Multiple Choice Questions:

1. Gibbs phase rule for general system:
(a) P+F=C-1 (b) P+F=C+1 (c) P+F=C-2 (d) P+F=C+2
2. In a single-component condensed system, if degree of freedom is zero, maximum number of phases that can co-exist _____.
(a) 0 (b) 1 (c) 2 (d) 3
3. The degree of freedom at triple point in unary diagram for water _____.
(a) 0 (b) 1 (c) 2 (d) 3
4. Above the following line, liquid phase exist for all compositions in a phase diagram.
(a) Tie-line (b) Solvus (c) Solidus (d) Liquidus
5. Following is wrong about a phase diagram.
(a) It gives information on transformation rates.
(b) Relative amount of different phases can be found under given equilibrium conditions.
(c) It indicates the temperature at which different phases start to melt.
(d) Solid solubility limits are depicted by it.
6. Not a Hume-Ruthery condition:
(a) Crystal structure of each element of solid solution must be the same.
(b) Size of atoms of each two elements must not differ by more than 15%.
(c) Elements should form compounds with each other.
(d) Elements should have the same valence.
7. Pick the odd one in the following:
(a) Isomorphous alloy (b) Terminal solid solution
(c) Intermediate solid solution (d) Compound
8. The boundary line between (liquid) and (liquid+solid) regions must be part of _____.
(a) Solvus (b) Solidus (c) Liquidus (d) Tie-line
9. The boundary line between (liquid+solid) and (solid) regions must be part of _____.
(a) Solvus (b) Solidus (c) Liquidus (d) Tie-line
10. The boundary line between (alpha) and (alpha+beta) regions must be part of _____.
(a) Solvus (b) Solidus (c) Liquidus (d) Tie-line
11. Horizontal arrest in a cooling curve represents:
(a) Continuous cooling (b) Invariant reaction (c) Both (d) None
12. Relative amounts of phases in a region can be deduced using
(a) Phase rule (b) Lever rule (c) Either (d) None
13. An invariant reaction that produces a solid up on cooling two liquids:
(a) Eutectic (b) Peritectic (c) Monotectic (d) Syntectic
14. A solid + a liquid result in a liquid up on heating during _____ reaction.
(a) Eutectic (b) Peritectic (c) Monotectic (d) Syntectic
15. A solid + a liquid result in a solid up on cooling during _____ reaction.
(a) Eutectic (b) Peritectic (c) Monotectic (d) Syntectic
16. On heating, one solid phase results in another solid phase plus on liquid phase during ___ reaction.
(a) Eutectic (b) Peritectic (c) Monotectic (d) Syntectic
17. A solid phase results in a solid plus another solid phase up on cooling during _____ reaction.
(a) Eutectoid (b) Peritectoid (c) Eutectic (d) Peritectic
18. A solid phase results in a solid plus another solid phase up on heating during _____ reaction.
(a) Eutectoid (b) Peritectoid (c) Monotectoid (d) None
19. A liquid phase produces two solid phases during _____ reaction up on cooling.
(a) Eutectic (b) Eutectoid (c) Peritectic (d) Peritectoid
20. Liquid phase is involved in the following reaction:
(a) Eutectoid (b) Peritectoid (c) Monotectoid (d) None
21. Not a basic step of precipitation strengthening
(a) Solutionizing (b) Mixing and compacting (c) Quenching (d) Aging

22. Both nucleation and growth require change in free energy to be _____.
(a) –ve (b) zero (c) +ve (d) Any
23. During homogeneous nucleation, critical size of a particle _____ with increase in under-cooling.
(a) Increases (b) Decreases (c) Won't change (d) Not related
24. Not a typical site for nucleation during solid state transformation
(a) Container wall (b) Grain boundaries (c) Stacking faults (d) Dislocations
25. Growth occurs by
(a) Diffusion controlled individual movement of atoms
(b) Diffusion-less collective movement of atoms
(c) Both (d) None
26. Overall transformation rate changes with temperature as follows:
(a) Monotonically decreases with temperature (b) First increases, then decreases
(c) Initially it is slow, and then picks-up (d) Monotonically increases with temperature
27. wt.% of carbon in mild steels
(a) <0.008 (b) 0.008-0.3 (c) 03-0.8 (d) 0.8-2.11
28. Eutectic product in Fe-C system is called
(a) Pearlite (b) Bainite (c) Ledeburite (d) Spheroidite
29. Eutectoid product in Fe-C system is called
(a) Pearlite (b) Bainite (c) Ledeburite (d) Spheroidite
30. Phases that exist on left side of an invariant reaction line are called
(a) Pro-phase (b) Hypo-phase (c) Hyper-phase (d) None
31. Alloying element that decreases eutectoid temperature in Fe-C system
(a) Mo (b) Si (c) Ti (d) Ni
32. Nose of a C-curve represents
(a) Shortest time required for specified fraction of transformation
(b) Longest time required for specified fraction of transformation
(c) Average time required for specified fraction of transformation
(d) No information regarding time required for specified fraction of transformation
33. Phase formed of diffusion-less reaction:
(a) Pearlite (b) Lower Bainite (c) Upper bainite (d) Martensite
34. Ms for Fe-C system is round _____ ℃.
(a) 725 (b) 550 (c) 450 (d) 210
35. Impurity not responsible for temper embrittlement
(a) Sn (b) Sb (c) Si (d) As

Answers:

1. d
2. c
3. a
4. c
5. a
6. c
7. a
8. c
9. b
10. a
11. b
12. b
13. d
14. c
15. b
16. b
17. a
18. b
19. a
20. d
21. b
22. a
23. b
24. a
25. c
26. b
27. b
28. c
29. a
30. c
31. d
32. a
33. d
34. d
35. c