(Answer ALL questions)

56. The mass of proton is

1. 1.673×10^{-27} kg
2. 1.673×10^{-28} kg
3. 1.673×10^{-29} kg
4. 1.673×10^{-30} kg

57. The number of slip systems in an ideal close packed hexagonal structure is

1. 3
2. 12
3. 24
4. 48

58. The Miller indices of the direction common to the planes (111) and (110) in a cubic system is

1. [111]
2. [110]
3. $[\bar{1}10]$
4. $[\bar{1}11]$

59. In an ideal HCP packing, the c/a ratio is

1. 1.225
2. 1.414
3. 1.633
4. 1.732

60. X-ray radiography is used to determine the

1. soundness of casting
2. chemical composition
3. crystal structure
4. phases present

61. A defect is bounded by two mirror planes is

1. twin
2. stacking fault
3. grain boundaries
4. edge dislocation

62. For systems that change from some initial state to some final state is given by

1. $\Delta G = \Delta H / T\Delta S$
2. $\Delta G = \Delta H + T\Delta S$
3. $\Delta G = T\Delta S / \Delta H$
4. $\Delta G = \Delta H - T\Delta S$

63. Austenitic stainless steel can be strengthened by

1. quench hardening
2. deformation hardening
3. irradiation hardening
4. quenching and tempering

64. If the diffusion jump distance is 1.5 Å, the theoretical value of Do in m^2/s is

1. 1.5×10^{3}
2. 1.5×10^{-3}
3. 2.25×10^{-7}
4. 2.25×10^{7}

65. Among the following elements, the one with the largest diffusion coefficient in steel at 1000°C is

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

66. A steel bar (elastic modulus = 200 GPa and yield strength = 400 MPa) is loaded to a tensile stress of 800 MPa and undergoes a plastic strain of 2%. The elastic strain in the bar in percent is

1. 0
2. 0.2
3. 0.5
4. 2.0

67. In a tensile test of a ductile material, necking starts at
1. Lower yield stress
2. Upper yield stress
3. Ultimate tensile stress
4. Just before fracture

68. Fatigue resistance of a steel is reduced by:
1. Decarburization
2. Polishing the surface
3. Reducing the grain size
4. Shot peening

69. A perfectly plastic metal piece, with 4 mm × 4 mm cross – section and 25 mm length, is stretched to 100 mm. What is the deformed cross-section?
1. 1 mm × 1 mm
2. 2 mm × 2 mm
3. 3 mm × 3 mm
4. 4 mm × 4 mm

70. Rockwell hardness on the C-scale is measured using an indenter with a:
1. 120° diamond cone with a slightly rounded tip
2. Square base diamond pyramid
3. 10 mm diameter steel ball
4. 3 mm diameter steel ball

71. Creep rate used in estimating the life of components operating at high temperature is
1. Strain rate in stage I
2. Average of the stage rates in stages I, II, III
3. Strain rate in stage III
4. Strain rate in stage II

72. Above the Debye Temperature θ_D, specific heat capacity of crystalline solids is given as
1. $C_v = 4R$
2. $C_v = 3R$
3. $C_v = 2R$
4. $C_v = 5R$

73. Mathisens Rule is
1. $\rho_{total} = \rho_t + \rho_i + \rho_d$
2. $\rho_{total} = \rho_t - \rho_i + \rho_d$
3. $\rho_{total} = \rho_t + \rho_i - \rho_d$
4. $\rho_{total} = -\rho_t + \rho_i + \rho_d$

74. The phenomenon that occurs when a current is made to flow through an electric circuit consisting of two different metals in series connected by junctions, a heat is evolved at one junction and is absorbed at the other junction, cooling the former and heating the latter is called as
1. Seebeck Effect
2. Petlier Effect
3. Thomson Effect
4. Joule Effect

75. Gadolium has a higher saturation magnetization than Co at
1. –273°C
2. 25°C
3. 290°C
4. 769°C

76. A metastable phase formed in steel is
1. Pearlite
2. Martensite
3. Ferrite
4. Cementite

77. Large polymer matrix fiber reinforced composite tubes are made by
1. Pultrusion
2. Moulding
3. Thermo forming
4. Filament winding

78. Binder metal used in Tungsten Carbide tools is
1. Mo
2. Al
3. Ni
4. Co

79. Depth of an internal defect can be measured by
1. X-Ray method
2. Gamma rays method
3. Ultrasonic method
4. Dye penetrant

80. The weight percentage of carbon in mild steel is
1. less than 0.008
2. 0.008 – 0.3
3. 0.3 – 0.8
4. 0.8 – 2.11

81. Eutectoid product in Fe – C system is called
1. Pearlite
2. Bainite
3. Ledeburite
4. Spheroidite

82. Energy band gap size for insulation is in the rage _____ eV.
1. 1-2
2. 2-3
3. 3-4
4. Greater than 4

83. The temperature range below which the amorphous polymer assumes a rigid glassy structure is
1. Melting temperature
2. Boiling temperature
3. Glass temperature
4. Degradation temperature

84. A material having different properties in different direction is known as
1. Amorphous
2. Copolymer
3. Anisotropic
4. Allotropy

85. Example for strengthening mechanism in single-phase material
1. Strain hardening
2. Precipitation hardening
3. Fiber strengthening
4. Dispersion strengthening

86. The phase transformation in silica that is accompanied with a maximum volume expansion of 15.4 – 17.4% is
1. α – quartz to β – quartz
2. α – quartz to α – tridymite
3. α – quartz to α – cristobalite
4. α – tridymite to α – cristobalite

87. Partially kaolinized feldspar is
1. Nepheline syenite
2. Cornish stone
3. Pyrophyllite
4. Meta kaolin

88. The primary reaction that aids in the conversion of feldspar to clay is
1. Pyrolysis
2. Recombination
3. Diffusion
4. Hydrolysis

89. Which of the following comes under kaolinite group of clay minerals?
1. Halloysite
2. Pyrophyllite
3. Illite
4. Montmorillonite

90. Heating Sillimanite group of minerals to 1250°C forms a mixture of
1. Mullite and corundum
2. Mullite and cristabolite
3. Mullite and carborundum
4. Mullite and chrysotile

91. 5 to 6% zircon is found in the beach sand in
1. Cuddalore
2. Pondicherry
3. Chennai
4. Kanyakumari

92. The major mineral found in bauxite is
1. Boehmite
2. Gibbsite
3. Diaspore
4. Laterite

93. Thermal decomposition of silicon imide results in the formation of
1. Silicon carbide
2. Silicon nitride
3. Spinel
4. Garnet

94. Which of the following additive aids in sintering of Silicon carbide?
1. Barium
2. Calcium
3. Boron
4. Chromium

95. When graphite is heated in inert atmosphere, it
1. Sublimes
2. Melts
3. Burns
4. Fuses

96. Bone china belongs to the group of
1. Terracotta
2. Earthenware
3. Stoneware
4. Porcelain

97. Which of the following have higher porosity?
1. Earthenware
2. Stoneware
3. Porcelain
4. Vitreous china

98. Formation of fine network of cracks on the surface of a glazed article due to thermal mismatch between the body and the glaze is known as
1. blistering
2. crazing
3. pin holing
4. cracking

99. The process of removing surface blemishes on the ware prior to firing and usually carried out in the partially dried and leather hard condition is known as
1. Jiggering
2. Jolleying
3. Fettling
4. Sponging

100. Pyrex glass is a type of
1. Borosilicate glass
2. Aluminosilicate glass
3. Lead glass
4. Vitreous silica glass

101. Annealing is done in _____ temperature range.
1. Transition
2. Transformation
3. Fusion
4. Deformation

102. Which of the following is the inorganic chemical bond used in shaped refractories?
1. Mullite
2. Pitch
3. Aluminous cement
4. Silica gel

103. The hearth of blast furnace is lined with _____ refractories.
1. Silicon nitride
2. Magnesia-chrome
3. Carbon block
4. Magnesia carbon

104. Abrasive grain suitable for soft metal polishing is
1. Flint
2. Crocus
3. Garnet
4. Silicon carbide

105. Resin bonded abrasive wheels are prepared with ———— resin
1. Phenol formaldehyde
2. Urea formaldehyde
3. Furfural
4. Shellac

106. The process of obtaining a highly oriented, layered crystallographic structure with different chemical and physical properties from non graphitic forms of carbon is called
1. Carbonization
2. Polymerization
3. Condensation
4. Graphitization

107. Alumina fibers which are hexagonal structure are called
1. Saphikon Fiber
2. FP Fiber
3. 3M Fiber
4. Nextel Fiber

108. Agents which have low solubility in glass
1. Fe
2. Cr
3. Ag
4. Ti

109. Cubic diamond like structure with hardness equivalent to diamond is called
1. β–BN
2. α–BN
3. γ–BN
4. ε–BN

110. In a discontinuous fiber metal matrix composites the fibre will fracture in the middle portion if
1. the length of the fiber is less than half of the critical fibre length
2. the length of the fiber is more than double the critical fiber length
3. the length of the fiber is nearly same as the critical fiber length
4. the fiber surface contains stress raisers

111. The temperature of transformation from spontaneous random polarization to permanent dipole domain is called
1. Debye Temperature
2. Curie Temperature
3. Weiss Temperature
4. Neel Temperature

112. Which of the following application is not based on ionic conductivity?
1. Solid oxide fuel cell
2. Sodium sulphate battery
3. Zirconium oxygen sensor
4. Thermistor

113. A protein with a fibrous structure is called
1. Collagen
2. Fibrogen
3. Ostereogen
4. Thrombogen

114. Emeralds are
1. $2Be_3Al_2(SiO_3)_6$
2. $3Be_3Al_2(SiO_3)_6$
3. $4Be_3Al_2(SiO_3)_6$
4. $Be_3Al_2(SiO_3)_6$

115. The Curie temperature of cobalt is
1. 2000K
2. 1400K
3. 1040K
4. 650K