MATERIAL TECHNOLOGY

01. An eutectoid steel consists of
A. Wholly pearlite
B. Pearlite and ferrite
C. Wholly austenite
D. Pearlite and cementite
ANSWER: A

02. Iron-carbon alloys containing 1.7 to 4.3% carbon are known as
A. Eutectic cast irons
B. Hypo-eutectic cast irons
C. Hyper-eutectic cast irons
D. Eutectoid cast irons
ANSWER: B

03. The hardness of steel increases if it contains
A. Pearlite
B. Ferrite
C. Cementite
D. Martensite
ANSWER: C

04. Pearlite is a combination of
A. Ferrite and cementite
B. Ferrite and austenite
C. Ferrite and iron graphite
D. Pearlite and ferrite
ANSWER: A

05. Austenite is a combination of
A. Ferrite and cementite
B. Cementite and gamma iron
C. Ferrite and austenite
D. Pearlite and ferrite
ANSWER: B

06. Maximum percentage of carbon in ferrite is
A. 0.025%
B. 0.06%
C. 0.1%
D. 0.25%
ANSWER: A

07. Maximum percentage of carbon in austenite is
A. 0.025%
B. 0.8%

C. 1.25%
D. 1.7%
ANSWER: D

08. Pure iron is the structure of
A. Ferrite
B. Pearlite
C. Austenite
D. Ferrite and pearlite
ANSWER: A

09. Austenite phase in Iron-Carbon equilibrium diagram _____
A. Is face centered cubic structure
B. Has magnetic phase
C. Exists below 727^{o} C
D. Has body centered cubic structure
ANSWER: A

10. What is the crystal structure of Alpha-ferrite?
A. Body centered cubic structure
B. Face centered cubic structure
C. Orthorhombic crystal structure
D. Tetragonal crystal structure
ANSWER: A

11. In Iron-Carbon equilibrium diagram, at which temperature cementite changes fromferromagnetic to paramagnetic character?
A. 190^{o} C
B. 210^{o} C
C. 276^{o} C
D. 375^{o}C
ANSWER: B

12. Which of the following statements is/are true about Iron in Iron-Carbon equilibrium diagram?
1. It is soft and ductile
2. It is allotropic in nature
3. It is magnetic above curie temperature
4. Below the temperature of 1539^{o} C, iron is in liquid state
A. 1 and 2
B. 2 and 3
C. 3 and 4
D. 2 and 4
ANSWER: A

13. Which transformation starts after the nucleation of ferrite phase?
A. Bainite transformation

B. Pearlite transformation
C. Martensite transformation
D. Pearlite and Martensite transformation
ANSWER: A

14.The process of decomposing martensitic structure, by heating martensitic steel below its critical temperature is called as _____
A. Austenitizing
B. Quenching
C. Tempering
D. Aging
ANSWER: C

15.Which of the following processes permit the transformation of austenite to martensite, throughout the cross-section of a component without cracking or distortion?
A. Martempering
B. Marquenching
C. Austempering
D. Martempering and Marquenching
ANSWER: D

16. In which of the following methods, surface of a steel component becomes hard due to phase transformation of austenite to martensite?
A. Carbonitriding
B. Flame hardening
C. Induction hardening
D. Cyaniding
ANSWER: B

17.Eutectic reaction for iron- carbon system occurs at
A. 600° C
B. 723° C
C. 1147° C
D. 1490° C
ANSWER: C

18. The crystal structure of Alpha iron is
A. Cubic
B. Face centered cubic
C. Body centered cubic
D. Close packed hexagonal
ANSWER: C

19. A peritectic reaction is defined as
A. Two solids reacting to form a liquid
B. Two solids reacting not to form a liquid

C. A liquid and solid reacting to form another solid
D. Two solids reacting to form a third solid
ANSWER: C

20. Eutectoid product in Fe-C system is called
A. Pearlite
B. Bainite
C. Ledeburite
D. Spheroidite
ANSWER: A

21. Hypereutectoid steels have structure of
A. Pearlite alone
B. Phases of ferrite and pearlite
C. Phases of cementite and pearlite
D. Phases of cementite and pearlite
ANSWER: C

22. The temperature and carbon content at which eutectic reaction occurs in Fe-C equilibrium diagram are
A. 723°C and 0.02%C
B. 723°C and 0.80%C
C. 910°C and 4.3%C
D. 1130° C and 4.3%C
ANSWER: C

23. Which is closest to the purest form of the iron?
A. Cast Iron
B. Wrought Iron
C. Pig Iron
D. Steel
ANSWER: B

24. Wt.% of carbon in mild steels are
A. Less than 0.008
B. 0.008 to 0.3
C. 0.3 to 0.8
D. 0.8 to 2.11
ANSWER: B

25. Stainless steel is so called because of its _____.
A. High strength
B. High corrosion resistance
C. High ductility
D. Brittleness
ANSWER: B

26. The percentage of carbon in gray cast iron is in the range of
A. 0.25 to 0.75 %

B. 1.25 to 1.75 %
C. 3 to 4%
D. 8 to 10 %
ANSWER: C

27. The product from blast furnace is called
A. Cast Iron
B. Wrought Iron
C. Pig Iron
D. Steel
ANSWER: C

28. Free carbon in iron makes the metal
A. Soft and gives a coarse grained crystalline structure
B. Soft and gives a fine grained crystalline structure
C. Hard and gives a coarse grained crystalline structure
D. Hard and gives a fine grained crystalline structure
ANSWER: A

29. The cupola is used to manufacture
A. Pig iron
B. Cast iron
C. Wrought iron
D. Steel
ANSWER: B

30.1.8 % C steel is called
A. Hypo eutectoid steel
B. Hypereutectoid steel
C. Eutectoid steel
D. Eutectic steel
ANSWER: B

31. 0.8 % C steel is called
A. Hypo eutectoid steel
B. Hyper eutectoid steel
C. Eutectoid steel
D. Eutectic steel
ANSWER: C

32. 0.5 % C steel is called
A. Hypoeutectoid steel
B. Hyper eutectoid steel
C. Eutectoid steel
D. Eutectic steel
ANSWER: A

33. Peritectic reaction is
A. Solid $\Leftrightarrow$ Liquid + Solid
B. Liquid + $Solid_1 \Leftrightarrow Solid_2$
C. $Solid_1 \Leftrightarrow Solid_2 + Solid_3$
D. Liquid $\Leftrightarrow Solid_1 + Solid_2$
ANSWER: B

34. Ledeburite is
A. Alpha-Fe + Pearlite
B. Gamma-Fe + Fe_3C
C. Pearlite + Fe_3C
D. Alpha-Fe + Fe_3C
ANSWER: B

35. Gibbs phase rule for general system is
A. P+F=C-1
B. P+F=C+1
C. P+F=C-2
D. P+F=C+2
ANSWER: D

36. 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
ANSWER: C

37. The degree of freedom at triple point in unary diagram for water _____.
A. 0
B. 1
C. 2
D. 3
ANSWER: A

38. Above the following line, liquid phase exist for all compositions in a phase diagram.
A. Tie-line
B. Solvus
C. Solidus
D. Liquidus
ANSWER: C

39. 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
ANSWER: A

40. 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.
ANSWER: C

41. Pick the odd one in the following:
A. Isomorphous alloy
B. Terminal solid solution
C. Intermediate solid solution
D. Compound
ANSWER: A

42. The boundary line between (liquid) and (liquid+solid) regions must be part of _____. A. Solvus
B. Solidus
C. Liquidus
D. Tie-line
ANSWER: C

43. The boundary line between (liquid+solid) and (solid) regions must be part of _____.
A. Solvus
B. Solidus
C. Liquidus
D. Tie-line
ANSWER: B

44. The boundary line between (alpha) and (alpha+beta) regions must be part of _____. A. Solvus
B. Solidus
C. Liquidus
D. Tie-line
ANSWER: A

45. Horizontal arrest in a cooling curve represents:
A. Continuous cooling
B. Invariant reaction
C. Discontinuous cooling
D. Continuous cooling and invariant reaction
ANSWER: B

46. Relative amounts of phases in a region can be deduced using
A. Phase rule
B. Lever rule
C. Phase rule and Lever rule
D. None of the mentioned
ANSWER: B

47. An invariant reaction that produces a solid up on cooling two liquids:
A. Eutectic
B. Peritectic
C. Monotectic
D. Syntectic
ANSWER: D

48. A solid + a liquid result in a liquid upon heating during _____ reaction.
A. Eutectic
B. Peritectic
C. Monotectic
D. Syntectic
ANSWER: C

49. A solid + a liquid result in a solid up on cooling during _____ reaction.
A. Eutectic
B. Peritectic
C. Monotectic
D. Syntectic
ANSWER: B

50. On heating, one solid phase results in another solid phase plus one liquid phase during ___ reaction.
A. Eutectic
B. Peritectic
C. Monotectic
D. Syntectic
ANSWER: B

51. A solid phase results in a solid plus another solid phase upon cooling during _____ reaction.
A. Eutectoid
B. Peritectoid
C. Eutectic
D. Peritectic
ANSWER: A

52. A solid phase results in a solid plus another solid phase upon heating during _____ reaction.
A. Eutectoid
B. Peritectoid
C. Monotectoid
D. None of the mentioned
ANSWER: B

53. A liquid phase produces two solid phases during _____ reaction up on cooling.
A. Eutectic
B. Eutectoid
C. Peritectic
D. Peritectoid
ANSWER: A

54. Liquid phase is involved in the following reaction:
A. Eutectoid
B. Peritectoid
C. Monotectoid
D. None of the mentioned
ANSWER: D

55. Not a basic step of precipitation strengthening
A. Solutionizing
B. Mixing and compacting
C. Quenching
D. Aging
ANSWER: B

56. Both nucleation and growth require change in free energy to be _____.
A. Negative
B. Zero
C. Positive

D. Both positive and negative
ANSWER: A

57. During homogeneous nucleation, critical size of a particle _____ with increase in under-cooling.
A. Increases
B. Decreases
C. Won't change
D. Not related
ANSWER: B

58. Not a typical site for nucleation during solid state transformation
A. Container wall
B. Grain boundaries
C. Stacking faults
D. Dislocations
ANSWER: A

59. Grain growth occurs by
A. Diffusion controlled individual movement of atoms
B. Diffusion-less collective movement of atoms
C. Both diffusion controlled individual and diffusion less collective movement of atoms
D. None of the mentioned
ANSWER: C

60. 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
ANSWER: B

61. Eutectic product in Fe-C system is called
A. Pearlite
B. Bainite
C.Ledeburite
D. Spheroidite
ANSWER: C

62. Eutectoid product in Fe-C system is called
A. Pearlite
B. Bainite
C.Ledeburite
D.Spheroidite

ANSWER: A

63. Phases that exist on left side of an invariant reaction line are called
A. Pro-phase
B. Hypo-phase
C. Hyper-phase
D. None of the mentioned
ANSWER: C

64. Alloying element that decreases eutectoid temperature in Fe-C system
A. Mo
B. Si
C.Ti
D. Ni
ANSWER: D

65. 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
ANSWER: A

66. Phase formed of diffusion-less reaction:
A. Pearlite
B. Lower Bainite
C. Upper bainite
D. Martensite
ANSWER: D

67. Ms for Fe-C system is round _____ ^{o}C.
A. 725
B. 550
C. 450
D. 210
ANSWER: D

68. Impurity not responsible for temper embrittlement
A. Sn
B. Sb
C. Si
D. As
ANSWER: C

69. The degrees of freedom for a system having equal number of components and phases will be
A.1
B. 2

C. 3
D. 5
ANSWER: B

70. In a single component system, the maximum number of phases that can coexist in equilibrium is
A. 5
B. 7
C. 3
D. 2
ANSWER: C

71. Pearlite phase in steel is made up of
A. Alternate layers of martensite and cementite
B. Alternate layers of ferrite and cementite
C. Alternate layers of ferrite and martensite
D. Alternate layers of bainite and cementite
ANSWER: B

72. In which of the following phases of steel cementite is in particle form?
A. Martensite
B. Ferrite
C. Pearlite
D.Bainite
ANSWER: D

73. In which of the following phases of steel cementite is in lamellar form?
A. Ferrite
B.Bainite
C. Martensite
D. Pearlite
ANSWER: D

74. The reaction that yields two solid phases on cooling a single solid phase is called
A. Eutectic
B. Peritectoid
C. Congruent
D. Eutectoid
ANSWER: D

75. When FCC iron and BCC iron coexist in equilibrium, the degrees of freedom are
A. 1
B. 2
C. 3
4. 0
ANSWER: A

76. The maximum number of coexisting phases in a C-system is
A. C–1

B. C + 2
C. P(C–1)
D. C–P + 2
ANSWER: B

77. When ice, water and water vapour coexist in equilibrium, the degrees of freedom are
A. 0
B. 1
C. 2
D. 3
ANSWER: A

78. The pearlite content in plain carbon steel
A. Increases with carbon content upto 8% and then decreases
B. Increases with increasing carbon content upto 1.2%
C. Decreases as carbon content increases
D. None of the mentioned
ANSWER: A
79. During cooling, the complete transformation of austenite takes place from liquid state
A. At 723°C
B. Just above 723°C
C. Just below 723°C
D. None of the mentioned
ANSWER: C

80. The reaction that on heating one solid phase yields another solid phase together with one liquid phase is termed
A. Peritectic
B. Peritectoid
C. Eutectic
D. Eutectoid
ANSWER: A

81. On heating, if one solid phase splits into two solid phases, the reaction is
A. Eutectoid
B. Eutectic
C. Peritectic
D. Peritectoid
ANSWER: D

82. The fraction of pearlite in a 0.55% C-steel is
A. 0.33
B. 0.69
C. 0.63
D. None of the mentioned
ANSWER: B

83. If the rate of cooling of a liquid metal is rapid, the temperature of freezing/crystallization will
A. Decrease

B. Increase
C. Remain constant
D. None of the mentioned
ANSWER: A

84. For the allotropic forms of iron, the points of arrest are
A. The points where no further change occurs
B. Constant for all metals
C. The points where there is no further flow of metal
D. The points of discontinuity
ANSWER: D

85. Grey cast iron
A. Contains 1.7 to 3.5% carbon in free state and is obtained by the slow cooling of molten cast iron
B. Is also known as chilled cast iron and is obtained by cooling rapidly.
C. Is produced by annealing process. It is soft, tough and easily machined metal
D. Is produced by small additions of magnesium (or cerium) in the ladle Graphite is in nodular or spheroidal form and is welldispersed throughout the material
ANSWER: A

86. Nodular iron has
A. High machinability
B. Low melting point
C. High tensile strength
D. All the mentioned.
ANSWER: D

87. Melting point of iron is
A. 1539°C
B. 1601°C
C. 1489°C
D. 1712°C
ANSWER: A

88. Compressive strength of grey cast iron in tonnes/cm is of the order of
A. 3- 5
B. 5-7
C. 7-10
D. 10-15
ANSWER: B

89. Blast furnace produces following by reduction of iron ore
A. Cast iron
B. Pig iron
C. Wrought iron
D. Malleable iron
ANSWER: B

90. Cupola produces following material
A. Cast iron

B. Pig iron
C. Wrought iron
D. Malleable iron
ANSWER: A

91. Which is the false statement about wrought iron. It has
A. High resistance to rusting and corrosion
B. High ductility
C. Ability of hold protective coating
D. Uniform strength in all directions.
ANSWER: D

92. The tensile strength of wrought iron is maximum
A. Along the lines of slag distribution
B. Perpendicular to lines of slag distribution
C. Uniform in all directions
D. Unpredictable
ANSWER: A

93. What is a phase?
A. The substance which is physically distinct
B. The substance which is homogenouschemically
C. The substance which is both physically distinct and chemically homogenous
D. The substance which is both physically distinct and chemically heterogeneous
ANSWER: C

94. Which of the following are examples of unary phase diagrams?
A. Cu-Ni phase diagram
B. Water phase diagram
C. Cu-Pd phase diagram
D. Mg-Db phase diagram
ANSWER: D

95. What are the external parameters that affect the phase structure?
A. Temperature, Pressure
B. Temperature, Composition
C. Pressure, Composition
D. Temperature, Pressure, Composition
ANSWER: D

96. What is the phase fraction of an alloy when it is one phase system?
A. 0.6
B. 0.8
C. 0.5
D. 1.0
ANSWER: D

97. What will be the phase composition of one phase system?
A. Same as alloy present in it
B. Different than the alloy present in it
C. Contains more than one alloys

D. Varies from molecule to molecule
ANSWER: A

98. Which of the following remains constant in Unary phase diagrams?
A. Pressure
B. Temperature
C. Composition
D. Both pressure and temperature
ANSWER: C

99. Along the phase boundaries, the phases on either side will be in _____
A. Equal
B. Equilibrium
C. Different
D. Constant
ANSWER: B

100. What is triple point?
A. All three states are in equilibrium
B. All three states are not in equilibrium
C. All three states don't exist
D. All three states don't exist and are not in equilibrium
ANSWER: A

101. What is temperature at triple point of water?
A. 288^{o} K
B. 273.16^{o} K
C. 298^{o} K
D. 277^{o} K
ANSWER: B

102. What is pressure at triple point of water?
A. 5.08×10^{-3}atm
B. 6.04×10^{-3}atm
C. 7.04×10^{-3}atm
D. 6.44×10^{-3}atm
ANSWER: B

103. How many components are present in binary phasesystem?
A. 3
B. 4
C. 2
D. 1
ANSWER: C

104. The line above which the alloy is liquid is called _____
A. Solidus line
B. Tie line
C. Liquidus line
D. Lever line
ANSWER: C

105. It can be noted that the two substances are soluble in each other in the entire range of compositions in both liquid and solid state. This kind of system is known as _____
A. Binary phase system
B. Unary phase system
C. Multiple phase system
D.Isomorphoussystem
ANSWER: D

106. What is used for determination of Phase amounts?
A. Tie line and Temperature–Composition Point
B. Lever line
C. Temperature–Composition Point
D. Pressure
ANSWER: A

107. A 53% Ni Cu-Ni alloy is cooled from liquid state to 1300°C. Calculate the % of liquid and solid at 1300°C.
A. 28, 72
B. 38, 62
C. 35, 65
D. 65, 35
ANSWER: B

108. From the figure the relative fractions of the phases at a given temperature for an alloy composition Co is obtained by the _____
A. Lever rule
B. Tie line
C. Solidus line
D. Liquidus line
ANSWER: A

109. What is the region between liquidus and solidus lines?
A. Two-phase region where liquid and solid coexist
B. Solid region
C. Liquid region
D. Lava region
ANSWER: A

110. Three phases (Liquid+Alpha+Beta) coexist at point E. This point is called _____
A. Peritectic point
B. Eutectic point
C. Eutectoid point
D. Eutectic point or composition
ANSWER: D

111. In hypoeutectic alloys micro structure at room temperature consists of_____
A.Proeutecticbeta and alpha
B. Eutectic mixture (alpha+beta)
C.Proeutectic beta and eutectic mixture (alpha+beta)
D.Proeutectic alpha and eutectic mixture (alpha+beta)
ANSWER: D

112. Why Pb-Sn eutectic alloys are used for soldering purpose?
A. The melting point at eutectic point is maximum
B. The melting point at the eutectic point isminimum
C. The melting point at the eutectic point is constant
D. The boiling point at the eutectic point is maximum
ANSWER: B

113. A 34.6% Pb-Sn alloy is cooled just below the eutectic temperature (183°C). What is the fraction of proeutectic alpha and eutectic mixture (alpha+beta)?
A. 70% and 30%
B. 64% and 36%
C. 36% and64%
D. 30% and 70%
ANSWER: B

114. A first solid phase results in a second solid phase another third solid phase on cooling during _____ reaction.
A. Eutectoid
B. Peritectic
C. Eutectic
D. Peritectoid
ANSWER: A

115. A first solid phase results in a second solid plus another third solid phase up on heating during _____ reaction.
A. Eutectoid
B. Peritectic
C. Eutectic
D. Peritectoid
ANSWER: D

116. Which of the following are Peritectic systems?
A. Pt – Ag
B. Ni-Re
C. Ni – Re, Fe – Ge, Sn-Sb
D. Pt – Ag, Ni – Re, Fe – Ge, Sn-Sb
ANSWER: D

117. What is the eutectoid structure of Iron?
A. Cementite
B. Ferrite
C. Pearlite
D.Austentite
ANSWER: C

118. What is % of C by weight in hypo-eutectoid steels?
A. 0.5%
B. 0.7%
C. 0.8%
D. 1.2%
ANSWER: C

119. The phase above eutectoid temperature for carbon steels is known as _____
A. Cementite
B. Ferrite
C. Pearlite
D.Austentite
ANSWER: D

120. What is the % solubility and temperature of exist of Alpha ferrite?
A. 0.05% and 273°c to 910°c
B. 0.025% and 273°c to 910°c
C. 2.1% and 910°c to 1394°c
D. 0.05% and 910°c to 1124°c
ANSWER: B

121. What is the % solubility and temperature of exist of Gamma Austenite?
A. 0.05% and 273°c to 910°c
B. 0.025% and 273°c to 910°c
C. 2.1% and 910°c to 1394°c
D. 0.09% and 1394°c to 1539°c
ANSWER: C

122. What is the % solubility and temperature of exist of Delta-ferrite?
A. 0.05% and 273°c to 910°c
B. 0.025% and 273°c to 910°c
C. 2.1% and 910°c to 1394°c
D. 0.09% and 1394°c to 1539°c
ANSWER: D

123. What is the % C content in Cementite Fe_3C?
A. 6.67%
B. 0.025%
C. 2.1%
D. 0.09%
ANSWER: A

124. What is the hardest phase of Fe-C system?
A. Graphite
B.Bainite
C. Martensite
D. Cementite
ANSWER: C

125. What is eutectoid temperature?
A. 727°c
B. 768°c
C. 1146°c
D. 1495°c
ANSWER: A

126. At what temperature Fe turns paramagnetic while heating?
A. 727°c
B. 768°c

C. 1146°c
D. 1495°c
ANSWER: B

127. What is value of eutectic temperature?
A. 727°c
B. 768°c
C. 1146°c
D. 1495°c
ANSWER: C

128. What is value of peritectic temperature?
A. 727°c
B. 768°c
C. 1146°c
D. 1495°c
ANSWER: D

129. A carbon steel cooled from region of austenitic contains 9.1% C of ferrite. What is the percentage C content in the steel?
A. 0.05% C
B. 0.1% C
C. 0.2% C
D. 0.3% C
ANSWER: B

130. The eutectic mixture of austenite and cementite (Fe_3C) is called _____
A.Ledeburite
B. Pearlite
C. Hyper and hypoeutectoid steel
D. Cast iron
ANSWER: A

1. The major components present in maraging steel
   a. **Fe, Ni** b. Fe, W c. Fe, Zr d. Fe, Cr
2. Upon ageing, the yield strength of maraging steel
   a. Decreases **b. increases** c. no change in yield strength d. none of the above
3. Maraging steel is a
   a. Low alloy steel b. high alloy steel c. medium carbon steel d. low carbon steel
4. Strengthening in maraging steel is by
   a. Martensite only b. precipitates only c. both martensite and precipitates
5. The maximum level of alloying contents that are allowed in maraging steels is
   a. 2% b. 4% c. 6% d. 25%
6. Maraging steels possess
   a. Good weldability b. resistance to hydrogen embrittlement c. resistance to stress corrosion d. all of the above
7. The maximum carbon content in maraging steels is
   a. 5% b. 3% c. 0.3% d. 0.03%

8. Maraging steels have undergone
   a. Only solution heat treatment at 815 °C b. only aging at 485 °C
   c. both solution heat treatment and aging d. none of the above
9. Yield strength of maraging steels is
   a. 250 MPa b. 500 MPa c. 1 GPa d. 2 GPa
10. The crystal structure of pure iron at room temperature and at 1 atmospheric pressure
   a. Hcp b. bcc c. fcc d. tetragonal
11. Intermetallic compounds
   a. Easily deform b. easily cross-slip c. easily slip across grain boundaries
   d.have high Peierls stress
12. The predominant Bonding in intermetallic compounds is
   a. Metallic b. ionic c. covalent d. mixture of metallic and covalent
13. Which is not an intermetallic compound
   a. TiAl b. Ni_3Si c. mild steel d. NiTi
14. Which is not true about intermetallic compounds
   a. Ordered at low temperatures b. disordered at high temperatures c. brittle
   d. dislocations move very easily with little applied stress
15. Formula for nickel aluminide is
   a. Ni_5Al b. Ni_2Al c. Ni_3Al d. Ni_4Al
16. The phase present in nickel aluminide is
   a. Tetragonal b. monoclinic c. triclinic d. ordered fcc
17. Nickel aluminide is a major strengthening phase in
   a. Superalloys b. shape memory alloys c. smart materials
   d. mild steel
18. One of the below material is ductile in single crystalline form and brittle in polycrystalline form
   a. Nickel aluminide b. mild steel c. copper d. bronze
19. The addition of ____ into nickel aluminide leads to improved ductility
   a. Boron b. chromium c. zirconium d. magnesium
20. As the temperature increases, yield stress increases in
   a. aluminium b. mild steel c. copper d. nickel aluminide
21. If a smart material changes colour due to temperature difference, it is
   a. Photochromic b. thermochromic c. photovoltaic d. liquid crystral
22. If a smart material changes colour due to deformation, it is
   a. Photochromic b. photovoltaic c. mechanochromic d. liquid crystal
23. If a smart material generates electricity due to deformation, it is
   a. Photochromic b. photovoltaic c. piezoelectric d. liquid crystal
24. If a smart material deforms due to applied voltage, it is
   a. Photochromic b. photovoltaic c. piezoelectric d. liquid crystal
25. If a smart material generates voltage due to temperature difference, it is
   a. Pyroelectric b. photovoltaic c. piezoelectric d. liquid crystal
26. If a smart material changes colour due to chemical concentration difference, it is
   a. chemochromics b. photovoltaic c. piezoelectric d. liquid crystal

27. If a smart material deforms due to applied magnetic field, it is
    a. Magnetorestrictive b. photovoltaic c. piezoelectric d. liquid crystal
28. If a smart material generates voltage due to light falling on it, it is
    a. Pyroelectric b. photovoltaic c. piezoelectric d. liquid crystal
29. If a smart material changes viscosity due to applied magnetic field, it is
    a. Magnetorheological b. photovoltaicc. piezoelectric d. liquid crystal
30. If a smart material generates light due to temperature difference, it is
    a. Thermoluminescent b. photovoltaic c. piezoelectric d. liquid crystal
31. If a smart material changes colour due to applied voltage, it is
    a. Photochromic b. photovoltaic c. electrochromic d. liquid crystal
32. If a smart material changes viscosity due to applied electric field, it is
    a. electrorheological b. photovoltaicc. piezoelectric d. liquid crystal
33. A fluid transforms to solid due to applied magnetic field is called as
    a. magnetorheological b. photovoltaicc. piezoelectric d. liquid crystal
34. Application areas for smart rheological fluids
    a. Automotive tire b. clutch c. chair/bed d. All the above
35. An intermediate phase between isotropic liquids and crystalline solids is called
    a. Liquid crystals b. plasma c. gas d. vapour
36. Orientationally ordered liquids with anisotropic properties are called
    a. Liquid crystals b. plasma c. quasicrystal d. polymer
37. Material system used in microphones, speakers, vibration reducing skis & doorbell pusher
    a. Pyroelectric b. photovoltaic c. piezoelectric d. liquid crystal
38. Piezoelectricity is observed in
    a. Polarized crystal b. quasicrystal c. metals d. liquid crystals
39. Example for piezoelectric material is
    a. Mild steel b. copper c. quartz d. bronze
40. Material system used in eyeglass frames, medical stent & actuators that eject disks in laptop
    a. Pyroelectric b. shape memory alloys c. piezoelectric d. liquid crystal

41. Material system that reverts back to the preset shape upon temperature change
    a. Pyroelectric b. shape memory alloys c. piezoelectric d. liquid crystal
42. During shape memory effect
    a. Solid state phase transformation occurs b. solid changes to liquid
    c. liquid changes to plasma d. liquid solidifies into a solid
43. Shape memory effect is
    a. Temperature dependent and reversible b. volume dependent and non-reversible
    c. Temperature dependent and non-reversible d. pressure dependent and non-reversible
44. Ability of a material to undergo enormous elastic and reversible deformation is called as
    a. Plasticity b. anelasticity c. ferroelasticity d. superelasticity

45. Example for a shape memory alloy
    a. NiTi b. CuZn c. CuSn d. zirconia
46. Shape memory alloys are related with one of the following phenomenon
    a. plasticity b. anelasticity c. ferroelasticity d. superelasticity
47. The high temperature phase in shape memory effect is
    a. Ferrite b. austenite c. martensite d. bainite
48. The low temperature phase in shape memory effect is
    a. Ferrite b. austenite c. martensite d. bainite
49. Which phase of the shape memory alloy is strong and hard
    a. Ferrite b. austenite c. martensite d. bainite
50. Which phase of steel is strong and hard
    b. Ferrite b. austenite c. martensite d. bainite
51. Which phase of the shape memory alloy is soft and ductile
    c. Ferrite b. austenite c. martensite d. bainite
52. Crystal structure of austenite phase of shape memory alloy is
    a. bcc b. fcc c. hcp d. tetragonal
53. Crystal structure of martensite phase of shape memory alloy is
    a. bcc b. fcc c. rhombic d. tetragonal
54. The room temperature stress-strain curve of martensite phase of shape memory alloy looks like that of
    a. ceramic b. elastomer c. glass d. tungsten
55. Deformation in martensite phase of shape memory alloy occurs via
    a. Twinning b. slip c. dislocation movement d. vacancy movement
56. Mechanically induced shape memory effect is related with
    a. plasticity b. anelasticity c. ferroelasticity d. superelasticity
57. Deformation achieved during superelasticity is
    a. 0.5% b. 1% c. 1.5% d. 8%
58. The movement of _____ leads to superelasticity
    a. Twin boundary b. dislocation c. vacancy d. stacking fault
59. _____ phase of shape memory alloy has minimum gibbs free energy at 35 ˚C
    a. Austenite b. martensite c. bainite d. ferrite
60. During austenite to martensite transformation of shape memory alloys,
    a. Chemical composition changes b. composition does not change
    c.slip occurs d. dislocation movement occurs
61. TRIP steel is
    a. Transformation induced plasticity steel b. transport related indian steel
    c. transformation induced pearlitic steel d. transport related italian steel
62. TRIP steels are
    a. Intercritically annealed and isothermally transformed b. normalized c. quenched
    d. spherodized
63. The major components in TRIP steel are

a. C, Si, Mn, Fe b. Zn, Mg, Fe, C c. Zr, Pb, C, Fe d. Cu, Ni, Cr, Fe, C

64. The maximum Si content in TRIP steels is
    a. 1.5% b. 4% c. 6% d. 8%
65. Si is added in TRIP steels to
    a. Minimize cementite formation b. maximize cementite formation c. minimize ferrite formation d. maximize ferrite formation
66. The microstructure of TRIP steel consists of
    a. Only ferrite b. only bainite c. ferrite+bainite+austenite+martensite
    d. only austenite
67. As the carbon content in austenite increases, the martensite start temperature
    a. increases b. decreases c. not affected d. none of the above
68. Dual phase steel consists only of
    a. Ferrite+austenite b. Ferrite+bainite c. bainte+austenite
    d. ferrite + martensite
69. In TRIP steels, austenite transforms to _____ upon cooling from subcritical isothermal treatment
    a. Ferrite b. bainite c. martensite b. cementite
70. Due to strain-induced deformation occurring in TRIP steel, ductility
    a. increases b. decreases c. not affected d. none of the above
71. During subcritical isothermal treatment of TRIP steel processing, austenite transforms to
    a. Ferrite b. bainite c. martensite b. cementite
72. The bainite phase of TRIP steel is a mixture of
    a. Acicular ferrite and retained austenite b. Acicular ferrite and martensite
    c. martensite and retained austenite d. ferrite and cementite
73. During subcritical isothermal treatment of TRIP steel, carbon content in ferrite
    a. increases b. decreases c. not affected d. none of the above
74. During subcritical isothermal treatment of TRIP steel, carbon content in austenite
    a. increases b. decreases c. not affected d. none of the above
75. Addition of high Al content in TRIP steel, _____ hot workability
    a. increases b. decreases c. does not affect d. exponentially improves
76. Aluminium is a
    a. Ferrite stabilizer b. austenite stabilizer c. cementite stabilizer d. pearlite stabilizer
77. Formation of silicon oxide during hot rolling of TRIP steel, _____ surface finish
    a. increases b. decreases c. does not affect d. exponentially improves
78. Formation of silicon oxide during hot rolling of TRIP steel, _____ coatability during galvanising
    a. increases b. decreases c. does not affect d. exponentially improves

79. subcritical isothermal treatment of TRIP steel is carried out at
    a. 900 ˚C b. 1100 ˚C c. 1400 ˚C d. 400 ˚C
80. Intercritical annealing treatment of TRIP steel is carried out at
    b. 810 ˚C b. 140 ˚C c. 1400 ˚C d. 230 ˚C

81. The strain-induced martensite of TRIP steel, _____ strain hardening

a. increases b. decreases c. does not affect d. exponentially decreases

82. Ultimate tensile strength of TRIP steel is

a. 200 MPa b. 400 MPa c. 500 MPa d. 750 MPa

83. Yield strength of TRIP steel is

b. 100 MPa b. 400 MPa c. 900 MPa d. 800 MPa

84. Strain induced martensite transformation occurs at high strains to _____ necking instability

a. Increase b. decrease c. not to affect d. exponentially increase

85. Ductile elongation in TRIP steel is

a. 2% b. 4% c. 6% d. 15%

86. Magnetorheological fluids are used in

a. Vibration control b. pressure control c. temperature control d. photovoltaics

87. Metallic glass has _____ structure

a. FCC b. BCC c. tetragonal d. amorphous

88. The microstructure of metallic glass contains

a. Screw dislocation b. Edge dislocation c. twins d. none of the above

89. Metallic glasses have _____ than their crystalline counterparts

a. Less strength b. more strength c. more stiffness d. poor resilience

90. Which is not true about Metallic glasses(MG)

a. Ferromagnetic MG is used as magnetic core material

b. Iron based MG has better corrosion resistance than stainless steel

c. $Ti_{40}Cu_{36}Pd_{14}Zr_{10}$ MG is biocompatible

d. The strength of $Ti_{40}Cu_{36}Pd_{14}Zr_{10}$ MG is half of that of Ti

91. Metallic glasses cannot be produced with

a. Rapid solidification b. mechanical alloying c. vapour deposition

d. very very slow cooling rate

92. Metallic glass does not have

a. Glass transition temperature b. crystallization temperature

c. ordered, repeating unitcells d. amorphous structure

93. As the metallic glasses are exposed to high temperatures, the hardness

a. Increases by 50%

b. Increases by 100 %

c. Increases by 200 %

d. Decreases

94. Metallic glasses have an elastic strain of

a. 0.1% b. 0.2% c. 0.4% d. 3%

95. Metallic glasses when compared with steel, has

a. low yield strength

b. low elastic limit

c. less elastic strain

d. high strength to weight ratio

96. Application areas for metallic glass composites

a. Springs b. armour c. medical implant d. all of the above

97. _____ is present in metallic glasses

a. Dislocation b. grain boundary c. long-range order

d. disordered structure

98. Localized plastic deformation occurs in metallic glasses by

a. Slip bands b. twinning c. vacancy annihilation d. crack nucleation

99. Plastic strain of the monolithic metallic glasses can be improved by

a. Increasing the cooling rate b. decreasing the cooling rate c. by creating non-homogeneous microstructured. none of the above

100. Corrosion resistance of metallic glasses is due to the non-presence of

a. Dislocations b. defects c. grain boundaries d. all the above

1._____ test is conducted when the material behaviour under large and permanent strains are required and also material acts brittle in tension.
a)Compression test b)Tension test c) shear test d) torsional test**(Ans: a; Compression test)**

2._____ force is found machine axles, twist drills and driving shafts .
a) Shear b) Torsion c) compression d) tension **(Ans: b; Torsion)**

3.The ASTM standards _____ has details on standard test methods for tensile testing of Metals.
a) E143 b) E9 c) E8 d)E100 **(Ans: c;E8)**

4) The following material will show non-linear elastic behaviour except _____
a) Polymer b)Gary cast iron c)Concrete d)Steel. **(Ans: d; Steel)**

5.The value of modulus of elasticity of ceramics is _____ as metals.

a) same b) lower c) higher d) negative **(Ans: a; same)**

6.Time dependent permanent deformation is called _____. (a) Plastic deformation (b) Elastic deformation (c) Creep (d) Anelastic deformation**(Ans: d; Anelastic deformation)**

7.A piece of metal originally 305 mm long is pulled in tension on applying a stress of 276 MPa. Assuming deformation is purely elastic, Find the value of elongation obtained in the metal. Taking E=110GPa
a)0.77 b)0.67 c) 0.07 d) 7.7 **(Ans: a; 0.77)**

8.The relationship between modulus of elasticity, shear modulus and Poisson's ratio(m) is
a) E= 3 G(1+m) b G=2E(1+m) c) E= 2G(2+m) d)E =2G (1+m) **(Ans: d; E =2G (1+m))**

9.In atomic perspective _____ means in breaking of bonds with original neighbouring atoms and then renewing bonds with new neighbouring atoms permanently
a) elastic deformation b) plastic deformation c) creep d) An elastic deformation**(Ans: b) plastic deformation)**

10**.**_____is the capacity of a material to absorb energy when it is deformed elastically
and then, upon unloading, to have this energy recovered
a) Toughness b) Resilience c) Hardness d)Roughness **(Ans: b;Resilience)**

11._____ it is a measure of the ability of a material to absorb energy up to fracture.
a) Toughness b)Hardness c)Ductility c) Modulus of elasticity **(Ans: a; Toughness)**

12. Pick-out the odd point in the following
a) Proportinal limit b) Elastic limit c)Yeild point d)Fracture point **(Ans: d; Fracture point)**

13.Toughness of a material is equal to area under _____ part of the stress-strain curve.
a) Elastic b) Plastic c) Both **(Ans:c; Both)**

14**.**Compute the strain-hardening exponent n for an alloy in which a true stress of 415 MPaproduces a true strain of 0.10; assume the value of K as 1035 MPa
a) 0.41 b) 0.42 c) 0.04 d) 0.40 **(Ans; d;0.40)**

15**.**_____ is a measure of a material's resistance to localized plastic deformation (e.g., a small
dent or a scratch).
a)Toughness b) Resilience c) Hardness d)Roughness **(Ans:c;Hardness)**

16.Hardness tests are performed more frequently than any other mechanical test for these reasons
a) Simple and inexpensiveb)Test is non-destructive c)Other mechanical properties are determined fromhardness data d) All the above **(Ans; d; All the above)**

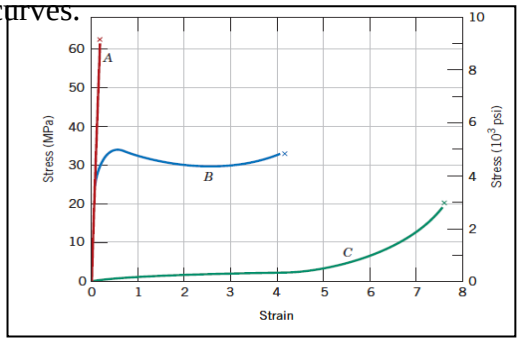
17.The load range for Rockwell hardness tests in the range of
a)1okg – 150 Kg b) 400KG- 600 Kg c) 500Kg- 800kg d) 1gm- 100g **(Ans: a;10Kg – 150Kg)**

18._____ known as micro indentation hardness technique
a) Rockwell hardness b) Brinell hardness c)Vicker's hardness d)Mohs Hardness
(Ans: c; Vicker's hardness

19. The tensile strengths were measured for four specimens of the same steel alloy are shown as follows:
(*MPa*) 520**,**512**,**515 **and** 522.tTe average tensile strength and standard deviation will be
a)417MPa, 4.6 MPab)517 MPa, 4.6MPa c) 517MPa, 5.6 MPa d) 507MPa, 4.6 MPa
(Ans: b; 517 MPa, 4.6MPa)

20.A steel alloy to be used for a spring application must have a modulus of resilience of at least 2.07 MPa .What must be its minimum yield strength?
a)20.7 MPa b)2007MPa c) 2.07MPa d)207MPa **(Ans: d; 207MPa)**

21.The three typical stress-strain behaviour curves of polymer is shown in the figure.viz Curve A, B and C. Which of the following is correct matching of curves.
a) Brittle, Plastic , highly elastic
b)Plastic ,Brittle,highly elastic
c)Highly elastic,Brittle, Plastic
d)Brittle, ductile, Highly elastic



(Ans: a; Brittle, Plastic , highly elastic)

22.In polymer, an intermediate _____ behaviour is seen which on applied stress results in an instantaneous elastic strain followed by time dependant strain .
a) Brittle b) viscoelastic c)viscous d)ductile **(Ans:b: Viscoelastic)**

23._____ polymer is a viscoelastic extreme sold as novelty and known for as "silly putty" in making dolls.
a) polyethylene b) polystyrene c) rubber d)Silicone **(Ans: b; Silicone)**

24._____ is known as time-dependant elastic modulus for viscoelastic polymer.
a)Modulus of elasticity b) Bulk modulus c)relaxation modulus **(Ans: c; Relaxation modulus)**

25. Many polymeric materials are susceptible to time-dependent deformation when the stress level is maintained constant; such deformation is termed _____.
a)viscoelastic creep b) creep c) hardness d) Relaxation modulus **(Ans: a; viscoelastic creep)**

26.**State True or False**:The phenomenon that frequently precedes fracture in some thermoplastic polymers is crazing **(Ans: True)**

27.Engineering stress-strain curve and True stress-strain curve are equal to

a) Proportional limit b) Elastic limit c)Yeild point d) Tensile strength point**(Ans:c; Yeild point)**

28.Shape of true stress-strain curve for a material depends on
a) Strain b) Strain rate c) Temperature d) All **(Ans : d: All)**

29.In an_____, localized lattice distortion exists along the end of an extra half-plane of atoms, which also defines the dislocation line.
a)edge dislocation b) screw dislocation c) plane dislocation **(Ans: a) edge dislocation)**

30.A _____may be thought of as resulting from shear distortion; its dislocation line passes through the center of a spiral, atomic plane ramp.
a) screw dislocation b)edge dislocation c)plane distortion d)Helical distortion **(Ans:a; screw dislocation)**

31.In screw dislocation , the dislocation line moves _____the applied shear stress and for screw dislocation, the dislocation line motion is _____ to the stress direction.
a)inline, angular b) perpendicular , angular c) perpendicular, inline d) inline, perpendicular **(Ans:d; inline, perpendicular)**

32._____densityin a material, is expressed as the total dislocation length per unit volume or, equivalently, the number of dislocations that intersect a unit area of a random section.
a) dislocation b)Mass c) deformation d) Weight **(Ans: a; dislocation)**

33. The units of dislocation density is
a)mm per cubic mm b) Nos per square mm c) mm per square mm d) Both a &b **(Ans: d; Both a &b)**

34.In edge dislocation,_____ strain will be induced above half place and _____ stain below the half plane respectively.
a) tension , compression b) compression, tension c) tension, tension d) tension, shear **(Ans:b; compression, tension)**

35.**State true or false :**For a screw dislocation,lattice strains are pure shear only **(Ans: True)**

36.Two edge dislocations of the same sign and lying on the same slip plane exert a _____force on each other a) attractive b) repulsive c) both d)shear
(Ans: b; repulsive)

37. Edge dislocations of opposite sign and lying on the same slip plane exert an _____ force on each othera) attractive b) repulsive c) both d) d) shear **(Ans: a; attractive)**

38.The combination of slip plane and slip direction is termed as _____
a) dilocationsystem b)force system c)slip system d)crystal system **(Ans; c; slip system)**

39. The number of slip systems majority in FCC, BCC and HCP are
a)24,12,6 b) 12,24,9 c)12,12,12 d)12,12, 6 **(Ans: d; 12,12,6)**

40These magnitude of resolved shear stressesdepend not only on the applied stress, but also on both of _____ and _____of the slip plane
a)orientation, direction b) density, volume c) volume , density **(Ans: a; orientation,direction)**

41**.** The **stress** required for dislocation to move _____**exponentially** with the length of the Burgers vector and _____**exponentially** withthe interplanar spacing of the slip planes.
a) decreases, decreases b) increases ,increases c) decreases, increases d)increases, decreases
(Ans: d;increases,decreases)

42. Slip occurs most easily between planes of atoms that are_____ and between planes that their interplanar spacing are _____.
a) rough ,far b)smooth , closer c)smooth, far d) rough ,closer **(Ans: c; smooth, far)**

43Following is not the 2-dimensional imperfection
a)Twib boundary b)Dislocaiton c) Surface d) Grain boundary **(Ans :b;Dilocation)**

44**.**Figure out the odd one in the following
a) Frenkel defect b)Tilt boundary c)Twist boundary d)Stacking fault **(Ans: c;Frenkel defect)**

45**.** Thermodynamically stable defects
a) Point defects b) Line defects c)Surface defects d)Volume defects **(Ans : a; Point defects)**

46**.**In twinning, a_____ stress is required to initiate ,but a _____stress is required for propogation.
a) high, high b) low,low c) low, high d)high ,low **(Ans: d; high,low)**

47.Requirement for cross-slip movement of dilocation
(a) Preferred slip plane (b) Preferred slip direction
(c) No preferred slip plane (d) No preferred slip direction
(Ans: c;No preferred slip plane)

48.Which among the following is known as Schmid's factor?
a. $(\cos^2 \alpha) \times (\cos^2 \beta)$ b. $(\cos \alpha) \times (\sin \beta)$ c. $(\sin \alpha) \times (\sin \beta)$ d. $(\cos \alpha) \times (\cos \beta)$
(Ans: d; (cos α) x (cos β))

49. A tensile stress of 5kPa is applied parallel to the [432] direction in a cubic crystal. Find the shear stresses, τ, on the (11-1) plane in the [011] direction.
a)1.76 KPa b) 17.6KPa c)0.176KPa d) 176KPa **(Ans: a; 1.76KPa)**

50.**State true or False**
The Burgers vector of an edge dislocation is perpendicular to the dislocationa) True b) False
(Ans: a; True)

51.The imperfection in the crystal structure of metal is known as
a) dislocation b) cleavagec) fractured) slip **(Ans: a; dislocation)**

52.A dislocation in a metal means
a) Weakness of the metal b) Point defect in the metalc) Volume defect in the metald) Line defect in the metal **(Ans:d; Line defect in the metal)**

55. Minimum number of slip systems that must be operative during plastic deformation
a) 3 b) 4 c) 5 d) 6 **(Ans: c; 5)**

56. Which of the following is false?
a) Line defects are thermodynamically stable
b) Dislocation can end inside a crystal without forming loop
c) ABC ABC ABC…is stacking sequence for HCP crystal
d) All **(Ans; d;All)**

57.Sharp break in dislocation line that is in slip plane _____.
a) Jog b) Kink c) Either jog or kink d) None **(Ans:b; Kink)**

60.The elastic stress strain behaviour of rubber isa) linear b) non linear **(Ans: a; Linear)**

61The unique property of cast iron is a) malleability b) ductility c) hardness
d) damping characteristics **(Ans:d; damping characteristics)**

62.The plastic deformation of metal takes place when the stress induced in the metal, due to the applied forces, reached the
a)Yield point b)Proportional limit c)Fatigue strength d)Ultimate strength**(Ans: a;Yield point)**

63.In deformation by slip, the deformation of metal takes place along
a)slip point b)slip line c)slip plane d)any of the above **(Ans: c; Slip plane)**

64. **In** deformation by twin, deformation occurs along two ____ planes
a)parallel b)perpendicular c)inclined d)any of the above **(Ans: a; Parallel)**

65. Energy required for deformation can be calculated using the formula
a) $E = L^2 G b$ b) $E = L G b^2$ c) $E = L (Gb)^2$ d) $E = L G b$**(Ans : b; $E = L G b^2$**

66.When are the slip lines observed?
a) after plastic deformation b)before plastic deformation c) after mechanical working
d) after annealing **(Ans: a; after plastic deformation)**

67.Negative screw location

(Ans: b)

68 Edge dislocations is also known as

a)Taylor-Orowan dislocation b)Burger's dislocation c) Frenkel dislocation d) Schmids dislocation

(Ans: a; Taylor-Orowandislocation)

69.Screw dislocation is also known as
a)Taylor-Orowan dislocation b)Burger's dislocation c) Frenkel dislocation d) Schmids dislocation

(Ans: b; Burgerdislocation)

70.Edge dislocation moves by _____ and Screw dislocation move by _____
a)Slip and climb , cross climb b) cross climb , Slip and climb **(Ans:a; Slip and climb , cross climb**)

71.Energy associated with a dislocation because of presence of stresses is proportional to _____
Of Burger's vector length.
a)Cube b) twice c)Square d) equal **(Ans: c: Square)**

72. Von Mises and Tresca criteria give different yield stress for
a) Uni-axial stress b) Balanced bi-axial stress c) Pure shear stress nd) All**(Ans: c; Pure shear stress)**

73. Following condition represents onset of necking
a) $\varepsilon_u = n$b) $\varepsilon_u = 1-n$ c) $\varepsilon_u = 1+n$ d) $\varepsilon_u = ln\ (1+n)$ (Ans: a)

74.As compared to engineering stress-strain curve, the true stress-strain curve is
a)above and to the left b) below and to the right c)crosses the engineering curve d) parallel to the engineering curve. **(Ans: a; above and to the left)**

75.In tensile test, the engineering stress corresponding to the maximum load is called
a) yield strength b) tensile strength c) Shear strength d) Upper yield stress (Ans**:b; tensile strength)**

76.In tensile test, necking starts at
a) lower yield stress b) Upper yield stress c)ultimate tensile stress d) just before fracture.

(Ans:c; ultimate tensile stress)

77.Superplastic materials have an index of strain-rate sensitivity m in the range of
a) 0 b) 0.1-0.2 c) 0.4-0.9 d)1.5-2.0 **(Ans: c; 0.4-0.9)**

78. The critical resolved shear stress (CRSS) for a polycrystalline copper is (μ= shear modulus)
a)μ/6 b)μ/88000 c)μ/110000 d) not defined **(Ans: d; not defined)**

79.The resolved shear stress for plastic deformation to start in an iron crystal is(μ= shear modulus)
a)μb)μ/6 c) μ/30 d) μ/4700 **(Ans: d;**μ/4700)

80.Crystal like diamond and silicon are brittle, because
a) they contain no dislocations
b)they are noncrystalline
c)the stress to move a dislocation is high in them
d) they contain very few dislocation

(Ans: d; they contain very few dislocation)

81.Copper is ductlile because
a)it is perfect crystal
b) it contain a very high density of dislocation
c)it has glassy structure
d)the stress to move a dislocation in it is low**(Ans: d; the stress to move a dislocation in it is low)**

82. The strength of a material with no dislocations is _____greater than the strength of a material with a high dislocation density.
a) 20-100 times b) 100-200 times c)200- 300 times d) 300-400 times

(Ans: a; 20-100 times)

83.The following agents serve as formation sites for dislocations during deformation

a) Grain boundaries,
b) internal defects
c) surface irregularities
d) All the above **(Ans: d; All the above)**

84. What is the odd one
a) Free Surfaces in Crystal
b) Grain Boundaries
c) Stacking Faults
d)dislocation **(Ans : d; dislocation)**

85.State true or false
The planes of highest atomic density frequently observed to be a slip planes**(Ans: True)**

86. Taylor dislocation can not move by the following way
a) Slip b) Climb c) Cross-slip d) All **(Ans: b; Climb)**
87. Conservative movement of dislocations
a) Slip b) Climb c) Both slip and climb d) None **(Ans:a; Slip)**

88.Average frequency of atomic vibrations in a solid (in Hz)
a) 10^{-12} b) 10^{-13} c) 10^{12} d) 10^{13} **(Ans: d;10^{13}**

89. Beneficial property of foreign particles
a) Reduces density
b) Act as stress raisers
c) Obstructs dislocation motion

d) None **(Ans: c; Obstructs dislocation motion)**

90. Stacking fault energies are in the range of
a) 0.01-0.1 J/m^2 b) 0.01-0.1 J/cm^2 c) 0.1-10 J/m^2 d) 0.1-10 J/m^2 **(Ans: a; 0.01-0.1 J/m^2)**
91. Value of Poisson's ratio for ionic solids in the range of
a) 0.1 b) 0.2 c) 0.3 d) 0.4 **(Ans: b; 0.2)**

92.. Hydrostatic stress results in the following
a) Linear strain b) Shear strain c) Both linear and shear strains d) None (Ans: d; None)

93.Which is the odd one of the following
a)Reversible
b)Depends on initial and final states of stress and strain
c)Stress is proportional to strain
d)Strain hardening effects **(Ans: d; Strain hardening effects)**

94.**State true or false**
For materials without linear elastic portion, either *tangent modulus* or *secant modulus* is used in design calculations. **(Ans: True)**

95. Time dependent recoverable deformation under load is called _____deformation
a) anelastic
b) elastic
c)plastic
d) creep **(Ans: a; anelastic)**

96.Time dependent i.e. progressive permanent deformation under constant load/stress is called.
a) anelastic
b) elastic
c)plastic
d) creep **(Ans: d, creep)**

97. The ration of Lateral and longitudinal strain is known as _____
a) Poissson'ratio.
b)Strain
c)Modulus
d) None **(Ans:a; Poisson ratio)**

98. Which is not true about plastic deformation?
a) Not reversible
b)Depends on loading path
c)No simple relation between stress and strain

d)No strain hardening effects **(Ans: d; No strain hardening effects)**

99. Toughness of a material is equal to area under _____ part of the stress-strain curve.
(a) Elastic (b) Plastic (c) Both (d) None **(Ans: c; Both)**

100 Point defects are
a)zero-dimensional
b)Single-dimensional
c)two dimensional
d)three dimensional **(Ans: a:Zero- dimensional)**

MCQ – Materials Technology – Placement

1. Number of Bravais lattices
   (a) 7
   (b) 3
   (c) 14
   (d) 10
2. Number of Bravais lattices
   (a) 12
   (b) 10
   (c) 7
   (d) 15
3. Number of crystal system?
   (a) 14
   (b) 3
   (c) 7
   (d) 4
4. Unit cell of a material is
   (a) Very larger than its crystal size
   (b) Equal to its crystal size
   (c) Smaller than its crystal size
   (d) Slightly larger than its crystal size
5. A space lattice has an indefinite time array of points in 3-dimension, all with identical surroundings
   (a) True
   (b) False
6. Tick the most accurate statement
   (a) Melting point of an alloy compared to its single phase elements is always higher
   (b) Melting point of an alloy compared to its single phase elements is always lower
   (c) Melting point of an alloy compared to its single phase elements depends on the exact composition of the alloy
   (d) All the above statements are false
7. Solid solution is found in a
   (a) Composite
   (b) Functionally graded material
   (c) Alloy
   (d) Metal
8. Crystal structure of Mg
   (a) HCP
   (b) FCC
   (c) BCC
   (d) Monoclinic
9. Crystal structure of Zn
   (a) HCP
   (b) FCC
   (c) BCC
   (a) Monoclinic
10. Crystal structure of Cu
    (a) FCC
    (b) HCP

(c) BCC
(a) Monoclinic

11. Crystal structure of Au
    (a) HCP
    (b) FCC
    (c) BCC
    (a) Monoclinic
12. Crystal structure of martensite
    (a) HCP
    (b) FCC
    (c) BCC
    (d) BCT
13. Crystal structure of Mo
    (a) HCP
    (b) FCC
    (c) BCC
    (a) Monoclinic
14. α-Fe and γ-Fe have same crystal structure
    (a) False
    (b) True
15. δ-Fe and α-Fe have same crystal structure
    (a) False
    (b) True
16. γ-Fe and α-Fe have same crystal structure
    (a) False
    (b) True
17. Crystal structure of Mg
    (e) HCP
    (f) FCC
    (g) BCC
    (e) Monoclinic
18. Crystal structure of Mg
    (h) HCP
    (i) FCC
    (j) BCC
    (e) Monoclinic
19. Crystal structure of δ-Fe
    (a) HCP
    (b) FCC
    (c) BCC
    (e) SCC
20. Crystal structure of Cementite
    (a) Orthorhombic
    (b) FCC
    (c) BCC
    (c) Monoclinic
21. How many numbers of atoms present in a FCC unit cell?
    (a) 4
    (b) 1
    (c) 14
    (d) 2
22. How many numbers of atoms present in a SCC unit cell?
    (a) 4
    (b) 1
    (c) 14
    (d) 2
23. How many numbers of atoms present in a BCC unit cell?
    (a) 4
    (b) 1
    (c) 9
    (d) 2
24. Atomic packing factor of SCC a unit cell
    (a) 0.52
    (b) 0.68
    (c) 0.74
    (d) 1.0
25. Atomic packing factor of BCC a unit cell
    (a) 0.52
    (b) 0.68
    (c) 0.74
    (d) 1.0
26. Atomic packing factor of FCC a unit cell
    (a) 0.52
    (b) 0.68
    (c) 0.74
    (d) 1.0
27. Coordination number of an ion placed at tetrahedral centre
    (a) 6
    (b) 4

(c) 8
(d) 3

28. Coordination number of an ion placed at octahedral centre
    (a) 8
    (b) 3
    (c) 6
    (d) 4
29. Coordination number of an ion placed at cubic centre
    (a) 3
    (b) 4
    (c) 6
    (d) 8
30. Coordination number of an ion placed at triangular centre
    (a) 3
    (b) 4
    (c) 6
    (d) 8
31. A pure metalsolidifies from its liquid state at a constant temperature.
    (a) Ture
    (b) False
32. An alloy solidifies from its liquid state in a range of temperature.
    (a) True
    (b) False
33. Softest phase among the followings:
    (a) Austenite
    (b) Cementite
    (c) Ferrite
    (d) Pearlite
34. Hardest phase among the followings:
    (a) Austenite
    (b) Cementite
    (c) Ferrite
    (d) Pearlite
35. Solid solution is found in
    (a) Ceramic matrix composite
    (b) Aqueous solution
    (c) Metal matrix composite
    (d) Alloys
36. Solid solution of an isomorphous system does not depend on
    (a) Electro negativity between the atoms of the two elements
    (b) Valence of the two elements
    (c) Size difference between the atoms of the two elements
    (d) Work function difference between the atoms of the two elements
    (e) Crystal structure of the two elements
37. Solid solution follows
    (a) Therm-rule
    (b) Farady rule
    (c) Hume-Rothery rule
    (d) Newton's second rule
38. Allotropes of a material must have
    (a) Same size
    (b) Same crystal structure
    (c) Same element
    (d) Same valence electron at outer shell
39. Miller indices of a plane indicates
    (a) A particular plane of a unit cell
    (b) Any plane of a unit cell
    (c) Lattice points of a unit cell
    (d) Direction of a plane
40. Slip direction of a FCC crystal is
    (a) [110]
    (b) [100]
    (c) [111]
    (d) [123]
41. Slip plane of FCC crystal is
    (a) (110)
    (b) (111)
    (c) (101)
    (d) (001)
42. A single plane of unit cell is presented by
    (a) {}
    (b) ()
    (c) []
    (d) <>

43. A single lattice direction of unit cell is presented by
    (a) {}
    (b) ()
    (c) []
    (d) <>
44. A group of plane of unit cell is presented by
    (a) {}
    (b) ()
    (c) []
    (d) <>
45. A group of lattice direction of unit cell is presented by
    (a) {}
    (b) ()
    (c) []
    (d) <>
46. Slip planes of a BCC crystal
    (a) {110}
    (b) {100}
    (c) {111}
    (d) {123}
47. Slip directions of a BCC crystal
    (a) <110>
    (b) <111>
    (c) <101>
    (d) <001>
48. Helmholtz free energy
    (a) G=H – TS
    (b) H = G+TS
    (c) F= E – TS
    (d) None of the above
49. Enthalpy, H, depends on
    (a) Bond energy
    (b) External energy
    (c) Randomness of atoms
    (d) vender Waals force
50. Entropy,S, depends on
    (a) Bond energy
    (b) External energy
    (c) Randomness of atoms
    (d) vender Waals force
51. Super cooling is a phenomenon
    (a) Which shows liquid state below freezing point during heating
    (b) Which shows liquid state below freezing point cooling
    (c) Which shows solid state below freezing point during cooling
    (d) Which shows solid state below freezing point during heating
52. Super heating is a phenomenon
    (a) Which shows solid state below melting point during heating
    (b) Which shows solid state below boiling point cooling
    (c) Which shows liquid state below boiling point during heating
    (d) Which shows liquid state above boiling point during heating
53. CondensedGibbs phase rule for liquid-solid transformation is
    (a) C = P + F – 2
    (b) P = C + F -2
    (c) C = P + F – 1
    (d) F = C + P – 1
54. Gibbs phase rule for liquid-vapour transformation is
    (a) C = P + F – 2
    (b) P = C + F -2
    (c) C = P + F – 1
    (d) F = C + P – 1
55. Degree of freedom at the triple point of a unary phase diagram of water
    (a) 1
    (b) 3
    (c) 0
    (d) 4
56. Degree of freedom at the eutectoid point of Fe-C phase diagram
    (a) 1
    (b) 3
    (c) 0
    (d) 4

57. Degree of freedom at the eutectic point of Fe-C phase diagram
    (a) 1
    (b) 3
    (c) 0
    (d) 4
58. Degree of freedom at the point of 768°C temperature and 0.5wt%C composition of steel in Fe-C phase diagram
    (a) 1
    (b) 3
    (c) 0
    (d) 4
59. Lever rule is used in an alloy system to
    (a) Measure the weight the alloy
    (b) Know the number of components present
    (c) Measure the volume or weight fraction of the composition
    (d) Know the melting point
60. Lediburite is
    (a) α-Fe + Pearlite $\gamma\delta$
    (b) γ-Fe + Fe_3C
    (c) Pearlite + Fe_3C
    (d) α-Fe + Fe_3C
61. Perlite is S
    (a) α-Fe + Fe_3C
    (e) α-Fe + δ-Fe
    (b) γ-Fe + Fe_3C
    (c) α-Fe + ferrite
62. Pearlite is
    (a) Alternate lamellae of ferrite and cementite
    (b) Alternate lamellae of ferrite and austenite
    (c) Alternate lamellae of cementite and austenite
    (d) Cementite + graphite
63. Maximum carbon concentration in steel is
    (a) 6.67 wt%
    (b) 4.3 wt%
    (c) 0.8 wt%
    (d) 2.1 wt%
64. Maximum carbon concentration in Fe-Fe_3C system is
    (a) 6.67 wt%
    (b) 4.3 wt%
    (c) 0.8 wt%
    (d) 2.1 wt%
65. Peritectic reaction is
    (a) Solid $\Leftrightarrow$ Liquid + Solid
    (b) Liquid + $Solid_1 \Leftrightarrow Solid_2$
    (c) $Solid_1 \Leftrightarrow Solid_2 + Solid_3$
    (d) Liquid $\Leftrightarrow$ $Solid_1$ + $Solid_2$
66. Austenite is transformed between 500 and 300 °Cto
    (a) Coarse pearlite
    (b) Martensite
    (c) Bainite
    (d) Retain austenite only
67. Martensite structure of steel is obtained due to
    (a) Quenching
    (b) Normalizing
    (c) Annealing
    (d) Tempering
68. Structure of bainite is
    (a) Needle like
    (b) Feathery
    (c) Globular
    (d) Spherical
69. Structure of martensite is
    (a) Needle like
    (b) Feathery
    (c) Globular
    (d) Spherical
70. Rockwell hardness of fine pearlite is
    (a) Rc 50
    (b) Rc 60
    (c) Rc 40
    (d) Rc 55
71. Rockwell hardness of fine bainite is
    (a) Rc 30
    (b) Rc 40

(c) Rc 60
(d) Rc 50

72. Rockwell hardness of fine martensite is
(a) Rc 50
(b) Rc 40
(c) Rc 60
(d) Rc 35

73. 1.8 % C steel is called
(a) Hypo eutectoid steel
(b) Hypereutectoid steel
(c) Eutectoid steel
(d) Eutectic steel

74. 0.8 % C steel is called
(a) Hypo eutectoid steel
(b) Hyper eutectoid steel
(c) Eutectoid steel
(d) Eutectic steel

75. 0.5 % C steel is called
(a) Hypoeutectoid steel
(b) Hyper eutectoid steel
(c) Eutectoid steel
(d) Eutectic steel

76. Microstructure of hypoeutectoid steel at room temperature after cooling from 950°C is
(a) Ferrite and austenite
(b) Ferrite and pearlite
(c) Austenite and pearlite
(d) Cementite and lediburite

77. Microstructure of hypereutectoid steel at room temperature after cooling from 1100°C is
(a) Ferrite and austenite
(b) Ferrite and pearlite
(c) Austenite and pearlite
(d) Cementite and pearlite

78. Which statement is correct
(a) Gold has poor solubility in copper
(b) Gold has good solubility in copper
(c) Gold has no solubility in copper
(d) Gold and copper are immiscible

79. Manganese steel is slowly cooled to achieve
(a) Austenitic structure
(b) Ferritic structure
(c) Bainitic structure
(d) Martensitic structure

80. %C in cast iron is in the range of
(a) 2 – 5 wt%
(b) 0.025 to 0.8 wt%
(c) 0.8 to 2.1 wt%
(d) Only at 0.8%

81. Identify the correct statement
(a) Spheroidal cast iron has lower machinability than grey cast iron
(b) Spheroidal cast iron has higher machinability than grey cast iron
(c) Malleable cast iron has lower machinability than white cast iron
(d) Malleable cast iron has lower machinability than grey cast iron

82. Identify the lowest tensile strengthamong the followings:
(a) Baitine
(b) Ferrite
(c) Pearlite
(d) Cementite
(e) Martensite

83. Solubility of nitrogen in steel can be explained by
(a) Oswald dilution law
(b) Gibb's Duhem equation
(c) Hume-Rothery rule
(d) Sievert's law

84. In FCC or CCP lattice, the packing sequence of atomic arrays is
(a) ABC ABC…
(b) AB AB AB…
(c) AC AC AC..
(d) BC BC BC..

85. In HCP lattice, the packing sequence of atomic arrays is
(a) ABC ABC…
(b) AB AB AB…
(c) CAB CAB CAB..
(d) BC BC BC..

86. Slip system is
    (a) Number of slip plane
    (b) Multiplication of number of slip planes and number of slip direction
    (c) Number of slip direction
    (d) None of these
87. Trace the correct statement
    (a) Martensitic transformation is diffusionless transformation
    (b) Martensitic transformation is diffusional transformation
    (c) Martensitic transformation is a long range transformation
    (d) None of the above
88. Hardenability is the measure of
    (a) Degree of hardness of steel
    (b) Amount of fine martensite
    (c) Degree of depth to which steel can be harden
    (d) Degree of surface hardness
89. The cementite is
    (a) A mixture of ferrite and iron carbide
    (b) A mixture of pearlite and iron carbide
    (c) Eutectoid pearlite
    (d) Iron carbide
90. The Curie temperature at which α-Fe changes its ferromagnetic to paramagnetic (β-Fe) properties during heating is
    (a) 910°C
    (b) 723°C
    (c) 768°C
    (d) 1137°C
91. Which statement is true?
    (a) Intermetallic compound has to be formed by at least two different elements and it should have same crystal structure from the one observed in the pure components.
    (b) Intermetallic compound has to be formed by at least two different elements and it must have different crystal structure from the one observed in the pure components.
    (c) Both are true
92. Miller indices for Octahedral plane in cubic crystal
    (a) (111)
    (b) (100)
    (c) (110)
    (d) (102)
93. The atomic diameter of an BCC crystal of lattice parameter*a* is
    (a) *a*/2
    (b) *a*/(4/√3)
    (c) a/√3
    (d) a/(4/√2)
94. Repeatable entity of a crystal structure is called as
    (a) Unit cell
    (b) Lattice
    (c) Miller indices
    (d) Crystal
95. Electron sea exists in
    (a) Metallic bond
    (b) Covalent bond
    (c) Vender Waals bond
    (d) Ionic bond
96. Which one of the following is not a strong bond?
    (a) Ionic bond
    (b) van der Waals bond
    (c) Covalent bond
    (d) Metallic bond
97. For a coordination number of four, anion sits at the center of ……..where corners are occupied by cations
    (a) Tetrahedron
    (b) Cube
    (c) Octahedron
    (d) Triangle
98. According to TTT diagram of γ transformation, all the γ is transformed into martensite at
    (a) Subcritical temperature

(b) Slow cooling rate

(c) Critical cooling rate

(d) Lower than critical cooling rate

99. In the austenitic transformation of steel, the critical cooling rate depends upon

(a) The temperature from which the cooling has been started

(b) Carbon content of steel

(c) Austenitic grain size

(d) Both, carbon content and austenitic grain size

100. Stacking fault defect in a crystal is called

(a) 1-D defect

(b) 2-D defect

(c) 3-D defect

(d) 4-D defect

Material technology

1. The word 'polymer' meant for material made from _____.

(a) Single entity (b) Two entities (c) Multiple entities (d) Any entity

2. One of characteristic properties of polymer material _____ .

(a) High temperature stability (b) High mechanical strength

(c) High elongation (d) Low hardness

3. Polymers are _____ in nature.

(a) Organic (b) Inorganic (c) Both (a) and (b) (d) None

4. These polymers cannot be recycled:

(a) Thermoplasts (b) Thermosets (c) Elastomers (d) All polymers

5. In general, strongest polymer group is _____ .

(a) Thermoplasts (b) Thermosets (c) Elastomers (d) All polymers

6. These polymers consist of coil-like polymer chains:

(a) Thermoplasts (b) Thermosets (c) Elastomers (d) All polymers

7. Strong covalent bonds exists between polymer chains in _____ .

(a) Thermoplasts (b) Thermosets (c) Elastomers (d) All polymers

8. Following is the unique to polymeric materials:

(a) Elasticity (b) Viscoelasticity (c) Plasticity (d) None

9. Elastic deformation in polymers is due to _____ .

(a) Slight adjust of molecular chains (b) Slippage of molecular chains

(c) Straightening of molecular chains (d) Severe of Covalent bonds

10. Kevlar is commercial name for _____ .

(a) Glass fibers (b) Carbon fibers (c) Aramid fibers (d) Cermets

11. Which one of the following is not a condensation polymer?

(a) Dacron (b) Neoprene (c) Melamine (d) Glyptal

12. Which of the following statements is false?

(a) The repeat unit in natural rubber is isoprene.

(b) Both starch and cellulose are polymers of glucose.

(c) Artificial silk is derived from cellulose.

(d) Nylon-66 is an example of elastomer.

13. Of the following which one is classified as polyester polymer?

(a) Nylon-66 (b) Terylene (c) Backelite (d) Melamine

14. Which polymers occur naturally**?**

(a) Starch and Nylon (b) Starch and Cellulose

(c) Proteins and Nylon (d) Proteins and PVC

15. Bakelite is obtained from phenol by reacting with

(a) HCHO (b) $(CH_2OH)_2$ (c) CH_3CHO (d) CH_3COCH_3

16. Which one of the following statements is not true?

(a) Natural rubber has the trans-configuration at every double bond

(b) Buna-S is a copolymer of butadiene and styrene

(c) Natural rubber is a 1, 4-polymer of isoprene

(d) In vulcanization, the formation of sulphur bridges between different chains make rubber harder and stronger.

17. The monomers of Buna-S rubber are

(a) styrene and butadiene

(b) isoprene and butadiene

(c) vinyl chloride and sulphur

(d) butadiene

18. Which one of the following polymers is prepared by condensation polymerization?

(a) Teflon (b) Rubber (c) Styrene (d) Nylon-6,6

19. $[NH(CH_2)NHCO(CH_2)_4CO]_n$ is a

(a) addition polymer (b) thermosetting polymer (c) homopolymer (d) co-polymer

20. Which of the following is a fully fluorinated polymer?

(a) Neoprene (b) Teflon (c) Thiokol (d) PVC

21. Which of the following is a polyamide?

(a)Teflon (b) Nylon-6,6 (c) Terylene (d) Bakelite

22. Nylon is not a

(a) condensation polymer (b) co-polymer (c) polyamide (d) homopolymer

23. Which of the following is a chain growth polymer?

(a) Nucleic acid (b) Polystyrene (c) Protein (d) Starch

24. Nylon threads are made of

(a) polyethylene polymer (b) polyvinyl polymer

(c) polyester polymer (d) polyamide polymer

25. Polymer formation from monomers starts by

(a) condensation reaction between monomers

(b) coordination reaction between monomers

(c) conversion of monomers to monomer ion by protons

(d) hydrolysis of monomers

26. Cellulose is polymer of

(a) Ribose (b) Fructose (c) Glucose (d) Sucrose

27. Inulin is a polymer of

(a) Glucose (b) Galactose (c) Fructose (d) Arabinose

28. Plexiglass is a commercial name of

(a) glyptal (b) polyacrylo nitrile (c) polymethyl methacrylate (d) polyethyl acrylate

29. The condensation polymer among the following is

(a) Protein (b) PVC (c) Polythene (d) Rubber

30. Among cellulose, poly (vinyl chloride), nylon and natural rubber, the polymer in which intermolecular forces of attraction are weakest is

(a) Nylon (b) Poly vinyl chloride(c) Cellulose (d) Natural rubber

31. Which of the following statement is not correct?

(a) Caprolactam is the monomer of nylon-6

(b) Terylene is a polyester polymer

(c) Phenol formaldehyde resin in known as bakelite

(d) The monomer of natural rubber is butadiene

32. Bakelite is a polymer of

(a) benzaldehyde and phenol (b) formaldehyde and phenol

(c) formaldehyde and benzyl alcohol (d) acetaldehyde and phenol

33. Which one of the following is an example of co-polymer?

(a) Buna-S (b) Teflon (c) PVC (d) Polypropylene

34. The catalyst used for olefin polymerization is

(a) Ziegler-Natta catalyst (b) Wilkinson catalyst

(c) Raney nickel catalyst (d) Merrifield resin

35. The monomer used to produce orlon is

(a) $CH_2 = CHF$ (b) $CH_2 = CCl_2$ (c) $CH_2 = CHCl$ (d) $CH_2 = CH-CN$

36. $F_2C = CF_2$ is a monomer of

(a) Teflon (b) Glyptal (c) Nylon-6 (d) Buna-S

37. The straight chain polymer is formed by

(a) Hydrolysis of $(CH_3)_2 SiCl_2$ followed by condensation polymerization

(b) Hydrolysis of $(CH_3)_3 SiCl$ followed by condensation polymerisation

(c) Hydrolysis of $CH_3 SiCl_3$ followed by condensation polymerisation

(d) Hydrolysis of $(CH_3)_4 Si$ by addition

polymerisation

38. The polymer containing strong inter molecular forces e.g. hydrogen bonding is

(a) Polystyrene (b) Natural rubber (c) Teflon (d) Nylon 6, 6

39. Chain transfer reagent is

(a) O_2 (b) CH_4

(c) CCl_4 (d) H_2

40. $F_2C = CF_2$ is a monomer unit of

(a) glyptal (b) nylon-6 (c) teflon (d) buna-S

41. Glass is a

(a) polymeric mixture (b) gel (c) super-cooled liquid (d) micro-crystalline solid

42. Arrange the following in increasing order of their intermolecular forces: Nylon 6,6 (I), Buna-S (II), Polythene (III).

(a) II, I, III (b) III, II, I (c) I, II, III (d) II, III, I

43. Bakelite is a product of the reaction between

(a) formaldehyde and NaOH (b) aniline and urea
(c) phenol and methanal (d) phenol and chloroform

44. Among cellulose, poly(vinyl chloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is

(a) Nylon (b) Cellulose (c) Poly vinyl chloride (d) Natural Rubber

45. Nylon is an example of

(a) Polyester (b) Polysaccharide
(c) Polyamide (d) Polythene

46. Natural polymer amongst the following is

(a) Cellulose (b) Kodel
(c) Nylon (d) Terylene

47. Nylon-6 is made from

(a) 1,3-butadiene (b) chloroprene
(c) adipic acid (d) caprolactam

48. Polymer used in bullet proof glass is

(a) PMMA (b) Lexan
(c) Nomex (d) Kevlar

49. Polymer used in the manufacturing of orlon is

(a) PTFE (b) PAN
(c) PMMA (d) PVC

50. PVC polymer can be prepared by which of the monomer?

(a) $CH_3CH=CH_2$ (b) $C_6H_5CH=CH_2$
(c) $CH_2=CH_2$ (d) $CH_2=CH–Cl$

51. Soft drinks and baby feeding bottles are generally made up of

(a) polyester (b) polyurethane
(c) polyurea (d) polyamide

52. The monomer of polystyrene is

(a) $C_2H_5 - CH = CH_2$ (b) $CH_2 = CHCl$
(c) $C_6H_5 - CH = CH_2$ (d) $CH_2 = CHCHO$

53. The monomer(s) used to prepare polyvinyl polythene is

(a) Vinyl chloride and ethene (b) 1, 3-butadiene

(c) Isoprene (d) 1, 3-butadiene and acrylonitrile

54. The monomers of Buna-S rubber are

(a) vinyl chloride and sulphur (b) butadiene
(c) styrene and butadiene (d) isoprene and butadiene

55. The monomers of terylene are

(a) phenol and formaldehyde (b) ethylene glycol and phthalic acid
(c) adipic acid and hexamethylenediamine (d) ethylene glycol and terephthalic acid

56. The plastic household crockery is prepared, using

(a) melamine and vinyl acetate (b) malonic acid and hexamethylenediamine
(c) melamine and tetrafluoroethane (d) melamine and formaldehyde

57. Thermosetting polymer, Bakelite is formed by the reaction of phenol with
(a) HCOOH (b) CH_3CH_2CHO
(c) CH_3CHO (d) HCHO

58. Which compound form linear polymer due to H-bond?

(a) H2O (b) NH3
(c) HBr (d) HCl

59. Three dimensional molecules with cross links are formed in the case of a _____.

(a) Thermoplastic (b) Thermosetting plastic
(c) Both (A) and (B) (d) None of these

60. Which is not polymer?

(a) Sucrose (b) Enzyme
(c) Starch (d) Teflon

61. Which is used in formation of nylon-66?

(a) Sulphur haxafluoride (b) Adipic acid
(c) Sulphurous acid (d) Phthalic acid

62. Which of the following has ester linkage?

(a) Nylon (b) Bakelite
(c) Terylene (d) PVC

63. Which of the following is an addition polymer?

(a) Nylon-6 (b) Nylon-6,6
(c) High density polythene (d) Dacron

64. Which type of polymer is "Cellulose diacetate fibre"?

(a) Natural (b) Semi-synthetic
(c) Synthetic (d) None of these

65. Which of the following is used in paints?

(a) Terylene (b) Nylon
(c) Glyptal (d) Chloroprene

66. Which of the following polymer is prepared from caprolactam?

(a) Nylon 6, 6 (b) Nylon 6, 10
(c) Nylon 6 (d) Nylon 11

67. Which of the followings is not a polymer?

(a) Glycogen (b) Starch

(c) Natural rubber (d) Petroleum

68. Nylon-6 is manufactured from

(a) adipic acid and hexamethylene diamine

(b) caprolactum

(c) maleic anhydride and hexamethylene diamine

(d) sebasic acid and hexamethylene diamine

69. The main use of butadiene is

(a) in the manufacture of synthetic rubber

(b) as an anti-skimming agent in paint

(c) as a plasticiser for unsaturated polyester

(d) none of these

70. The monomer of poly vinyl chloride (PVC) is
(a) chloroethane (b) ethylene dichloride
(c) ethyl chloride (d) chloroform

71. Buna-S is also known as
(a) teflon (b) PTFE
(c) SBR (d) polycrylates

72. Mastication of rubber means

(a) a treatment to retard its deterioration due to oxidation (b) improving its curing rate

(c) depression of its freezing point

(d) its softening

73. Neoprene is a
(a) polyester (b) synthetic rubber
(c) monomer (d) none of these

74. _____ tubes are good substitude for human blood vessels onrheart by-pass operation.
(a) PVC (b) Teflon/dacron
(c) Polythene (d) Polystyrene

75. _____ resins are produced by the condensation polymerisation of formaldehyde with urea or melamine.
(a) Alkyd (b) Epoxy
(c) Amino (d) Phenolic

76. Out of all the elastomers, natural rubber has the longest elongation range & flexibility of the order of _____ percent.
(a) 1-1000 (b) 1000-1500
(c) 2000-2500 (d) 1500-2000

77. Reaction of dimethyl terephthalate (DMT) and ethylene glycol produces
(a) polyester (b) dacron
(c) nylon-6 (d) PVC

78. Automobile steering wheels are normally made of
(a) PVC (b) cellulose nitrate (c) high density polythene (d) cellulose acetate

79. 90% of the caprolactum is converted to nylon-6 on its condensation polymerisation in the reactor maintained at a temperature of _____ °C.
(a) -5 (b) 10-30
(c) 250-280 (d) 500-800

80. Caprolactum, a raw material for the manufacture of nylon-6, is produced from
(a) pyridine (b) benzene
(c) naphthalene (d) phenol

81. Buna-S is a _____ material.
(a) fibrous (b) plastic
(c) resinous (d) rubbery

82. Neoprene is chemically known as
(a) polyurethane (b) poly chloroprene
(c) styrene butadiene rubber (SBR) (d) polybutandiene

83. Due to its excellent permeability to air/gas and oxidation resistance, the tubes of automobile tyres is made of

(a) butyl rubber (b) cold SBR
(c) Bunai N (d) Buna S

84. Cellulose is the main contituent of most _____ fibres.
(a) acrylic (b) synthetic
(c) spandex (d) natural

85. Lavatory cisterns are normally made of
(a) expanded polystyrene (b) perspex
(c) saturated polyester (d) PVC

86. Polymethyl methacrylate (PMMA) is known as
(a) teflon (b) perspex
(c) nylon-6 (d) bakelite

87. In a cross linked polymer, the monomeric units are linked together to constitute a three dimensional network. Which of the following is a cross-linked polymer ?
(a) Polyester (b) Bakelite (phenol formaldehyde) (c) Polythene (d) Nylon-6

88. The synthetic fibres produced from _____ are known as rayon.
(a) lignin (b) polyamides
(c) cellulose (d) ethylene glycol

89. Celluloid is
(a) regenerated cellulose (b) cellulose nitrate
(c) cellulose acetate (d) cellulose acetate butyrate

90. Neoprene is the trade name of
(a) phenol formaldehyde (b) polyurethane
(c) polychlorophrene (d) styrene butadiene rubber (SBR)

91. Tubeless tyres are made of _____ rubber, which is a co-polymer of isoprene & isobutylene.
(a) silicone (b) neoprene
(c) butyl (d) nitrile

92. _____ is not a polyester fibre.
(a) Nylon (b) Dacron
(c) Polyacrylonitrite (d) Terylene

93. Nitrile rubber is produced by the polymerisation of
(a) acrylonitrile & styrene (b) acrylonitrile& butadiene
(c) isobutylene & isoprene (d) none of these

94. Vinyl flooring is done using _____ sheets.
(a) polythene (b) polypropylene
(c) PVC (d) polyvinyl acetate

95. Thiokol is nothing but
(a) polysulphide rubber (b) engineering plastic
(c) polyamide fibre (d) exponded polystyrene

96. Which of the following is generally not used as eord for synthetic rubber tyrecasing ?
(a) Cellulose (b) Nylon
(c) Dacron (d) None of these

97. Trade name of _____ is neoprene.
(a) polyisoprene (b) polychloroprene (c) polytetraflouroethylene (d) poly vinyl acetate

98. Orlanfibre which is used as a wool sub stitute is
(a) an amorphous polymer (b) polyacrylonitrile
(c) polymethylmethacrylate (PMMA) (d) a natural polymeric fibre

99. Visco-elastic behaviour exhibited by plastics is a _____ like behaviour.
(a) solid (b) liquid (c) neither solid nor liquid (d) combination of solid & liquid

100. Peptizers like aromatic mercaptans (e.g. thiophenes) are added in rubber to
(a) reduce its viscosity to permit easier processing

(b) protect rubber goods from attack by oxygen & ozone present in the atmosphere
(c) reduce the time of vulcanisation and quantity of vulcanising agent
(d) increase its viscosity

101. Fillers such as zinc oxide and carbon black are added to the crude natural rubber before vulcanisation in order to improve its
(a) plasticity (b) elasticity (c) strength (d) weathering characteristics

102. Dacron is a/an
(a) inorganic polymer (b) polyester (c) unsaturated polyester (d) polyamide

103. Transistor parts and refrigerator components are normally made of
(a) polystyrene (b) polyester (c) polyurathane (d) high density polythene

104. Which of the following is a copolymer ?
(a) PVC (b) Bakelite (c) Teflon (d) Polythene

105. Density of high density polythene is about _____ gm/c.c.
(a) 1.18 (b) 1.05 (c) 0.95 (d) 0.99

106. The word 'ceramic' meant for _____.
(a) soft material (b) hard material (c) burnt material (d) dry material

107. Not a characteristic property of ceramic material
(a) high temperature stability (b) high mechanical strength (c) low elongation(d) low hardness

108. Major ingredients of traditional ceramics
(a) silica (b) clay (c) feldspar (d) all

109. Not a major contributor of engineering ceramics
(a) SiC (b) SiO_2 (c) Si_3N_4 (d) Al_2O_3

110. The following ceramic product is mostly used as pigment in paints
(a) TiO_2 (b) SiO_2 (c) UO_2 (d) ZrO_2

111. Most commercial glasses consist of
(a) lime (b) soda (c) silica (d) all

112. Hot isostatic pressing is not a viable option if the chief criterion is
(a) strength without grain growth (b) lost cost
(c) zero porosity (d) processing refractory ceramics

113. During sintering densification is not due to
(a) atomic diffusion (b) surface diffusion (c) bulk diffusion (d) grain growth

114. The hardest known material is
(a) Ceramic (b) Diamond (c) high carbon steel (d) alloy steel

115. Diamond has
(a) low heat conductivity (b) high electrical conductivity
(c) lowest thermal expansion (d) high coefficient of friction

116. Democratic material
(a) Diamond (b) Titanium (c) Iron (d) Gold

117. Strong and ductile materials

(a) Polymers (b) Ceramics (c) Metals (d) Semiconductors

118. Density of alumina is nearly-----

(a) 2g/cc (b) 3 g/cc (c) 4 g/cc (d) 5 g/cc

119. In Aluminium hydroxide main component is

(a) bauxite (b) cementite (c) Pearlite (d) ferrite

120. Aluminium oxide flakes are used in -----

(a) Cement (b) paint (c) electrode (d) bottles

121. Silicon carbide is used as an oil additive to reduce

(a) friction (b) emissions (c) harmonics (d) all of these

122. --------- was the first commercially important semiconductor material

(a) Alumina (b) Silicon carbide (c) Tungsten carbide (d) Titanium carbide

123. --------- also known as carborundum.

(a) Alumina (b) Silicon carbide (c) Tungsten carbide (d) Titanium carbide

124. Melting point of silicon carbide is nearly

(a) 1500 °C (b) 2000 °C (c) 2300°C (d) 3000°C

125. Silicon Nitride is prepared by heating powdered silicon between

(a) 800 °C to 900 °C (b) 1300 °C to 1400 °C(c) 1800 °C to 1900 °C(d) 2200 °C to 2300 °C

126. Cubic boron nitride has a crystal structure analogous to that of

(a) Silica (b) Alumina (c) Silicon nitride (d) Diamond

127. Density of cubic boron nitride is nearly

(a) 2.28 g/cc (b) 3.1 g/cc (c) 3.45 g/cc (d) 3.9 g/cc

128. Titanium carbide has an elastic modulus of approximately

(a) 100 GPa (b) 200GPa (c) 400 GPa (d) 600GPa

129. Titanium carbide appearance in -------

(a) black powder (b) white powder (c) fine gray powder (d) yellow powder

130. Most basic form of tungsten carbide is ------

(a) black powder (b) white powder (c) fine gray powder (d) yellow powder

131. Tungsten carbide historically referred to as

(a) Wolfram (b) Kevin (c) Thomas (d) Mary

Answers:

1. c	21.b	41. c	61. b	81. d	101. d	121. d
2. c	22.d	42. d	62. c	82. b	102. b	122. b
3. c	23. b	43. c	63. c	83. a	103. a	123. b
4. b	24. d	44. d	64. c	84. d	104. b	124. d
5. b	25. a	45. c	65. c	85. a	105. c	125. b
6. c	26. c	46. a	66. c	86. b	106. c	126. d
7. b	27. c	47. d	67. d	87. b	107. d	127. c
8. b	28. c	48. b	68. b	88. c	108. d	128. c
9. a	29. a	49. b	69. a	89. b	109. b	129. a
10. c	30. d	50. d	70. a	90. c	110. a	130. c
11. b	31. d	51. a	71. c	91. c	111. d	131. a
12. d	32. b	52. c	72. d	92. a	112. b	
13. b	33. a	53. a	73. b	93. b	113. b	
14. b	34. a	54. c	74. b	94. c	114. b	
15. a	35. d	55. d	75. c	95. a	115. c	
16. a	36. a	56. d	76. a	96. a	116. c	
17. a	37. a	57. d	77. b	97. b	117. c	
18. d	38. d	58. b	78. d	98. B	118. c	
19. d	39. c	59. b	79. b	99. D	119. a	
20. b	40. c	60. a	80. b	100. A	120. b	