) Phase d) Precipitate.

19. An alloy with a single melting point which is the lowest melting point of the alloy system is called (a, an):

a) Inter-metallic b) Eutectic c) Solid solution

d) Peritcctic

20. Two metals are partially soluble in the liquid and solid condition form: a) Solid solution b) Eutectic alloy c) Inter-metallic compound

1. The number of phases present at any point between the liquidus and solidus lines of an alloy system is usually:

a) One b) Two c) Three.

1. In precipitation hardening, the precipitated phase reduces the mobility of dislocations and thus:
   * 1. Increases the strength and hardness of the alloy.
     2. Decreases the strength and hardness of the alloy.
     3. Increases the ductility of the alloy.
2. Grain is related to:
   * 1. Casting.
     2. Cold working
     3. Similar orientation of space lattice.
3. In a constitutional diagram in the area below the solidus the metal is:
   * 1. Solid.
     2. Liquid
     3. Both solid and liquid
     4. Amorphous
4. Cold working causes:
   * 1. Increase strength.
     2. Increase toughness
     3. Increase modulus of elasticity
     4. Increase ductility
5. All lattice imperfections increase strength except:
   * 1. Vacancies.
     2. Dislocation
     3. Grain boundaries
     4. Extra atoms.
6. If a gold copper alloy is cooled rapidly from the solidus temperature:
   * 1. AuCu and CuCu3 super lattice are formed.
     2. Disordered face centered cubic solid solution is formed
     3. Ordered solid solution is retained at room temperature.
7. Mechanical properties of metal can be improved by:
   * 1. Addition of a grain refiner.
     2. Addition of an alloying element that form a solution
     3. Addition of an element that precipitates a new phase
     4. Ordering the orientation of atoms
     5. All of the above
     6. Non of the above
8. Metals are characterized by high melting point because of:
   1. Their cast structure.
   2. The presence of dislocations.
   3. The strength of interatomic bonding within the crystalline colid.
   4. None of the above.

***State true or false and correct the false:***

1. Rapid cooling from liquid state refines grains.

1. Eutectic alloys are usually ductile.
2. Rapid cooling of gold-copper system produces super lattice structure.
3. An alloy which has the eutectic composition is characterized by having a melting point that is lower than any other alloy in the system.
4. Softening heat treatment of gold alloy should proceed slow cooling if hardening is required.
5. When two metals have chemical affinity to each other, intermetallic compounds may form.
6. Stainless steel alloy is an example of substitational solid solution.
7. Homogenized structures are more corrosion prone than non homogenized one.
8. A coarse grain structure metal is stronger than a finer one.
9. All types of alloys have a melting range.
10. Eutectic alloys have high corrosion resistance.
11. Solid state reactions in metals and alloys do not affect the modulus of elasticity.
12. In gold alloys range of 64-88% An, Au Cu3 superlattice with F.C. cubic fattice forms.
13. Precipitation hardening takes place in gold alloys at temperatures above 700oC.
14. Control of grain size is the only method of altering the mechanical properties of metals and or alloys.
15. Grain refiner in gold alloy increases its strength.
16. Wrought dental alloys usually have higher tensile strength compared to its corresponding cast structure.
17. The smaller the grain size, the lower the strength.
18. Rapid rate of crystallization produces a large grain size.
19. Cast properties can be regained by heating the wrought structure at lower temperature which allow recovery.

### In grain boundaries, there is enough surface energy to start the formation

### of new set of grains.

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1. All metals are solids in room temperature.
2. Grain boundaries in polycrystalline metals are amorphous in nature.
3. Elastic deformation becomes difficult in metals if dislocations cannot move.
4. Stainless steel alloy is an example of substitutional solid solution.
5. Eutectic alloys have a high corrosion resistance.
6. Control of grain size is the only method of altering the mechanical properties of metals and/or alloys.
7. Eutectic alloys are formed at any composition but at definite temperature
8. Presence of imperfections in crystalline structure increases the strength properties.

1. Presence of dislocations in crystalline structures increase their strength properties and decreases deformation.
2. Opacity of metals is due to the presence of valence electrons.
3. Nucleating agents give castings of coarse grain size.
4. During solidification, if the rate of crystallization is higher than the rate of nucleation, coarse grain structure will be formed
5. During shaping of metals, bonding of particles in absence of any liquid is called plastic forming
6. Stress relief procedure should be done after cold working to increase ductility of the wire.
7. The hardening heat treatment is indicated for structures that are to be shaped or cold worked.
8. In the solidification of an alloy, areas of microscopically heterogenous composition are set up by process called coring.
9. Ordered solid solution is more ductile than disordered one.
10. The greater the number of slip planes, the greater the ductility of a metal
11. The grain size in metals is increased either by the addition of nucleating agents or by rapid cooling from the liquid state.
12. Softening heat treatment of gold alloys increases strength, hardness and decrease ductility.
13. Heterogenous nucleation is associated with foreign atoms.
14. Grain size increases with rapid cooling of a molten metal.
15. Hardening heat treatment of gold alloy would increase its strength
16. Cored structure occur in alloy with wide melting range.
17. An alloy that has the eutectic composition is characterized by having a melting range that is lower than any other alloy in the system.
18. Large grains of an alloy give rise to inferior strength properties.
19. Presence of vacancies within lattice structure would allow atomic diffusion in the solid state to take place.
20. Hardening heat treatment increases rigidity of the material.
21. Cored structure resist corrosion.