

PART III

19-MATERIALS SCIENCE & CERAMIC TECHNOLOGY

(Answer ALL questions)

56. The Miller indices are the same for
- alternate half indices planes
 - crystallographic planes
 - orthogonal planes
 - parallel planes
57. The converse of magnetostriction effect is
- Thompson Effect
 - Inverse piezo electric effect
 - Curie effect
 - Villari effect
58. Which one of the following is not the polymorph of silica?
- cristobalite
 - niobate
 - tridymite
 - quartz
59. The electrical conductivity of a conductor may be increased by
- increasing its temperature
 - decreasing its temperature
 - increasing its vibration
 - increasing impurity concentration
60. The depletion region in an open circuited p-n junction contains
- electrons
 - holes
 - uncovered immovable impurity ions
 - neutralized impurity atoms
61. The electromechanical effect of polarization is known as
- magnetostriction
 - electrostriction
 - piezo electricity
 - inverse piezo electricity
62. Above curie temperature the hysteresis loop of a ferroelectric material merges into a
- parabola
 - cycloid
 - straight line
 - point
63. In which of the following materials, the magnetization is nonlinearly associated to the applied field
- ferro magnetic materials
 - paramagnetic materials
 - dia magnetic materials
 - all of the above
64. For isotropic materials the linear, areal and volume expansion coefficients are in the ratio
- 1:2:3
 - 1:4:9
 - 1: $\sqrt{2}$: $\sqrt{3}$
 - 1:1:1
65. An octahedral void is surrounded by
- 8 atoms
 - 18 atoms
 - 6 atoms
 - 4 atoms
66. The degrees of freedom for a system having equal number of components and phases will be
- 1
 - 2
 - 3
 - 4
67. The reaction that yields two solid phases on cooling a single solid phase is called
- Eutectic
 - Eutectoid
 - Peritectic
 - Peritectoid

68. During cooling, the complete transformation of austenite takes place from liquid state
- at 723°C
 - just above 723°C
 - just below 723°C
 - none of the above
69. Gibbs phase rule for general system:
- $P + F = C + 1$
 - $P + F = C - 2$
 - $P + F = C - 1$
 - $P + F = C + 2$
70. Pearlite phase in steel is made up of
- alternate layers of ferrite and cementite
 - alternate layers of martensite and cementite
 - alternate layers of ferrite and martensite
 - alternate layers of bainite and cementite
71. Recrystallization temperature is the temperature at which recrystallization just reaches completion in
- 1 hr
 - 2 hr
 - 3 hr
 - 4 hr
72. Which of the following element is added to iron to improve its oxidation resistance?
- Copper
 - Zinc
 - Magnesium
 - Chromium
73. Choose the correct statement
- Thermoplastics are crystalline
 - Thermosetting and thermoplastic polymers are essentially amorphous
 - Thermoplastics are either amorphous or crystalline but thermosets are amorphous
 - Thermosetting plastics are crystalline
74. For metal-matrix composites the matrix is a
- polymer
 - ceramic
 - ductile metal
 - glass
75. Which of the following statement/s is are true for nanoparticles?
- Carbon nanotubes are cylindrical fullerenes
 - Volume to surface area ratio is very large for nanomaterials
 - Hardness of a single walled nanotube is about 63×10^9 Pa.
 - The size of a quantum dot is 100 nm
76. Matthiessen's rule relates to
- Superconductors
 - Ferromagnetic materials
 - Resistivity of impure metals
 - Diffusion
77. Electronic polarization
- Increases with temperature
 - Decreases with temperature
 - Independent of temperature
 - None of the above
78. The sprinkling of water reduces the temperature of the closed room
- The water has large latent heat of vaporization
 - Water is bad conductor of heat
 - Specific heat of water is high
 - The temperature of water is less than that of room temperature
79. The main constituent of permalloy is
- Cobalt
 - Chromium
 - Nickel
 - Tungsten

80. In a tension specimen the elongation at the time of fracture is
- localized near the ends
 - localized in the region of necking
 - delocalized in the centre of the length
 - none of the above
81. In the Griffith equation, the fracture stress is proportional to
- C
 - $2C$
 - $C^{\frac{1}{2}}$
 - $\left(\frac{1}{C}\right)^{\frac{1}{2}}$
82. A type-I superconducting material when placed in a magnetic field will
- Expel all the magnetic lines of forces passing through it
 - Attract the magnetic field toward its centre
 - Not influence the magnetic field
 - None of the above
83. The temperature below which certain materials are ferromagnetic and above which they are paramagnetic is called
- Neel temperature
 - Curie temperature
 - Weiss temperature
 - None of these
84. Creep occurs at a temperature above
- $0.16 T_m$
 - $0.22 T_m$
 - $0.4 T_m$
 - $0.9 T_m$
85. Fatigue failure occurs due to
- Extended constant loading
 - Extended cyclic loading
 - Diffusion of atoms
 - Movement of dislocations
86. Flow behaviour exhibited by clay suspensions is ———
- Newtonian
 - Bingham plastic
 - Dilatent
 - Thixotropic
87. Which of the following is not a type of crypto-crystalline quartz?
- Flint pebble
 - Sandstone
 - Opal
 - Agate
88. Talc is hydrated aluminium silicate containing ——— ions.
- Calcium
 - Sodium
 - Magnesium
 - Potassium
89. Cornish stone is geologically altered variety of ——— rock.
- Granite
 - Basalt
 - Feldspar
 - Quartz
90. The predominant gangue material in chrome ore is ———
- Talc
 - Serpentine
 - Spodumene
 - Dolomite
91. Owing to poor sinterability, ——— is sintered by hot pressing.
- SiC
 - SiAlON
 - Si_3N_4
 - BN

92. Presence of _____ as impurity in the silicon powder enhances α Si_3N_4 formation during nitriding of silicon.
- Aluminium
 - Iron
 - Oxygen
 - Sodium
93. Select the correct sequence of materials with increasing starting temperature of oxidation
- BN, AlN, Si_3N_4
 - BN, Si_3N_4 , AlN
 - AlN, BN, Si_3N_4
 - AlN, Si_3N_4 , BN
94. _____ is used as seed particles for extracting alumina in Bayer's process.
- Boehmite
 - Diatomite
 - Gibbsite
 - Diaspore
95. Zirconia exists in _____ form in partially stabilized zirconia.
- Cubic
 - Tetragonal
 - Monoclinic and tetragonal
 - Monoclinic and cubic
96. The Filter Press is mainly used in
- Ceramic Insulator making
 - Cement making
 - Glass making
 - Refractory making
97. The 'Glass content' of porcelain bodies is in the Range of
- 20 – 40 %
 - 50 – 80%
 - 80 – 90%
 - 10 – 20%
98. The Belleek China is a
- Translucent ceramic containing significant amount of frit
 - Translucent ceramic containing low amount of frit
 - Opaque ceramic body containing a significant amount of frit
 - Translucent ceramic containing high amount of frit
99. Which of the following is an advantages for Lead compounds in Glaze?
- It gives higher brilliance due to higher refractive index
 - It increases the co-efficient of expansion as compared to the alkalies
 - It increases the modulus of elasticity
 - It increases the strength of the fired body
100. _____ compound imparts yellow color in glass.
- CdS
 - FeS
 - CuS
 - ZnS
101. _____ is not a glass former.
- S
 - Se
 - Te
 - As
102. In unfired chemically bonded magnesite bricks _____ is used as a binder.
- CaSO_4
 - MgSO_4
 - $\text{Al}_2(\text{SO}_4)_3$
 - K_2SO_4
103. _____ refractory undergoes bursting when in contact with iron oxide.
- periclase
 - dolomite
 - chrome
 - mullite

104. _____ is a non vitreous bond used in abrasives.
- flint
 - clay
 - frit
 - shellac
105. The specific gravity of diamond is _____
- 1.50 - 1.56
 - 2.50 - 2.56
 - 3.50 - 3.56
 - 4.50 - 4.56
106. _____ boron nitride has a hexagonal layered structure similar to graphite.
- β
 - γ
 - α
 - σ
107. _____ is a inorganic natural fibre.
- Nylon
 - Jute
 - Polyethylene
 - Basalt
108. _____ fiber is called as Tyranno.
- Multifilament SiC
 - Multifilament Al_2O_3
 - Multifilament Carbon
 - Multifilament Boron
109. Cracking catalysts can be made using
- bentonite
 - kaolinite
 - kaonite
 - dolomite
110. _____ is an anti-ferroelectric material.
- lead zirconate
 - lead titanate
 - barium titanate
 - strontium titanate
111. _____ is natural mineral used as a dielectric material.
- vermicullite
 - bentonite
 - halloysite
 - mica
112. _____ material is used as an electrolyte in Na-S cell.
- single crystal of MgO
 - beta alumina
 - rutile
 - quartz
113. As a biomaterial, graphite is used as _____
- Femoral balls
 - Bone replacement
 - Ear implants
 - Heart valve components
114. Which of the following happens on titanium implants coated with hydroxyapatite?
- Slow bone apposition rates
 - Bonding osteogenesis
 - Formation of fibrous capsule of protective tissue around implant
 - Slow healing compared to uncoated implants
115. '5' in 45S5 Bioglass^R refers to _____
- Ratio of Ca/P
 - Percentage of Silica
 - Percentage of P_2O_5
 - Ratio of Si/Ca