

18 — MATERIAL SCIENCE AND CERAMIC TECHNOLOGY

(Answer ALL questions)

56. The planar density for (111) plane in a FCC crystal is

1. 0.68
2. 0.74
3. 0.85
4. 0.91

57. The atomic packing factor for diamond cubic structure is

1. 0.74
2. 0.68
3. 0.34
4. 0.25

58. In a rhombohedral crystal structure

1. $a \neq b \neq c$ and $\alpha = \gamma = 90^\circ \neq \beta$
2. $a \neq b \neq c$ and $\alpha = \gamma = \beta = 90^\circ$
3. $a = b = c$ and $\alpha = \gamma = 90^\circ = \beta$
4. $a = b = c$ and $\alpha = \gamma = 90^\circ \neq \beta$

59. In one FCC unit cell, there are

1. 4 tetrahedral and 8 octahedral sites
2. 8 tetrahedral and 4 octahedral sites
3. 12 tetrahedral and 4 octahedral sites
4. 4 tetrahedral and 4 octahedral sites

60. The driving force for grain growth is

1. decrease in dislocation strain energy
2. increase in grain boundary energy
3. decrease in grain boundary energy
4. decrease in vacancy concentration

61. For a dislocation with Burgers Vector b , the energy is

1. independent of b
2. proportional to b
3. inversely proportional to b^2
4. proportional to b^2

62. Cross slip is prevalent in materials with

1. high stacking fault energy
2. high grain boundary energy
3. low stacking fault energy
4. low grain boundary energy

63. Secondary hardening in steels arise out of

1. the precipitation of fine alloy carbide at high temperatures
2. the refinement of ferrite grain size working
3. the decomposition of retained austenite upon heat treatment
4. the precipitation of complex intermetallics upon heat treatment

64. In a steel during carburization at 937 °C 0.6% carbon is found at a depth of 0.2 mm after 1 hour. The time required to get 0.6% carbon at double this depth at the same temperature is

1. 60 s
2. 1.414 hr
3. 2 hr
4. 4 hr

65. The fastest diffusing species in Fe is

1. H
2. Ni
3. C
4. W

66. The property that cannot be obtained from tensile test is

1. Young's modulus
2. Yield strength
3. Ultimate tensile strength
4. Endurance limit

67. The Poisson's ratio of a ceramic material lies

1. Less than 0.30
2. 0.35
3. 0.50
4. More than 0.50

68. The fatigue resistance of a material is improved by the following technique

1. anodizing
2. carburizing
3. ion nitriding
4. shot peening

69. The appearance of intergranular fracture suggests that the following mechanism is responsible for the failure

1. ductile fracture
2. brittle fracture
3. fatigue fracture
4. high temperature creep failure

70. On decreasing the grain size of a polycrystalline material, the property most likely to deteriorate is

1. creep
2. toughness
3. tensile strength
4. fatigue

71. The Charpy impact test can be used to determine

1. the ductile - brittle transition temperature
2. yield strength under dynamic loading conditions
3. hardenability
4. ductility

72. Herring Nabarro creep is prominent in

1. coarse grained material at high temperature
2. coarse grained material at low temperature
3. fine grained material at high temperature
4. fine grained material at low temperature

73. Rochelle Salt is

1. $\text{NaKC.4H}_2\text{O}_6.8\text{H}_2\text{O}$
2. $\text{NaKC.4H}_2\text{O}_6.6\text{H}_2\text{O}$
3. $\text{NaKC.4H}_2\text{O}_6.4\text{H}_2\text{O}$
4. $\text{NaKC.4H}_2\text{O}_6.2\text{H}_2\text{O}$

74. In a n-type extrinsic semiconductor, at some temperature all of the states have been exhausted of their donor electrons is

1. exhaustion region
2. forbidden region
3. valence region
4. conduction region

75. The factors that obstruct domain wall motion in Fe are

1. dislocation tangles
2. impurity atoms
3. voids
4. nonmagnetic dislocations

76. The hardest element among the Fe-C phases is

1. Pearlite
2. Cementite
3. Martensite
4. Ferrite

77. Normalising of steel is

1. Cooling in water
2. Furnace Cooling
3. Cooling in air
4. Cooling in Oil

78. Dimensional control in Hot rolling is

1. Accurate
2. Difficult
3. Easy
4. More accurate

79. The Young's modulus value of fiber reinforced composite is maximum at

1. Iso strain condition
2. Iso stress condition
3. Neutral axis
4. Surface

80. Molecular Weight of polymer is depending upon

1. Molecular mass of monomer
2. Chain length
3. Branch Length
4. No of elements

81. The isothermal heat treatment by which Austenite transforms to Bainite is

1. Carburising
2. Nitriding
3. Martempering
4. Austempering

82. The alloys that are shaped by a deformation process is

1. Super alloys
2. Binary alloy
3. Wrought alloy
4. Reactive alloys

83. Coating of glass fibers with an organic material is called

1. Roving
2. Shaping
3. Sizing
4. Cementing

84. Cross linking elastomer chains introducing sulfur is called

1. Thermoplastic
2. Relaxation
3. Vulcanization
4. Polymerization

85. Shape memory alloys exhibit

1. Elastic behaviour
2. Super plastic behaviour
3. Thixo Character
4. Super Elastic behaviour

86. Which of the following is not a form limestone?

1. Coral
2. Marble
3. Shale
4. Shell

87. Kaolinisation under acidic conditions form

1. Kaolinite
2. Montmorillonite
3. Illite
4. Mica

88. Fuller's earth is a type of

1. Silica
2. Clay
3. Alumina
4. Feldspar

89. Plagioclase is a solid solution of

1. Sodium and potassium feldspar
2. Sodium and calcium feldspar
3. Calcium and magnesium feldspar
4. Calcium and potassium feldspar

90. Displacive transformation in silica that requires high temperature is

1. α - quartz to β - quartz
2. α - tridymite to β - tridymite
3. β tridymite to γ - tridymite
4. α - cristobalite to β - cristobalite

91. Baddeleyite is a source of

1. Alumina
2. Titania
3. Zirconia
4. Beryllia

92. Iron scales are added to dolomite with high amount of calcium carbonate to

1. Lower the sintering temperature
2. Increase hydration resistance
3. Increase slag attack resistance
4. Lower spalling tendency

93. Which of the following additive helps in volatilization of impurities during SiC preparation by Acheson process?

1. Coke
2. NaCl
3. Saw dust
4. Na_2CO_3

94. Which of the following has crystal structure similar to graphite?

1. α - Boron carbide
2. β - Boron carbide
3. α - Boron nitride
4. β - Boron nitride

95. Material with highest non wetting characteristic is

1. Silicon carbide
2. Silicon nitride
3. Carbon
4. Boron nitride

96. Wall tiles come under the category of

1. Stoneware
2. Earthenware
3. Porcelain
4. Terracotta

97. Zeta potential of a casting slip relates to

1. Viscosity
2. Cation exchange capacity
3. Suspension stability
4. Casting rate

98. The Seger Formula is

1. $1\text{RO} \cdot (0.1x)\text{R}_2\text{O}_3 \cdot x\text{RO}_2$
2. $0.1\text{RO} \cdot (0.1x)\text{R}_2\text{O}_3 \cdot x\text{RO}_2$
3. $1\text{RO} \cdot (0.1x)\text{R}_2\text{O}_3 \cdot (1-x)\text{RO}_2$
4. $1\text{RO} \cdot (x)\text{R}_2\text{O}_3 \cdot x\text{RO}_2$

99. The cracking of the fired product either in kiln or subsequently as a result of stresses associated with temperature gradients is known as

1. Warpage
2. Dunting
3. Spalling
4. Crawling

100. Refining agent commonly used in glass is

1. Na_2CO_3
2. NaOH
3. NaNO_3
4. Na_2SO_4

101. Durability of glass decreases with increase in percentage of

1. Silica
2. Soda
3. Alumina
4. Lime

102. Refractory which undergoes expansion on firing is

1. Forsterite
2. Firebrick
3. Silica
4. Alumina

103. The refractory material which is commonly used as a buffer layer between acid and basic refractory lining is

1. Carbon
2. Alumina
3. Zirconia
4. Chromia

104. The process of passing a coated abrasive roll through two closely spaced steel rollers to produce a product with uniform thickness designed for fine finishing applications is

1. Satining
2. Skiving
3. Splicing
4. Stenciling

105. The important characteristic of hard grinding wheel is that it

1. Cuts fast
2. Last long
3. Produce smooth finish
4. Can cut hard materials

106. The product of the bending moment (M) and the radius of curvature (R) is called

1. Elasticity
2. Flexural rigidity
3. Modulus of Rupture
4. Toughness

107. Silica stabilized alumina fibers are called

1. Saphikon fibers
2. FP Fibers
3. Saffil Fibers
4. Nextel Fibers

108. Agents that have high solubility in glass is

1. Zirconia
2. Alumina
3. Magnesia
4. Calcia

109. Hexagonal layered structure similar to graphite is called

1. α - BN
2. β - BN
3. ε - BN
4. γ - BN

110. In a composite, the matrix

1. is always fibrous
2. transfers the load to the reinforcement
3. is usually stronger than the reinforcement
4. is never a ceramic

111. Barium titanate exhibits a peak permittivity at

1. 110°C
2. 120°C
3. 130°C
4. 140°C

112. The production of hydrogen by the direct decomposition of water at very high temperatures is called

1. Hydrolysis
2. Electrolysis
3. Thermolysis
4. Electro osmosis

113. A metallic implant that will shield the bone from carrying the load that would support under normal conditions is called

1. stress compacting
2. stress relieving
3. stress hardening
4. stress shielding

114. Thick walled vessel made of steel which allows to carry out reactions at a pressure and at high temperature is called

1. centrifuge
2. autoclave
3. isostatic press
4. furnace

115. The ratio of the atomic radius/3d shell radius of Mn, which normally exhibit antiferromagnetic behavior is

1. 1.47
2. 1.63
3. 1.82
4. 1.98