**Material Science**

**Department of Mechanical Engineering**

1 There are ----- basic crystal systems.

(A) Two

(B) Four

(C) Six

(D) Seven

Answer: D

2. Total number of atoms in the FCC unit cell is—

(A) 1

(B) 2

(C) 3

(D) 4

Answer: D

3. For the BCC structure, the total number of the slip system is –

(A) 48

(B) 12

(C) 24

(D) 6

Answer: A

4. The Burger vector is at ----- to the edge dislocation

(A) Perpendicular

(B) Parallel

(C) Inclined

(D) None of the above

Answer: A

5. Atomic packing factor of FCC crystal is -

(A) 0.74

(B) 0.52

(C) 0.68

(D) 1

Answer: A

6. Delta iron exists -

(A) Between 900°C and 1404°C

(B) Between 1404°C and 1535°C

(C) Below 768°C

(D) Between 768°C and 900°C

Answer: B

7. The carbon content in cast iron is-

(A) Above 2%

(B) Upto 2%

(C) Below 0.8%

(D) Above 6.3%

Answer: A

8. Process annealing is done -

(A) Below the lower critical temperature of the steel

(B) Above the upper critical temperature of the steel

(C) At the critical temperature of the steel

(D) None of the above

Answer: A

9. The Austenite has -

(A) FCC structure

(B) BCC structure

(C) HCP structure

(D) All of the above

Answer: A

10. Brass is an alloy of –

(A) Copper and Tin

(B) Copper and Zinc

(C) Copper and Lead

(D) Copper and Aluminum

Answer: B

11. What is Gibbs phase rule for general system?  
(A) P = C – 1 – F  
(B) P = C + 1 – F  
(C) P + F = C – 2  
(D) P + F = C + 2

Answer: D

12. The body centered cubic (BCC) lattice is found in

(A) Aluminum

(B) Copper

(C) Cadmium

(D) Tungsten

Answer: D

13. The Brinell Hardness Number (BHN) for mild steel lies in the range of:

(A) 50 to 70

(B) 70 to 100

(C) 110 to 150

(D) 150 to 300

Answer: C

14. Which of the following test is a destructive test?

(A) Radiography

(B) Compression test

(C) Ultrasonic inspection

(D) None of the above

Answer: B

15. Which hardness method can be used to measure hardness of a single grain?

(A) Rockwell

(B) Knoop

(C) Vickers

(D) Shore

Answer: B

16. Higher is the temperature of tempering:

(A) the softer will be the product

(B) the tougher will be the product

(C) the harder will be the product

(D) the stronger will be the product

Answer: B

17. Mild steel is

(A) High carbon steel

(B) Medium carbon steel

(C) Low carbon steel

(D) None…

Answer: C

18. The following constituents of steel is least strong and softest

(A) Ferrite

(B) Pearlite

(C) Austenite

(D) Martensite

Answer: A

19. In which of the following carbon varies from 4 to 4.5%?

(A) Wrought iron

(B) Pig iron

(C) Grey iron

(D) Cast iron

Answer: B

20. Minimum carbon content in Cast iron is

(A) 1%

(B) 2%

(C) 3%

(D) 4%

Answer: B

21. Presence of which of the following makes pig iron hard

(A) Sulphur

(B) Phosphorous

(C) Sodium

(D) Calcium

Answer: A

22. Which the following is added to steel to increase the corrosion resistance?

(A) tungsten and vanadium

(B) zinc and lead

(C) chromium and nickel

(D) Sulphur and phosphorous

Answer: C

23. Following stress relieving process is used after cold working of materials

(A)Tempering

(B) Cyaniding

(C) Annealing

(D) Normalizing

Answer: C

24. Dislocation in materials is \_ defect.

(A) Point

(B) Line

(C) Plane

(D) Casting defect

Answer: B

25. Purpose of tempering is to improve

(A) ductility

(B) malleability

(C) hardness

(D) machinability

Answer: D

26. Tensile strength of steel is increased by addition of

(A) Manganese

(B) Sulphur

(C) Phosphorous

(D) Carbon

Answer: A

27. The degree of freedom at a triple point in the unary diagram for water is \_\_\_\_\_\_\_\_  
(A) 2  
(B) 3  
(C) 0  
(D) 1

Answer: C

28. Which of the following is associated with minimum plastic deformation?

(A) Ductile fracture

(B) Brittle fracture

(C) Fatigue

(D) It doesn’t occur during fracture

Answer: B

29. How many slips system is there in FCC lattice?  
(A) 12  
(B) 6  
(C) 10  
(D) 18

Answer: A

30. Which law is related to slip plane and slip direction?  
(A) Bragg’s law  
(B) Fick’s law  
(C) Schmid’s law  
(D) Such a law doesn’t exist

Answer: C

31. Value of critical resolved shear stress for a given material at a given temperature is--  
(A) Increases with time  
(B) Decreases with time  
(C) Decreases harshly with time  
(D) Remains constant

Answer: D

32. Which of the following stresses is required for the slip to occur?  
(A) Tensile stress  
(B) Compressive stress  
(C) Critical resolved shear stress  
(D) Slip doesn’t occur due to stress

Answer: C

33. How many slip systems are there in BCC lattice?  
(A) 36  
(B) 48  
(C) 24  
(D) 18

Answer: B

34. How many slip systems are there in hexagonal closed packed crystal?  
(A) 3  
(B) 6  
(C) 9  
(D) 18

Answer: A

35. In which of the following processes does recovery, recrystallization, grain growth take place?  
(A) Surface hardening  
(B) Tempering  
(C) Strengthening  
(D) Annealing

Answer: D

36. At which of the following temperature can recovery occur? (where Tm is melting point)  
(A) 0.2Tm  
(B) 0.4Tm  
(C) 0.5Tm  
(D) 0.6Tm

Answer: A

37. Frenkel defect belongs to which of the following classes?  
(A) Point defect  
(B) Linear dislocation  
(C) Interfacial defect  
(D) Bulk defect

Answer: A

38. Foreign species is present in which of the following defects?  
(a) Interstitial  
(b) Vacancy  
(c) Substitution  
(d) All of the mentioned

Answer: C

39. Burger vectors are relevant to which of the following crystalline defects?  
(a) Point defects  
(b) Line defects  
(c) Interfacial defects  
(d) Bulk defects

Answer: B

40. Which of the following point defects is non-stoichiometric in nature?  
(a) Schottky defect  
(b) Metal excess defect  
(c) Interstitial defect  
(d) Impurity defect

Answer: B