383. Lessing ring is formed by the addition of a partition across the centre of a raschig ring, which results in an area increase of about ________ percent.
   (A) 5
   (B) 20
   (C) 35
   (D) 55
   Answer: Option B

384. What is the value of \( q \) for saturated liquid feed to a distillation column?
   (A) 0
   (B) <1
   (C) 1
   (D) >1
   Answer: Option C

385. In chemical process equipments, the conical bottom heads used, usually has an apex angle of
   (A) 20°
   (B) 40°
   (C) 60°
   (D) 80°
   Answer: Option C

Refractory Technology
(www.objectivebooks.com)

01. Silica refractories are not used in
   (A) Coke oven walls
   (B) Beehive coke ovens
   (C) Dome and upper portion of B.F. stoves
   (D) Open hearth furnace roof
   Answer: Option B

02. Si percentage in silica refractories used in the walls of coke oven is about
   (A) 45
   (B) 60
   (C) 80
   (D) 95
   Answer: Option D

03. Porosity of silica bricks varies from _________ percent.
   (A) 5 to 10
   (B) 20 to 30
   (C) 45 to 60
   (D) 60 to 75
   Answer: Option B

04. Chrome magnesite bricks are
   (A) Acidic in nature
   (B) Neutral in nature
   (C) Having higher RUL than silica bricks
   (D) Made by mixing 30% Chromite and 70% Periclase
   Answer: Option C

05. Alumina-graphite bricks are used for lining the
   (A) Slide gate in teeming laddies
   (B) Continuous casting systems
   (C) Both (A) and (B)
   (D) Neither (A) nor (B)
06. Maximum shrinkage in volume occurring during burning/firing of dried refractories may be as high as ________ percent.
   (A) 10
   (B) 15
   (C) 20
   (D) 30
   Answer: Option D

07. The main raw material for manufacture of silicon carbide refractories is
   (A) Corundum
   (B) Carborundum
   (C) Bauxite
   (D) Periclase
   Answer: Option B

08. Which of the following consumes the maximum tonnage of refractories annually in an integrated steel plant?
   (A) Soaking pits
   (B) Reheating furnace
   (C) L.D. converter
   (D) Rotary lime kiln
   Answer: Option C

09. Upper portion of hot metal mixer are lined with mullite bricks, which helps in resisting the
   (A) Washing action of metal
   (B) Corrosion by layer of slag
   (C) Both (A) & (B)
   (D) Neither (A) nor (B)
   Answer: Option A

10. Lower part of hot metal mixer are lined with ________ bricks.
    (A) Superduty fireclay
    (B) High alumina
    (C) Silica
    (D) Carborundum
    Answer: Option D

11. High density refractory bricks have lower
    (A) Spalling resistance
    (B) Thermal conductivity
    (C) Fusion point
    (D) Slag penetration resistance
    Answer: Option A

12. Bauxite calcining rotary kilns are lined with ________ bricks.
    (A) Fireclay
    (B) Carbon
    (C) 85% alumina
    (D) Corundum
    Answer: Option C

13. Fireclay bricks are used in the
    (A) Furnaces allowed to cool frequently
    (B) Flues
    (C) Chimney linings
    (D) All (A), (B) and (C)
    Answer: Option D

14. Carbon refractory blocks
    (A) Are wetted by molten iron
    (B) Are used in the hearth of blast furnace
    (C) Are acidic in nature
    (D) All (A), (B) and (C)
15. Spalling of a refractory means its
(A) Softening
(B) Fracture due to uneven expansion at high temperature
(C) Resistance to compressive loads
(D) Resistance to chemical action of gases and molten fluxes
Answer: Option B

16. Chromite refractories are used in
(A) Bottom of soaking pits
(B) Between acid & basic linings in basic open hearth furnaces to prevent their chemical action with each other
(C) Both (A) & (B)
(D) Neither (A) and (B)
Answer: Option C

17. The linear thermal expansion of _______ bricks upto 1000 °C is very low of the order of ≤ 0.5 percent.
(A) Fireclay
(B) Silica
(C) Magnesite
(D) Corundum
Answer: Option A

18. Maximum apparent porosity of magnesite bricks is about _______ percent.
(A) 8
(B) 24
(C) 44
(D) 58
Answer: Option B

19. Chrome magnesite is not used in the
(A) Inner lining of L.D. converter
(B) Aluminium melting furnaces
(C) Wear out lining of steel melting furnaces
(D) All (A), (B) and (C)
Answer: Option C

20. Cold crushing strength of refractories depends upon its
(A) Composition
(B) Texture
(C) Firing temperature
(D) All (A), (B) and (C)
Answer: Option D

21. _______ bricks are used in the burning zone of a cement rotary kiln.
(A) High alumina
(B) Fireclay
(C) Thoria
(D) Silicon carbide
Answer: Option A

22. Pick out the wrong statement.
(A) Fluxing material like lime is added in clay to reduce the vitrification temperature
(B) Main constituents of clay are alumina and silica
(C) Addition of sand in ceramic materials makes it non-plastic, increases its fusion point and reduces its shrinkage on burning
(D) Vitrification of fireclay material is done to increase its porosity
Answer: Option D

23. Maximum water percentage in refractory mix meant for hand moulding may be as high as _______ percent.
(A) 2-3
(B) 5-7
24. Which property is important for bricks used in the combustion chamber & dome of blast furnace stoves?
   (A) High refractoriness
   (B) High resistance to spalling
   (C) High strength and density
   (D) All (A), (B) and (C)
   Answer: Option A

25. Which of the following has the lowest electrical resistivity?
   (A) Graphite
   (B) Fireclay
   (C) Alumina
   (D) Zircon
   Answer: Option A

26. Spalling resistance of a refractory cannot be increased by
   (A) Increasing its porosity
   (B) Using a coarser grog during its manufacture
   (C) Decreasing its thermal co-efficient of expansion
   (D) Making it denser
   Answer: Option D

27. Refractory castables are used for
   (A) Producing monolithic linings
   (B) Patch work
   (C) Minimising the number of joints in the structure
   (D) All (A), (B) and (C)
   Answer: Option D

28. High refractoriness of refractory bricks means, that it has a
   (A) High spalling resistance
   (B) Low spalling resistance
   (C) High resistance to fusion
   (D) Low porosity
   Answer: Option C

29. Silicon carbide refractories have very low
   (A) Refractoriness (< 1700°C)
   (B) Thermal conductivity
   (C) Resistance to thermal shock
   (D) None of these
   Answer: Option D

30. To resist spalling tendency, a refractory should have
   (A) Greater diffusivity
   (B) Low specific heat
   (C) Low thermal co-efficient of expansion
   (D) All (A), (B) and (C)
   Answer: Option D

31. Because of its very high refractoriness of the order of __________ °C, silicon carbide refractories are used in zinc smelting furnace, muffle furnace and for supporting the wares in tunnel kilns.
   (A) 1800
   (B) 2200
   (C) 2400
   (D) 2700
   Answer: Option D

32. Cermets are
   (A) Composite material containing both ceramic & metallic constituents
Having high strength & resistance to high temperature
(C) Used in space vehicles, missiles & nuclear energy plants
(D) All (A), (B) and (C)
Answer: Option D

33. Carbon refractories are exclusively used in the
(A) Hearth of blast furnace
(B) Walls of coke oven
(C) Regenerators of coke oven
(D) Side wall of soaking pits
Answer: Option A

34. Dry mix hydraulic compositions of refractory aggregates with suitable bonding materials are called refractory
(A) Mortars
(B) Cements
(C) Castables
(D) None of these
Answer: Option C

35. Which is the most stable crystalline form of silica at room temperature?
(A) Quartz
(B) Cristobalite
(C) Tridymite
(D) None of these
Answer: Option A

36. Hot face insulating linings of high purity alumina fused mullite are used, where
(A) Very high temperatures are involved
(B) Highly reducing conditions are involved
(C) Presence of iron or silica is harmful
(D) All (A), (B) and (C)
Answer: Option D

37. Which of the following bricks has the most close values of RUL and PCE?
(A) Silica bricks
(B) Fireclay bricks
(C) High alumina bricks
(D) Tar dolomite bricks
Answer: Option A

38. Periclase refractory contains mainly
(A) CaO
(B) MgO
(C) Al₂O₃
(D) SiO₂
Answer: Option B

39. Roof of a basic open hearth furnace is lined with __________ bricks.
(A) Silica
(B) Fireclay
(C) Dolomite
(D) Magnesite
Answer: Option A

40. Silica bricks have low spalling resistance below 600°C, due to its
(A) Very high thermal conductivity
(B) High co-efficient of expansion upto this temperature
(C) High thermal diffusivity
(D) Low refractoriness
Answer: Option B

41. Chrome magnesite bricks are used in the
(A) Side walls of soaking pits and arc furnaces
(B) Copper melting furnaces & converters
42. Magnesite refractories have low resistance to
   (A) Attack by basic slag
   (B) Abrasion
   (C) Disintegration on sudden change of temperature
   (D) Both (B) and (C)
   Answer: Option D

43. Refractory materials are never used in the construction of
   (A) Segar cones
   (B) Orton cones
   (C) Pressure vessels
   (D) Ovens & retorts
   Answer: Option C

44. Which is a basic refractory?
   (A) Fireclay
   (B) Silica
   (C) Chrome magnesite
   (D) None of these
   Answer: Option C

45. Graphite or carbon refractories
   (A) Exhibit wetting characteristics
   (B) Should be used in neutral or reducing atmosphere
   (C) Exhibit high shrinkage on thermal treatment
   (D) Are not resistant to corrosion by slag
   Answer: Option B

46. Tar dolomite bricks are used in the
   (A) Basic Bessemer converter
   (B) Basic open hearth furnace
   (C) Electric furnaces
   (D) All (A), (B) and (C)
   Answer: Option D

47. Zirconia refractory
   (A) Does not react with basic slags
   (B) Is produced from baddeleyite
   (C) Cannot be used as an insulator
   (D) Has poor electrical conductivity at high temperature
   Answer: Option B

48. Cold crushing strength of fireclay bricks is about __________ kgf/cm$^2$.
   (A) 50-100
   (B) 100-150
   (C) 200-400
   (D) 500-1000
   Answer: Option C

49. Carbon refractories have very high
   (A) Wetting characteristics
   (B) Refractoriness
   (C) Thermal conductivity
   (D) Both (B) and (C)
   Answer: Option D

50. Sillimanite ($\text{Al}_2\text{O}_3\cdot\text{SiO}_2$) refractory, which is a neutral refractory, is not used in
   (A) Pottery furnace
   (B) Glass melting furnace
   (C) Crucibles
   (D) Gas retorts
51. An ideal refractory should have high
   (A) Spalling rate
   (B) Fusion point
   (C) Shrinkage ability
   (D) None of these
   Answer: Option B

52. Pick out the wrong statement.
   (A) Electrical conductivity of refractory is not important, when these are to be used in electrical furnaces
   (B) Graphite and metals are the good electrical conductor among the refractories and others are all electrical insulators
   (C) Refractories used for lining electrical furnaces should ordinarily have very low electrical conductivity
   (D) Electrical conductivity of porous refractory material is low
   Answer: Option A

53. Fusion point of an acidic refractory material is
   (A) Increased by the addition of basic oxides
   (B) Reduced by the addition of basic oxides
   (C) Not affected by the addition of basic oxides
   (D) Always more than 2500°C
   Answer: Option B

54. Rate of slag attack on refractories increases with rise in temperature due to the
   (A) Decreased viscosity of slag
   (B) Increased thermal conductivity of brick
   (C) Oxidising condition in the furnace
   (D) None of these
   Answer: Option A

55. Segar cones are used for the determination of __________ of refractories.
   (A) Softening temperature
   (B) Spalling resistance
   (C) Electrical conductivity
   (D) Resistance to slag attack
   Answer: Option A

56. Tar bonded dolomite bricks
   (A) Are stored under controlled temperature & humidity to avoid hydration
   (B) Are used in outer lining of L.D. converters
   (C) Have poorer hydration resistance than pitch bonded bricks
   (D) All (A), (B) and (C)
   Answer: Option D

57. Porosity is induced in insulating refractories by adding
   (A) Powdered naphthalene
   (B) Ammonium chloride/sulphate
   (C) Calcium phosphate
   (D) All (A), (B) and (C)
   Answer: Option D

58. Which furnace consumes maximum refractory annually in an integrated steel plant?
   (A) Soaking pit
   (B) Blast furnace
   (C) L.D. converter
   (D) Coke ovens
   Answer: Option C

59. Machine moulding of dry mixture of refractories requires a pressure of the order of __________ kg/cm².
   (A) 10
   (B) 100
60. Which of the following bricks should not be used, if the furnace is to be used intermittently?
   (A) Firebricks
   (B) Silica bricks
   (C) Silicon carbide bricks
   (D) Sillimanite
   Answer: Option B

61. Carbon bricks are not used in the lining of the
   (A) Combustion chamber of blast furnace stoves
   (B) Electric furnaces
   (C) Highly chemical resistant equipments
   (D) Blast furnace hearth
   Answer: Option A

62. Refractoriness under load (RUL) is the most important property for the refractory bricks
   (A) At the hearth bottom of the furnace on which stock is placed
   (B) Used for furnace insulation
   (C) Used in the roof of the furnace
   (D) None of these
   Answer: Option A

63. Grog addition in fireclay during brick manufacture is done to
   (A) Reduce its shrinkage on heating
   (B) Impart greater spalling resistance
   (C) Enhance the strength of fired refractories
   (D) All (A), (B) and (C)
   Answer: Option D

64. Pick out the wrong statement.
   (A) Sand & coke is the main raw material for the manufacture of silicon carbide
   (B) Carbon refractories cannot be used in the furnaces operating under reducing conditions
   (C) Mullite can be obtained by the heating of alusite, kyanite or sillimanite
   (D) Silica occurs in nature in all cellular, amorphous or crystalline form
   Answer: Option B

65. Which of the following does not occur during firing/burning of refractories?
   (A) Removal of water of hydration
   (B) Vitrification
   (C) Decrease in crushing strength
   (D) Development of stable mineral form
   Answer: Option C

66. Ganister is a source of the
   (A) Silica
   (B) Periclase
   (C) Lime
   (D) None of these
   Answer: Option A

67. Conversion of silica mineral to Cristobalite is accompanied by reduction in its
   (A) Volume
   (B) Specific gravity
   (C) Both (A) & (B)
   (D) Neither (A) nor (B)
   Answer: Option B

68. Which is required in an insulating refractory?
   (A) High thermal conductivity
   (B) Low porosity
   (C) Both (A) and (B)
   (D) Neither (A) nor (B)
69. Magnesite chrome bricks are used in the
   (A) Roof lining of basic open hearth & other basic furnaces
   (B) Reheating furnaces
   (C) Soaking pits
   (D) All (A), (B) and (C)
   Answer: Option D

70. Sillimanite is a _______ refractory.
   (A) Basic
   (B) Neutral
   (C) High alumina
   (D) Insulating
   Answer: Option C

71. Silica bricks are attacked by basic slags at high temperature. Which of the following is not
    used solely as a binding material?
   (A) Aluminium phosphate
   (B) Water
   (C) Lime
   (D) Plaster of Paris
   Answer: Option B

72. Carbon refractories
   (A) Do not burn/oxidise, when exposed to air on heating
   (B) Are not attacked by slags, as they are not wetted by melts
   (C) Do not resist temperature fluctuations
   (D) Have extremely low thermal & electrical conductivities
   Answer: Option B

73. Periclase is
   (A) Crystalline form of MgO
   (B) MgCO₃
   (C) ZrSO₄
   (D) Amorphous magnesite
   Answer: Option A

74. Refractoriness under load (RUL) of fireclay bricks (under a load of 2 kg/cm²) is ________°C.
   (A) 500
   (B) 1000
   (C) >1350
   (D) >2000
   Answer: Option C

75. RUL of refractories depends on the
   (A) Chemical composition
   (B) Physical structure
   (C) Presence of impurities like iron & alkali
   (D) All (A), (B) and (C)
   Answer: Option D

76. Natural silica
   (A) Mainly contains quartz
   (B) Is not stable at high temperature
   (C) Transforms to other allotropic forms i.e. Tridymite and Cristobalite involving very high
      volume changes
   (D) All (A), (B) and (C)
   Answer: Option D

77. Which one contains maximum percentage of Al₂O₃?
   (A) Firebrick
   (B) Sillimanite
   (C) Magnesite
78. **Spalling tendency of refractories is reduced by increasing its**
   (A) Porosity
   (B) Specific gravity
   (C) Thermal conductivity
   (D) Strength
   Answer: Option A

79. **Which is not a basic refractory?**
   (A) Chrome magnesite
   (B) Magnesite
   (C) Dolomite
   (D) Silicon carbide
   Answer: Option D

80. **Which is not a high alumina refractory?**
   (A) Mullite
   (B) Corundum
   (C) Bauxite
   (D) Dolomite
   Answer: Option D

81. **Silica refractories**
   (A) crack when subjected to sudden change of temperature
   (B) Cannot be used in the dome of hot blast stoves
   (C) Have lower thermal conductivity than fireclay bricks
   (D) All (A), (B) and (C)
   Answer: Option A

82. **Which brick undergoes maximum shrinkage on drying?**
   (A) Tar bonded dolomite bricks
   (B) Fireclay bricks
   (C) Magnesite bricks
   (D) Chromite bricks
   Answer: Option B

83. **Firing of refractory brick is done to**
   (A) Dehydrate the dried refractory
   (B) Develop stable mineral forms in them
   (C) Form ceramic bonds necessary for development of high crushing strength in the finished product
   (D) All (A), (B) and (C)
   Answer: Option D

84. **10 to 30% magnesite is added to Chromite to produce chrome-magnesite refractories. Magnesite addition is mainly done to improve the _________ of Chromite.**
   (A) Spalling resistance
   (B) Refractoriness
   (C) Crushing strength
   (D) Resistance to slag
   Answer: Option A

85. **Ferromagnetic ceramic material is not used in the**
   (A) Thermal insulation
   (B) Transformers
   (C) Magnetic switches
   (D) Television sets
   Answer: Option A

86. **Furnace atmosphere for softening temperature determination of refractories (in which Seger Cones are placed) should be**
   (A) Oxidising
   (B) Neutral
87. Which one expands on heating?
   (A) Silica bricks
   (B) Fireclay bricks
   (C) Both (A) & (B)
   (D) Neither (A) nor (B)
   Answer: Option A

88. Ramming masses are used for
   (A) Obtaining monolithic working faces
   (B) Repairing construction of various furnace parts
   (C) Both (A) & (B)
   (D) Neither (A) nor (B)
   Answer: Option C

89. __________ nozzles are used in continuous casting of steel,
   (A) Zircon
   (B) Thoria
   (C) Carborundum
   (D) Beryllia
   Answer: Option A

90. Pyrometric cone equivalent (PCE) of a refractory is the measure of its
   (A) Spalling resistance
   (B) Fusion point
   (C) Resistance to slag penetration
   (D) Resistance to carbon monoxide attack
   Answer: Option B

91. Chromite refractories
   (A) Are bonded with lime and clay
   (B) (Free from silica) have better thermal fatigue resistance than silica and magnesite refractories.
   (C) Are resistant to basic slag
   (D) All (A), (B) and (C)
   Answer: Option D

92. Addition of grog in fireclay brick during its manufacture is advantageous, because it results in
   (A) Less shrinkage in heating, decreased apparent porosity & increased specific gravity
   (B) High strength & thermal spalling resistance
   (C) Less addition of water to get a workable plasticity & lesser time required for drying the raw refractories and hence increased rate of production
   (D) All (A), (B) and (C)
   Answer: Option D

93. Zircon refractories have
   (A) Low co-efficient of expansion
   (B) High RUL (1600°C) and refractoriness (> 2000°C)
   (C) High spalling resistance
   (D) All (A), (B) and (C)
   Answer: Option D

94. Use of higher percentage of lime for bonding silica bricks, reduces their
   (A) Strength
   (B) Abrasion resistance
   (C) Both (A) & (B)
   (D) Neither (A) nor (B)
   Answer: Option C

95. Cermets are combination of ceramic and metallic materials due to which they have high strength & resistance to high temperature. Cermets are used in the
   (A) Hearth of the blast furnace
96. **Magnesite chrome refractories**
   (A) Have better spalling resistance than chrome magnesite refractories
   (B) Have very low thermal co-efficient of expansion
   (C) Are not at all resistant to the corrosive action of iron oxide
   (D) Have very low (50 kg/cm²) cold crushing strength (C.C.S.), and cannot be used in metal case form
   Answer: Option A

97. *Super refractories* are made from pure
   (A) Carbides
   (B) Oxides
   (C) Borides
   (D) Nitrides
   Answer: Option B

98. Which is the stable form of silica upto 1470°C?
   (A) Quartz
   (B) Cristobalite
   (C) Tridymite
   (D) None of these
   Answer: Option C

99. Skull is not formed on the carbon blocks in the hearth of a blast furnace, when it becomes cold, because of its
   (A) Non-wetting characteristic
   (B) High thermal conductivity
   (C) High crushing strength
   (D) None of these
   Answer: Option A

100. Thermal spalling mainly occurs during _________ of furnaces.
    (A) Cooling down
    (B) Warming up
    (C) Both (A) & (B)
    (D) Neither (A) nor (B)
    Answer: Option C

101. Maximum safe working temperature for fireclay bricks is about _________ °C.
    (A) 1150
    (B) 1300
    (C) 1450
    (D) 1550
    Answer: Option D

102. High alumina refractories are used in the
    (A) Dome of blast furnace stoves
    (B) Electric arc furnace roof
    (C) Glass melting furnaces
    (D) All (A), (B) and (C)
    Answer: Option D

103. Which is the stable form of silica between 1470°C and the melting point 1713°C?
    (A) Cristobalite
    (B) Tridymite
    (C) Quartz
    (D) None of these
    Answer: Option A

104. _________ is not a single oxide-refractory.
    (A) Zirconia
105. **Cold crushing strength of a refractory does not depend upon its**
   (A) Shape  
   (B) Composition  
   (C) Firing temperature  
   (D) Texture  
   Answer: Option A

106. **Chrome magnesite brick is not used for lining the**
   (A) Hearth of soaking pits  
   (B) Bottom hearth of reheating furnace  
   (C) Coke oven regenerator  
   (D) Burning zone of limestone rotary kilns  
   Answer: Option A

107. **Thoria**
   (A) Has high fusion temperature (> 3000°C) but poor resistance to thermal shock  
   (B) Has high resistance to basic slags  
   (C) Which is expensive & radioactive, is used in crucibles for melting high purity metals  
   (D) All (A), (B) and (C)  
   Answer: Option D

108. **Most Cermets, which normally have high thermal conductivity and high thermal shock resistance, comprises of ceramic & metallic components of _________ percent respectively.**
   (A) 80 and 20  
   (B) 20 and 80  
   (C) 50 and 50  
   (D) 60 and 40  
   Answer: Option A

109. **Chromite refractories are**
   (A) Acidic refractory  
   (B) Neutral refractory  
   (C) Basic refractory  
   (D) Fired at a temperature of 600°C only  
   Answer: Option B

110. **_________ of carbon blocks in the hearth of blast furnace helps in avoiding skull formation, when it becomes cold.**
   (A) High thermal conductivity  
   (B) Low porosity  
   (C) Non-wetting characteristics  
   (D) High density  
   Answer: Option C

111. **Vacuum steel degassing units are lined with**
   (A) Silica bricks  
   (B) Low duty firebricks  
   (C) High alumina bricks  
   (D) Graphite blocks  
   Answer: Option C

112. **Rotary kilns meant for calcination of limestone are lined with chrome magnesite in _________ zone.**
   (A) Preheating  
   (B) Cooling  
   (C) Burning  
   (D) All the above  
   Answer: Option C

113. With increasing alumina content, the fusion point of high alumina refractories
114. **Semi-silica bricks compared to silica bricks have**
(A) Less fusion point
(B) Better spalling resistance
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option C

115. **Walls, roofs & combustion chambers of annealing furnaces are made of _________ bricks.**
(A) High duty fireclay
(B) Silica
(C) Mullite
(D) Carborundum
Answer: Option A

116. **Which of the following impurities reduces the refractoriness of magnesite bricks?**
(A) Al₂O₃
(B) CaO
(C) SiO₂
(D) All (A), (B) & (C)
Answer: Option D

117. **Cold crushing strength of ordinary fireclay brick is about 950 kg/cm². On exposure to a temperature of about 1500°C, its crushing strength may come down to as low as _________ kg/cm².**
(A) 450
(B) 250
(C) 150
(D) 65
Answer: Option D

118. **SiO₂ percentage in firebrick is about**
(A) 35-40
(B) 55-60
(C) 80-85
(D) > 94
Answer: Option B

119. **Thoria is an expensive refractory material and is radioactive in nature. Thorium oxide is used in the manufacture of**
(A) Segar cones
(B) Muffles for muffle furnaces
(C) Insulating bricks
(D) Crucibles used for melting of high purity metals
Answer: Option D

120. **Pick out the wrong statement.**
(A) A ceramic material which becomes fluid upon heating and can be moulded in liquid/viscous state is termed a glass
(B) Ceramic materials do not undergo vitrification on heating
(C) Ceramic materials are brittle in nature
(D) Non-oxide ceramic materials generally act as a semi-conductor
Answer: Option B

121. **PCE value (Segar cone) of Superduty refractories is more than 33, which is equivalent to a temperature of _________ °C.**
(A) 1520
(B) 1630
(C) 1670
(D) 1730
Answer: Option A
122. 'Spinel', a refractory mineral is chemically represented as
   (A) $\text{MgAl}_2\text{O}_4$
   (B) $\text{MgAl}_2\text{O}_3$
   (C) $\text{Mg}_2\text{SO}_4$
   (D) $\text{MgAl}_2\text{O}_3\cdot 2\text{H}_2\text{O}$
   Answer: Option A

123. Spray test determines the _________ of refractories.
   (A) Resistance to slag penetration
   (B) Resistance to CO attack
   (C) RUL
   (D) Permanent linear change
   Answer: Option A

124. With increase in the density of silica refractories, its
   (A) Resistance to slag attack increases
   (B) Spalling resistance reduces
   (C) Both (A) and (B)
   (D) Neither (A) nor (B)
   Answer: Option C

125. Fireclay refractories have
   (A) Low co-efficient of thermal expansion
   (B) Poor thermal spalling resistance
   (C) Tendency to expand unduly high during firing
   (D) Very high cost
   Answer: Option A

126. Mixing of ground refractory material and water is done in a _________ mill.
   (A) Pug
   (B) Ball
   (C) Tube
   (D) Rod
   Answer: Option A

127. Dolomite bricks have good resistance to attack by
   (A) Molten steel
   (B) Iron oxide
   (C) Lime slag
   (D) None of these
   Answer: Option A

128. Silicon carbide refractories are used in the
   (A) Muffle furnace
   (B) Zinc smelting furnace
   (C) Ceramic recuperators
   (D) All (A), (B) and (C)
   Answer: Option D

129. Zirconia refractories are not used in
   (A) Making sheaths for thermocouple
   (B) Lining high temperature ceramic kilns
   (C) Furnaces subjected to fluctuating temperature
   (D) High frequency induction furnaces in the form of inductors
   Answer: Option C

130. Firing temperature of magnesite bricks is about __________ °C.
   (A) 800-1000
   (B) 1000-1200
   (C) 1600-1800
   (D) 2400-2600
   Answer: Option C
131. The highest melting pure oxide (m.p. > 3000°C) is
   (A) Thoria
   (B) Alumina
   (C) Beryllia
   (D) Zirconia
   Answer: Option A

132. Which of the following is not an acidic refractory?
   (A) Silica bricks
   (B) Fireclay bricks
   (C) Bauxite bricks
   (D) Magnesia bricks
   Answer: Option D

133. The largest consumer of refractories is the ________ industry.
   (A) Cement
   (B) Metallurgical
   (C) Fertiliser
   (D) Power
   Answer: Option B

134. Grog
   (A) Contains both alumina and silica
   (B) Is crushed firebrick
   (C) Is a non-plastic material
   (D) All (A), (B) and (C)
   Answer: Option D

135. Crushing strength of a refractory
   (A) Increases with rise in service temperature
   (B) Decreases with rise in service temperature
   (C) Is unaffected with change in service temperature
   (D) Decreases with increase in porosity
   Answer: Option B

136. Except ________, all other refractories are bad conductors of electricity (i.e, have low electrical conductivity).
   (A) Fireclay
   (B) Carborundum
   (C) Graphite
   (D) Chromite
   Answer: Option C

137. Colour of fireclay bricks is
   (A) Light buff to reddish buff
   (B) Yellow
   (C) Black
   (D) None of these
   Answer: Option A

138. Refractoriness of a typical silica brick corresponds to Segar cone number, '32', which is equivalent to a temperature of ________ °C.
   (A) 1380
   (B) 1520
   (C) 1710
   (D) 1915
   Answer: Option C

139. Slide gates in teeming ladde used for steel pouring in ingot moulds is lined with ________ bricks.
   (A) Bakelite impregnated or fused periclase
   (B) Silica
   (C) Semi-silica
   (D) Fireclay
   Answer: Option A
140. With increase in the alumina content in firebricks, its fusion point (refractoriness) 
   (A) Decreases linearly 
   (B) Remains unchanged 
   (C) Increases 
   (D) Decreases 
   Answer: Option C

141. Highest melting (m.p = 3070°C) oxide refractory is 
   (A) Alumina 
   (B) Thoria 
   (C) Zirconia 
   (D) Magnesia 
   Answer: Option B

142. Insulating refractories should have 
   (A) High porosity 
   (B) Low thermal conductivity 
   (C) Both (A) and (B) 
   (D) Neither (A) not (B) 
   Answer: Option B

143. Dilatometer is used for the determination of _________ of refractories. 
   (A) Modulus of rupture 
   (B) Permanent linear change 
   (C) Resistance to CO attack 
   (D) RUL 
   Answer: Option B

144. Which is the stable form of silica below 870°C? 
   (A) Tridymite 
   (B) Cristobalite 
   (C) Quartz 
   (D) None of these 
   Answer: Option C

145. Refractoriness under loads (RUL) is quite close to the fusion temperature (PCE) for 
   _________ bricks. 
   (A) Fireclay 
   (B) Silica 
   (C) Dolomite 
   (D) Very low alumina 
   Answer: Option B

146. Which of the following is not a neutral refractory? 
   (A) Silicon carbide 
   (B) Magnesite 
   (C) Chromite 
   (D) Graphite 
   Answer: Option B

147. The maximum linear expansion of silica bricks during firing is about _________ percent. 
   (A) 0.5 
   (B) 1 
   (C) 2 
   (D) 3.5 
   Answer: Option D

148. Firing temperature is minimum (1250-1400 °C) for _________ bricks. 
   (A) Fireclay 
   (B) Direct bonded basic 
   (C) Silica 
   (D) Magnesite 
   Answer: Option A
149. Hot blast main (carrying air at 1000°C) in blast furnace are lined with ________ bricks.
(A) Silica
(B) Fireclay
(C) Magnesite
(D) Zirconia
Answer: Option B

150. Electrical resistor bars are made of
(A) Silicon carbide
(B) Alumina
(C) Zirconia
(D) Graphite
Answer: Option A

151. With decrease in porosity, the ________ of the refractories decreases.
(A) Strength
(B) Thermal conductivity
(C) Spalling resistance
(D) None of these
Answer: Option C

152. Refractories are dried in the
(A) Rotary kilns
(B) Tunnel kilns
(C) Sun
(D) None of these
Answer: Option B

153. ________ bricks should not be used in oxidising atmosphere.
(A) Tar dolomite
(B) Carbon
(C) Silica
(D) Fireclay
Answer: Option B

154. Which refractory must have controlled atmosphere (temperature and humidity) for its safe storage?
(A) Tar bonded dolomite bricks
(B) Fireclay bricks
(C) Mullite bricks
(D) Magnesite bricks
Answer: Option A

155. Magnesite bricks have poor resistance to attack by ________ slag.
(A) Lime
(B) Basic
(C) Acid
(D) None of these
Answer: Option C

156. An indication of degree of firing in silica brick is its
(A) Specific gravity
(B) Fusion point
(C) RUL
(D) None of these
Answer: Option A

157. Which is not a natural insulating material?
(A) Diatomaceous earth/kieselgur
(B) Asbestos
(C) Vermiculite
(D) None of these
Answer: Option D

158. Which is not an alumino-silicate refractory?
159. Which of the following is not a high alumina refractory material?
   (A) Kyanite
   (B) Sillimanite
   (C) Diaspore
   (D) Periclase
   Answer: Option D

160. Resistance to slag attack of a refractory
   (A) Depends on the nature of slag & refractory
   (B) Decreases at higher temperature
   (C) Decreases, if defective joints & cracks exist in the refractory
   (D) All (A), (B) and (C)
   Answer: Option D

161. _________ is the measure of the strength of refractory under the combined effect of temperature & load.
   (A) Porosity
   (B) RUL
   (C) Specific gravity
   (D) Thermal conductivity
   Answer: Option B

162. Fireclay bricks are never used in the
   (A) Beehive oven
   (B) Coke oven walls
   (C) Zinc roaster
   (D) Lead blast furnace
   Answer: Option B

163. Which one contains minimum percentage of SiO₂?
   (A) Firebrick
   (B) Sillimanite
   (C) Semi-silica
   (D) Aluminous firebrick
   Answer: Option B

164. Magnesite bricks are used in those parts of furnaces, which are
   (A) Subjected to temperature fluctuation
   (B) Required to resist corrosive basic slag
   (C) Subjected to high load
   (D) None of these
   Answer: Option B

165. Pure bauxite is the best raw material for the manufacture of high alumina refractories, in which maximum alumina content can be as high as _________ percent.
   (A) 55
   (B) 70
   (C) 80
   (D) 90
   Answer: Option D

166. High thermal conductivity of a refractory material is not important, when it is to be used in the
   (A) Coke oven regenerators
   (B) Muffle furnace
   (C) Blast furnace
   (D) Recuperators
   Answer: Option C
167. Mullite is chemically represented by
   (A) $\text{Al}_2\text{O}_3$, $2\text{SiO}_2$
   (B) $3\text{Al}_2\text{O}_3$, $2\text{SiO}_2$
   (C) $\text{Al}_2\text{O}_3$, $\text{SiO}_2$
   (D) $2\text{Al}_2\text{O}_3$, $3\text{SiO}_2$
   Answer: Option B

168. Pyrometric cone equivalent (PCE) value (Segar cone) of 'Superduty refractories' is more than 33 which corresponds to a temperature of __________ °C.
   (A) 1520
   (B) 1630
   (C) 1670
   (D) 1730
   Answer: Option D

169. High alumina refractory compared to fireclay bricks have
   (A) Less load bearing capacity
   (B) Less resistance to slag attack
   (C) Low refractoriness
   (D) High resistance to thermal shock and creep
   Answer: Option D

170. Basic bricks are not made of
   (A) Fireclay
   (B) Magnesite
   (C) Forsterite
   (D) Chromite
   Answer: Option A

171. Porosity of fireclay refractories is __________ percent.
   (A) 5-10
   (B) 10-25
   (C) 25-35
   (D) 35-50
   Answer: Option B

172. A steel member used in the furnace construction to take the thrust of the brickwork is called
   (A) Buckstay
   (B) Breast wall
   (C) Armouring
   (D) Baffle
   Answer: Option A

173. Fusion temperature of pure silica ($\text{SiO}_2$) is __________ °C.
   (A) 1350
   (B) 1715
   (C) 2570
   (D) 2800
   Answer: Option B

174. Hollow refractory bricks are made by
   (A) Slip casting
   (B) Hand moulding
   (C) pressing/machine moulding
   (D) Extrusion
   Answer: Option A

175. Bottom of basic open hearth furnace are constructed of
   (A) Dead burnt magnesite ramming mass
   (B) Porous fireclay bricks
   (C) Semi-silica bricks
   (D) Silicon carbide bricks
   Answer: Option A
176. Capacity of a refractory brick to withstand-sudden changes in temperature is denoted by the property called
   (A) Spalling resistance
   (B) Refractoriness
   (C) Refractoriness under load (RUL)
   (D) None of these
   Answer: Option A

177. Addition of zircon to silica refractory brick improves its
   (A) Crushing strength
   (B) Resistance to slag attack
   (C) Both (A) and (B)
   (D) Neither (A) nor (B)
   Answer: Option B

178. Refractoriness/fusion points of 'Superduty' refractories is ________ °C.
   (A) 1520-1630
   (B) 1630-1670
   (C) > 1730
   (D) > 2000
   Answer: Option C

179. Refractories subjected to alternate cycles of heating & cooling are liable to loose their resistance to
   (A) Thermal spalling
   (B) Slag attack
   (C) Fusion under load
   (D) CO attack
   Answer: Option A

180. With increase in the porosity, thermal spalling resistance of fireclay brick
   (A) Increases
   (B) Decreases
   (C) Remain same
   (D) May increase or decrease
   Answer: Option A

181. Refractory bricks with lower permeability is produced by using
   (A) Higher firing temperature
   (B) Higher moulding pressure
   (C) Finer grog size
   (D) All (A), (B) and (C)
   Answer: Option D

182. Quartz is
   (A) Stable form of silica upto 870°C
   (B) Converted to Tridymite on firing between 870 to 1470°C
   (C) Transformed to Cristobalite on heating above 1470°C
   (D) All (A), (B) and (C)
   Answer: Option D

183. Pure oxide refractories are generally monocrystalline in nature and are self bonded
     bricks are generally used as moderator in nuclear reactors.
     (A) Beryllia
     (B) Carborundum
     (C) Corundum
     (D) Thoria
     Answer: Option A

184. Beryllia (which is used in making crucibles for melting uranium & thorium) is superior to alumina in all respects for high temperature (> 1900°C ) use, except
   (A) Cost
   (B) Electrical conductivity
   (C) Thermal conductivity
   (D) Fusion point
185. Ceramic recuperators used for waste heat recovery from high temperature flue gas going out of the furnace is made of
(A) Fireclay
(B) Silicon carbide
(C) Corundum
(D) Siliceous fireclay
Answer: Option B

186. Water content in ground refractory material to be shaped into bricks by hand moulding is about ________ percent.
(A) 5
(B) 20
(C) 40
(D) 55
Answer: Option B

187. Refractory bricks having lower porosity have
(A) High insulating properties
(B) Low heat capacity
(C) Low thermal conductivity
(D) Greater strength
Answer: Option D

188. Maximum alumina content in high alumina refractory can be as high as ________ percent.
(A) 30
(B) 50
(C) 70
(D) 90
Answer: Option D

189. Silica bricks are never used for lining the
(A) Beehive coke ovens
(B) By-product coke ovens
(C) Dome of blast furnace stoves
(D) Roof of open hearth furnace
Answer: Option A

190. Panel test determines the ________ of refractories.
(A) Fusion point
(B) Spalling resistance
(C) Slag penetration resistance
(D) Refractoriness under load (RUL)
Answer: Option B

191. Fireclay refractories
(A) Are not resistant to the action of basic slags
(B) Combine with salts (e.g. chlorides sulphates etc.) & bases (e.g. lime, magnesia etc.) forming fusible aluminates silicates etc
(C) Shrink during firing
(D) All (A), (B) and (C)
Answer: Option D

192. Chemically, mullite refractories is
(A) 3Al₂O₃·2SiO₂
(B) Al₂O₃
(C) ZrSO₄
(D) ThO₂
Answer: Option A

193. Fireclay bricks is not used for lining the
(A) Cupola
(B) Gas producer
194. Presence of MgO in alumino-silicate refractories ________ its refractoriness.
   (A) Increases
   (B) Lowers
   (C) Does not affect
   (D) Either (A) or (B); depends on its quantity
   Answer: Option B

195. In panel test for spalling resistance, the average face temperature of panel assembly is maintained at ________ °C for 24 hours.
   (A) 700
   (B) 1000
   (C) 1600
   (D) 2000
   Answer: Option C

196. Hot metal runner in blast furnace are lined with ________ bricks.
   (A) Silica
   (B) Carborundum
   (C) Fireclay
   (D) Magnesite
   Answer: Option C

197. Which is an acidic refractory?
   (A) Magnesite
   (B) Dolomite
   (C) Fireclay
   (D) Chrome magnesite
   Answer: Option C

198. Fireclay bricks are not used in the
   (A) Beehive coke oven
   (B) By-product coke oven walls
   (C) Combustion chamber of B.F. stoves
   (D) Coke oven regenerators
   Answer: Option B

199. Which is a neutral refractory?
   (A) Graphite
   (B) Magnesite chrome
   (C) Silica
   (D) Magnesia
   Answer: Option A

200. High porosity refractory bricks have
   (A) Poor resistance to the penetration of molten slag, metal & flue gases
   (B) Poor heat conductivity & low strength
   (C) Better thermal spalling resistance
   (D) All (A), (B) and (C)
   Answer: Option D

201. Which is not an acidic refractory?
   (A) Silica
   (B) Fireclay
   (C) High alumina refractory
   (D) Carbon black
   Answer: Option D

202. Fireclay bricks are used in the
   (A) Coke ovens regenerator
   (B) Outer lining of L.D. converter
   (C) Hearth bottom of blast furnace
203. Magnesite refractories are generally not used in the
   (A) Electric furnace walls
   (B) Steel melting furnace
   (C) Open hearth furnace
   (D) Burning zone of cement kilns
   Answer: Option A

204. Fusion point of a basic refractory material is
   (A) Reduced by the addition of acid oxides
   (B) Increased by the addition of acid oxides
   (C) Not affected by the addition of acid oxides
   (D) Always less than 1000°C
   Answer: Option A

205. Thermal conductivity of refractory bricks
   (A) Increases with decrease in porosity
   (B) Decreases with decreases in porosity
   (C) Is independent of its porosity and is maximum for insulating bricks
   (D) Increases with the amount of air entrapped in pores
   Answer: Option A

206. Thermal diffusivity of a refractory brick is high, when its ________ is high.
   (A) Density
   (B) Specific heat
   (C) Thermal conductivity
   (D) None of these
   Answer: Option C

207. Which form of silica has the highest specific gravity?
   (A) Quartz
   (B) Cristobalite
   (C) Tridymite
   (D) All have the same specific gravity
   Answer: Option A

208. With increase in the alumina content, the refractoriness of high alumina refractories
   (A) Increases
   (B) Decreases
   (C) Remain same
   (D) May increase or decrease
   Answer: Option A

209. Pick out the wrong statement.
   (A) Refractories used in muffle furnace should have low thermal conductivity
   (B) The electrical resistivity of refractories drops rapidly with rise in temperature
   (C) For reducing spalling tendency, the refractory should be well fired and its porosity should be
       more
   (D) Refractoriness under load (RUL) of a refractory is always less than its refractoriness
   Answer: Option A

210. Test piece for determination of RUL of a refractory is heated in a/an
   (A) Oxidising atmosphere
   (B) Reducing atmosphere
   (C) Electric furnace
   (D) Neutral atmosphere
   Answer: Option C

211. Fireclay bricks are not used in the
   (A) Blast furnace
   (B) Hot blast stove
   (C) Cupola
   (D) Wall of coke oven
212. An insulating refractory brick should have high porosity and low thermal conductivity. Which of the following is not used for inducing porosity in the insulating refractory bricks during its manufacture?
   (A) Cork
   (B) Saw dust
   (C) Sand
   (D) Chemically prepared foam
   Answer: Option C

213. Permeability of bricks is a measure of the
   (A) Refractoriness
   (B) Melting point
   (C) Rate at which a fluid will pass through the pores
   (D) Expansion during heating
   Answer: Option C

214. Magnesite refractories are used for the construction of those furnaces, which are
   (A) Not required to resist the corrosive action of basic slag
   (B) Not subjected to fluctuation in temperature
   (C) Used for raising & maintaining high temperature
   (D) Both (B) and (C)
   Answer: Option D

215. Pick out the wrong statement.
   (A) Insulating refractories used in place of regular refractory bricks are usually called light weight refractories, and they have similar composition as heavy bricks
   (B) Graphite refractories are also called plumbago refractories
   (C) Superduty fireclay bricks correspond to a pyrometric cone equivalent of 26-28
   (D) Calcined magnesite is also called dead burnt magnesite
   Answer: Option C

216. Outer combustion chamber of blast furnace stove is lined with __________ bricks.
   (A) Fireclay
   (B) Silica
   (C) Chrome magnesite
   (D) Zirconia
   Answer: Option A

217. Carborundum used for making crucibles for melting non-ferrous metals is chemically
   (A) Silicon carbide
   (B) Silicon nitride
   (C) Crystalline magnesia
   (D) Zirconium sulphate
   Answer: Option A

218. Roof of a basic electric furnace is made of __________ bricks.
   (A) Superduty fireclay
   (B) Silica
   (C) Chromite
   (D) None of these
   Answer: Option B

219. Faster rate of drying of moulded refractories results in high __________ of refractories.
   (A) Green strength
   (B) Voids
   (C) Shrinkage
   (D) Both (B) and (C)
   Answer: Option D

220. Which property of refractories is the most important for top section of the blast furnace?
   (A) Resistance to abrasion
   (B) Resistance to slag penetration
   (C) Stability of volume at high temperature