14

Engineering Materials

14.1. Ductility of a material can be defined as
(*a*) ability to undergo large permanent deformations in compression
(*b*) ability to recover its original form
(*c*) ability to undergo large permanent deformations in tension
(*d*) all of the above
(*e*) none of the above.

14.2. Malleability of a material can be defined as
(*a*) ability to undergo large permanent deformations in compression
(*b*) ability to recover its original form
(*c*) ability to undergo large permanent deformations in tension
(*d*) all of the above
(*e*) none of the above.

14.3. In compression, a prism of brittle material will break
(*a*) by forming a bulge
(*b*) by shearing along oblique plane
(*c*) in direction perpendicular to application of load
(*d*) by crushing into thousands of pieces
(*e*) none of the above.

14.4. The ability of a material to resist softening at high temperature is known as
(*a*) creep (*b*) hot tempering
(*c*) hot hardness (*d*) fatigue
(*e*) superhardening.

14.5. Mild steel belongs to the following category
(*a*) low carbon steel
(*b*) medium carbon steel
(*c*) high carbon steel
(*d*) alloy steel
(*e*) special steel.

14.6. The ultimate tensile strength of low carbon steel by working at a high strain rate will
(*a*) decrease
(*b*) increase
(*c*) remain constant
(*d*) first increase and then decrease
(*e*) first decrease and then increase.

14.7. Slow plastic deformation of metals under a constant stress is known as
(*a*) creep
(*b*) fatigue
(*c*) endurance
(*d*) plastic deformation
(*e*) non-plastic deformation.

14.8. The ultimate tensile strength and yield strength of most of the metals, when temperature falls from 0 to −150°C will
(*a*) increase (*b*) decrease
(*c*) remain same
(*d*) first increase and then decrease
(*e*) show unpredictable behaviour.

14.9. The number of electrons in 1 cm^3 of metal would be of the order of
(*a*) 10^{10} (*b*) 10^{16}
(*c*) 10^{22} (*d*) 10^{40}
(*e*) 10^{52}

14.10. Stress relaxation is the phenomenon
(*a*) in which parts are not loaded
(*b*) in which stress remains constant on increasing load
(*c*) in which deformation tends to loosen the joint and produces a stress reduction

(*d*) stress reduces on increasing load
(*e*) none of the above.

14.11. The elastic stress strain behaviour of rubber is
(*a*) linear (*b*) non-linear
(*c*) plastic
(*d*) no fixed relationship
(*e*) unpredictable behaviour.

14.12. Isotropic materials are those which have the same
(*a*) elastic properties in all directions
(*b*) stresses induced in all directions
(*c*) thermal properties in all directions
(*d*) electric and magnetic properties in all directions
(*e*) density throughout.

14.13. Recrystallization temperature is one
(*a*) at which crystals first start forming from molten metal when it is cooled
(*b*) at which new spherical crystals first begin to form from the old deformed one when a strained metal is heated
(*c*) at which change of allotropic form takes place
(*d*) at which crystals grow bigger in size
(*e*) at which crystals are destroyed on heating.

14.14. Points of arrest for iron correspond to
(*a*) stages at which allotropic forms change
(*b*) stages at which further heating does not increase temperature for some time
(*c*) stages at which properties do not change with increase in temperature
(*d*) there is nothing like points of arrest
(*e*) none of the above.

14.15. Delta iron occurs at temperature of
(*a*) room temperature
(*b*) above melting point
(*c*) between 1400°C and 1539°C
(*c*) between 910°C and 1400°C
(*e*) none of the above.

14.16. A material is known as allotropic or polymorphic if it
(*a*) has a fixed structure under all conditions
(*b*) exists in several crystal forms at different temperatures
(*c*) responds to heat treatment
(*d*) has its atoms distributed in a random pattern
(*e*) none of the above.

14.17. Super conduction by metals is observed in the temperature range of
(*a*) below 10°K
(*b*) above 100°K
(*c*) around 0°C
(*d*) around 100°C
(*e*) above 1000°C.

14.18. Which of the following constituents of steels is softest and least strong
(*a*) austenite (*b*) pearlite
(*c*) ferrite (*d*) cementite
(*e*) bainite.

14.19. Which of the following represents the allotropic forms of iron
(*a*) alpha iron, beta iron and gamma iron
(*b*) alpha iron and beta iron
(*c*) body centred cubic α-iron and face centred cubic α-iron
(*d*) alpha iron, gamma iron and delta iron
(*e*) none of the above.

14.20. The following types of materials are usually the most ductile
(*a*) face-centred cubic lattice
(*b*) body-centred cubic lattice
(*c*) hexagonal close-packed lattice
(*d*) all of the above
(*e*) none of the above.

14.21. Pure iron is the structure of
(*a*) ferrite (*b*) pearlite
(*c*) anstenite
(*d*) ferrite and cementite
(*e*) ferrite and pearlite.

14.22. The temperature at which ferromagnetic alpha iron transforms to paramagnetic alpha iron is
(*a*) 770°C (*b*) 910°C
(*c*) 1050°C
(*d*) below recrystallisation temperature
(*e*) above recrystallization temperature.

14.23. Gamma iron exits at following temperature
(*a*) room temperature
(*b*) near melting point
(*c*) between 1400°C and 1539°C
(*c*) between 910°C and 1400°C
(*e*) none of the above.

14.24. Ferromagnetic alpha iron exists in temperature range of
(*a*) below 723°C (*b*) 770 - 910°C
(*c*) 910–1440°C (*d*) 1400–1539°C
(*e*) above 1539°C.

14.25. Paramagnetic alpha iron changes to gamma iron at
(*a*) 770°C (*b*) 910°C
(*c*) 1440°C (*d*) 1539°C
(*e*) none of the above.

14.26. A reversible change in the atomic structure of steel with corresponding change in the properties is known as
(*a*) molecular change
(*b*) physical change
(*c*) allotropic change
(*d*) solidus change
(*e*) atomic change.

14.27. The molecules in a solid move
(*a*) in a random manner
(*b*) in a haphazard way
(*c*) in circular motion
(*d*) back and forth like tiny pendulums
(*e*) do not move.

14.28. The crystal structure of gamma iron is
(*a*) body centred cubic
(*b*) face centred cubic
(*c*) hexagonal close packed
(*d*) cubic structure
(*e*) orthorhombic crystal.

14.29. The crystal of alpha iron is
(*a*) body centred cubic
(*b*) face centred cubic
(*c*) hexagonal close packed
(*d*) cubic structure
(*e*) orthorhombic crystal.

14.30. The metallic structure of mild steel is
(*a*) body centred cubic
(*b*) face centred cubic
(*c*) hexagonal close packed
(*d*) cubic structure
(*e*) orthorhombic crystal.

14.31. 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
(*e*) the points where major changes take place.

14.32. The percentage of carbon in pig iron varies from
(*a*) 0.1 to 1.2% (*b*) 1.5 to 2.5%
(*c*) 2.5 to 4% (*d*) 4 to 4.5%
(*e*) 4.5 to 6.3%.

14.33. The percentage of carbon in grey iron castings usually varies between
(*a*) 0.5 to 1% (*b*) 1 - 2%
(*c*) 2.5 to 4.5% (*d*) 5 - 7%
(*e*) 7–9%.

14.34. Pig iron is the name given to
(*a*) raw material for blast furnace
(*b*) product of blast furnace made by reduction of iron ore
(*c*) iron containing huge quantities of carbon
(*d*) iron in molten form in the ladles
(*e*) iron scrap.

14.35. The unique property of cast iron is its high
(*a*) malleability
(*b*) ductility
(*c*) surface finish
(*d*) damping characteristics
(*e*) hardness.

14.36. Cast iron is characterised by minimum of following %age of carbon
(*a*) 0.2% (*b*) 0.8%
(*c*) 1.3% (*d*) 2%
(*e*) 6.3%.

14.37. In grey cast iron, carbon is present in the form of
(*a*) cementite (*b*) free carbon
(*c*) flakes (*d*) spheroids
(*e*) nodular aggregates of graphite.

14.38. In nodular iron, graphite is in the form of
(*a*) cementite (*b*) free carbon
(*c*) flakes (*d*) spheroids
(*e*) nodular aggregates of graphite.

14.39. In malleable iron, carbon is present in the form of
(*a*) cementite (*b*) free carbon
(*c*) flakes (*d*) spheroids
(*e*) nodular aggregates of graphite.

14.40. Wrought iron is
(*a*) hard

(*b*) high in strength
(*c*) highly resistant to corrosion
(*d*) heat treated to change its properties
(*e*) least resistant to corrosion.

14.41. Sulphur in pig iron tends to make it
(*a*) hard (*b*) soft
(*c*) ductile (*d*) tough
(*e*) malleable.

14.42. Pick up wrong statement about wrought iron
(*a*) It contains carbon of the order of 0 to 0.25%
(*b*) It melts at 1535°C
(*c*) It is very soft and ductile
(*d*) It can be easily forge welded
(*e*) It is made by adding suitable percentage of carbon to molten iron and subjecting the product to repeated hammering and rolling.

14.43. Iron is
(*a*) paramagnetic
(*b*) ferromagnetic
(*c*) ferroelectric
(*d*) dielectric
(*e*) none of the above.

14.44. A reversible change in the atomic structure of the steel with a corresponding change in the properties is known as
(*a*) allotropic change
(*b*) recrystallisation
(*c*) heat treatment
(*d*) precipitation
(*e*) austempering.

14.45. Chilled cast iron has
(*a*) no graphite
(*b*) a very high percentage of graphite
(*c*) a low percentage of graphite
(*d*) graphite as its basic constituent of composition
(*e*) none of the above is true.

14.46. Cast iron has
(*a*) high tensile strength
(*b*) its elastic limit close to the ultimate breaking strength
(*c*) high ductility
(*d*) all of the above
(*e*) none of the above.

14.47. White cast iron contains carbon in the form of
(*a*) free carbon (*b*) graphite
(*c*) cementite (*d*) white carbon
(*e*) ferrite.

14.48. In mottled cast iron, carbon is available in
(*a*) free form (*b*) combined form
(*c*) nodular form (*d*) flat form
(*e*) partly in free and partly in combined state.

14.49. An important property of high silicon (12 - 18%) cast iron is the high
(*a*) tenacity (*b*) brittleness
(*c*) plasticity (*d*) corrosion resistance
(*e*) hardness.

14.50. An important property of malleable cast iron in comparison to grey cast iron is the high
(*a*) compressive strength
(*b*) ductility
(*c*) carbon content
(*d*) hardness
(*e*) surface finish.

14.51. Steel contains
(*a*) 80% or more iron
(*b*) 50% or more iron
(*c*) alloying elements like chromium, tungsten nickel and copper
(*d*) elements like phosphorus, sulphur and silicon in varying quantities
(*e*) high quantities of sulphur.

14.52. Carbon steel is
(*a*) made by adding carbon in steel
(*b*) refined from cast iron
(*c*) an alloy of iron and carbon with varying quantities of phosphorus and sulphur
(*d*) extensively used for making cutting tools
(*e*) extremely brittle.

14.53. Annealing of white cast iron results in production of
(*a*) malleable iron
(*b*) nodular iron
(*c*) spheroidal iron
(*d*) grey iron
(*e*) none of the above.

14.54. 'Killed steels' are those steels
(*a*) which are destroyed by burning
(*b*) which after their destruction are recycled to produce fresh steel

(c) which are deoxidised in the ladle with silicon and aluminium
(d) in which carbon is completely burnt
(e) which have poor properties due to improper manufacturing.

14.55. Hardness of steel depends on
(a) amount of carbon it contains
(b) the shape and distribution of the carbides in iron
(c) method of fabrication
(d) contents of alloying elements
(e) the quality of ore from which it is made.

14.56. Maximum percentage of carbon in ferrite is
(a) 0.025% (b) 0.06%
(c) 0.1% (d) 0.25%
(e) 0.8%.

14.57. Maximum percentage of carbon in austenite is
(a) 0.025% (b) 0.26%
(c) 0.8% (d) 1.25%
(e) 1.7%.

14.58. Corrosion resistance of steel is increased by addition of
(a) chromium and nickel
(b) sulphur, phosphorus, lead
(c) vanadium, aluminium
(d) tungsten, molybdenum, vanadium, chromium
(e) zinc.

14.59. In which of the following cases, consideration of creep is important
(a) flywheel of steam engine
(b) cast iron pipes
(c) cycle chains
(d) gas turbine blades
(e) piston I.C. engine.

14.60. The most effective inhibitor of grain growth, when added in small quantities is
(a) carbon (b) vanadium
(c) manganese (d) cobalt
(e) copper.

14.61. Depth of hardness of steel is increased by addition of
(a) nickel (b) chromium
(c) tungsten (d) vanadium
(e) all of the above.

14.62. Railway rails are normally made of
(a) mild steel (b) alloy steel
(c) high carbon (d) tungsten steel
(e) cast iron steel.

14.63. Pick up the wrong statement
(a) aluminium in steel results in excessive grain growth
(b) manganese in steel induces hardness
(c) nickel and chromium in steel help in raising the elastic limit and improve the resilience and ductility
(d) tungsten in steels improves magnetic properties and hardenability
(e) sulphur, phosphorous and lead improve machining properties of steel.

14.64. Pick up the wrong statement
Nickel and chromium in steel help in
(a) providing corrosion resistance
(b) improving machining properties
(c) providing high strength at elevated temperatures
(d) raising the elastic limit
(e) improving the resilience and ductility.

14.65. Machining properties of steel are improved by adding
(a) sulphur, lead, phosphorous
(b) silicon, aluminium, titanium
(c) vanadium, aluminium
(d) chromium, nickel
(e) lubricants.

14.66. Eutectoid steel contains following percentage of carbon
(a) 0.02% (b) 0.3%
(c) 0.63% (d) 0.8%
(e) 1.2%.

14.67. The basic constituents of Hastelloy are
(a) aluminium, copper etc.
(b) nickel, molybdenum etc.
(c) nickel, copper, etc.
(d) all of the above
(e) none of the above.

14.68. Basic constituents of Monel metal are
(a) nickel, copper
(b) nickel, molybdenum
(c) zinc, tin, lead
(d) nickel, lead and tin
(e) none of the above.

14.69. German silver is an alloy of
(a) silver and some impurities
(b) refined silver

(*c*) nickel, copper and zinc
(*d*) nickel and copper
(*e*) silver and gold.

14.70. Surveying tapes are made of a material having low coefficient of expansion and enough strength. The alloy used is
(*a*) silver metal (*b*) duralumin
(*c*) Hastelloy (*d*) monel metal
(*e*) invar.

14.71. A cold chisel is made of
(*a*) mild steel (*b*) cast iron
(*c*) H.S.S. (*d*) high carbon
(*e*) german silver.

14.72. An engineer's hammer is made of
(*a*) cast iron (*b*) forged steel
(*c*) mild steel (*d*) high carbon steel
(*e*) H.S.S.

14.73. Inconel is an alloy of
(*a*) nickel, chromium and iron
(*b*) nickel, copper (*c*) nickel, chromium
(*d*) nickel, zinc (*e*) nickel, lead.

14.74. By severely deforming a metal in a particular direction it becomes
(*a*) ductile (*b*) malleable
(*c*) homogeneous (*d*) isotropic
(*e*) anisotropic.

14.75. Solder is an alloy consisting of
(*a*) tin, antimony, copper
(*b*) tin and copper
(*c*) tin and lead
(*d*) lead and zinc
(*e*) lead and copper.

14.76. Cyaniding is the process of
(*a*) dipping steel in cyanide bath
(*b*) reacting steel surface with cyanide salts
(*c*) adding carbon and nitrogen by heat treatment of steel to increase its surface hardness
(*d*) obtaining cyanide salts
(*e*) making corrosion resistant steel.

14.77. Induction hardening is the process of
(*a*) hardening surface of workpiece to obtain hard and wear resistant surface
(*b*) heating and cooling rapidly
(*c*) increasing hardness throughout
(*d*) inducing hardness by continuous process
(*e*) hardening core.

14.78. The loss of strength in compression with simultaneous gain in strength in tension due to overloading is known as
(*a*) hysteresis
(*b*) creep
(*c*) visco elasticity
(*d*) Boeschinger effect
(*e*) inelasticity.

14.79. Process of austempering results in
(*a*) formation of bainite structure
(*b*) carburised structure
(*c*) martenistic structure
(*d*) lamellar layers of carbide distributed throughout the structure
(*e*) relieving of stresses throughout a component.

14.80. The surface hardness of the following order is achieved by nitriding operation
(*a*) 600 VPN
(*b*) 1500 VPN
(*c*) 1000 to 1100 VPN
(*d*) 250 VPN
(*e*) 2000 VPN.

14.81. Hardness of martensite is about
(*a*) RC 65 (*b*) RC 48
(*c*) RC 57 (*d*) RC 80
(*e*) RC 32.

14.82. Weld decay is the phenomenon found with
(*a*) cast iron
(*b*) mild steel
(*c*) non-ferrous materials
(*d*) wrought iron
(*e*) stainless steel.

14.83. Materials after cold working are subjected to following process to relieve stresses
(*a*) hot working (*b*) tempering
(*c*) normalising (*d*) annealing
(*e*) special heat treatment.

14.84. Hardness of upper bainite (acicular structure) is about
(*a*) RC 65 (*b*) RC 48
(*c*) RC 57 (*d*) RC 80
(*e*) RC 32.

14.85. Carbon in iron is an example of
(*a*) substitutional solution
(*b*) interstitial solid solution
(*c*) intermetallic compounds
(*d*) all of the above
(*e*) none of the above.

14.86. Brass (alloy of copper and zinc) is an example of
(*a*) substitutional solid solution
(*b*) interstitial solid solution
(*c*) intermetallic compounds
(*d*) all of the above
(*e*) none of the above.

14.87. Which is false statement about annealing. Annealing is done to
(*a*) relieve stresses
(*b*) harden steel slightly
(*c*) improve machining characteristic
(*d*) soften material
(*e*) permit further cold working.

14.88. Argentite is the principal ore or raw material for
(*a*) aluminium (*b*) tin
(*c*) zinc (*e*) lead
(*e*) silver.

14.89. Hardness of lower bainite (tempered martensite) is about
(*a*) RC 65 (*b*) RC 48
(*c*) RC 57 (*d*) RC 80
(*e*) RC 32.

14.90. Sphalerite is the principal ore or raw material for
(*a*) zinc (*b*) silver
(*c*) tin (*d*) magnesium
(*e*) copper.

14.91. Which is false statement about normalising. Normalising is done to
(*a*) refine grain structure
(*b*) reduce segregation in casting
(*c*) improve mechanical properties
(*d*) induce stresses
(*e*) relieve internal stresses.

14.92. Vanadium in high speed steels
(*a*) promotes decarburisation
(*b*) provides high hot hardness
(*c*) forms very hard carbides and thus increases wear resistance
(*d*) promotes retention of austenite
(*e*) increases toughness.

14.93. Amorphous material is one
(*a*) in which atoms align themselves in a geometric pattern upon solidification
(*b*) in which there is no definite atomic structure and atoms exist in a random pattern just as in a liquid
(*c*) which is not attacked by phosphorous
(*d*) which emits fumes on melting
(*e*) none of the above.

14.94. Dislocations in materials refer to the following type of defect
(*a*) point defect (*b*) line defect
(*c*) plane defect (*d*) volumetric defect
(*e*) chemical defect.

14.95. An example of amorphous material is
(*a*) zinc (*b*) lead
(*c*) silver (*d*) glass
(*e*) brass.

14.96. Which is false statement about tempering. Tempering is done to
(*a*) improve machinability
(*b*) improve ductility
(*c*) improve toughness
(*d*) release stresses
(*e*) reduce hardness and brittleness.

14.97. Which is false statement about case hardening. Case hardening is done by
(*a*) electroplating
(*b*) cyaniding
(*c*) induction hardening
(*d*) nitriding
(*e*) flame hardening.

14.98. Which of the following is the binding material in cemented carbides
(*a*) cobalt (*b*) nickel
(*c*) vanadium (*d*) iron
(*e*) carbon.

14.99. Chromium in steel
(*a*) improves wear resistance, cutting ability and toughness
(*b*) refines grain size and produces less tendency to carburisation, improves corrosion and heat resistant properties
(*c*) improves cutting ability and reduces hardenability
(*d*) gives ductility, toughness, tensile strength and anticorrosion properties
(*e*) makes steel hard.

14.100. Manganese in steel increases its
(*a*) tensile strength
(*b*) hardness (*c*) ductility
(*d*) fluidity (*e*) malleability.

14.101. Cemented carbide tools are not found to be suitable for cutting

(*a*) brass (*b*) cast iron
(*c*) aluminium (*d*) steel
(*e*) non-ferrous alloys.

14.102. Sulphur in steel
(*a*) acts as deoxidiser
(*b*) reduces the grain size
(*c*) decreases tensile strength and hardness
(*d*) lowers the toughness and transverse ductility
(*e*) increases hardness.

14.103. Tungsten in steel
(*a*) improves wear resistance, cutting ability and toughness
(*b*) refines grain size and produces less tendency to carburisation, improves corrosion and heat resistant properties
(*c*) improves cutting ability and reduces hardenability
(*d*) gives ductility, toughness, tensile strength and anticorrosion properties
(*e*) raises its melting point.

14.104. Tungsten in high speed steel provides
(*a*) hot hardness
(*b*) toughness
(*c*) wear resistance
(*d*) sharp cutting edge
(*e*) cold hardness.

14.105. Which of the following is not the correct method of increasing fatigue limit
(*a*) shot peening
(*b*) nitriding of surface
(*c*) cold working
(*d*) surface decarburisation
(*e*) under-stressing.

14.106. Connecting rod is usually made of
(*a*) aluminium
(*b*) low carbon steel
(*c*) medium carbon steel
(*d*) high carbon steel
(*e*) cast iron.

14.107. Which of the following pipes is least corrosion resistant
(*a*) brass (*b*) mild steel
(*c*) cast iron (*d*) wrought iron
(*e*) copper.

14.108. Tensile strength of steel can be safely increased by
(*a*) adding carbon upto 2.8%
(*b*) adding carbon upto 6.3%
(*c*) adding carbon upto 0.83%
(*d*) adding small quantities of copper
(*e*) adding copper and carbon.

14.109. High carbon steel carries carbon %age of
(*a*) 0.1 to 0.3% (*b*) 0.3 to 0.6%
(*c*) 0.6 to 0.8% (*d*) 0.8 to 1.5%
(*e*) 1.5 to 2.5%.

14.110. Cobalt in steel
(*a*) improves wear resistance, cutting ability and toughness
(*b*) refines grain size and produces less tendency to carburisation, improves corrosion and heat resistant properties
(*c*) improves cutting ability and reduces hardenability
(*d*) gives ductility, toughness, tensile strength and anticorrosion properties
(*e*) none of the above.

14.111. The percentage of carbon in low carbon steel is
(*a*) 0.05% (*b*) 0.15%
(*c*) 0.3% (*d*) 0.5%
(*e*) 0.7%.

14.112. The hardness of steel increases if it contains
(*a*) austenite (*b*) martensite
(*c*) pearlite (*d*) cementite
(*e*) all of the above.

14.113. 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. It is almost unmachinable
(*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 well dispersed throughout the material
(*e*) none of the above is true.

14.114. Nodular iron has
(*a*) high machinability

(*b*) low melting point
(*c*) high tensile strength
(*d*) good fluidity
(*e*) all of the above.

14.115. Nickel in steel
(*a*) improves wear resistance, cutting ability and toughness
(*b*) refines grain size and produces less tendency to carburisation, improves corrosion and heat resistant properties
(*c*) improves cutting ability and reduces hardenability
(*d*) gives ductility, toughness, tensile strength and anticorrosion properties
(*e*) none of the above.

14.116. Which of the following elements does not impart hardness to steel
(*a*) copper (*b*) chromium
(*c*) nickel (*d*) silicon
(*e*) none of the above.

14.117. The presence of sulphur in pig iron makes
(*a*) it easily machinable
(*b*) it brittle
(*c*) it hard
(*d*) the casting unsound
(*e*) increases the fluidity.

14.118. Melting point of iron is
(*a*) 1539°C (*b*) 1601°C
(*c*) 1489°C (*d*) 1712°C
(*e*) 1131°C.

14.119. Compressive strength of grey cast iron in tonnes/cm^2 is of the order of
(*a*) 3– 5 (*b*) 5–7
(*c*) 7–10 (*d*) 10–15
(*e*) 15– 22.

14.120. Blast furnace produces following by reduction of iron ore
(*a*) cast iron (*b*) pig iron
(*c*) wrought iron (*d*) malleable iron
(*e*) white iron.

14.121. Cupola produces following material
(*a*) cast iron (*b*) pig iron
(*c*) wrought iron (*d*) malleable iron
(*e*) white iron.

14.122. The machinability of steel is increased by
(*a*) silicon and sulphur
(*b*) phosphorous, lead and sulphur
(*c*) sulphur, graphite and aluminium
(*d*) phosphorous and aluminium
(*e*) none of the above.

14.123. The following element can't impart high strength at elevated temperature
(*a*) manganese (*b*) magnesium
(*c*) nickel (*d*) silicon
(*e*) none of the above.

14.124. Which of the following element results in presence of free graphite in C.I.
(*a*) carbon (*b*) sulphur
(*c*) silicon (*d*) manganese
(*e*) phosphorous.

14.125. White 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. It is almost unmachinable
(*c*) is produced by annealing process. It is soft, tough and easily machined metal
(*d*) is produced by small additions of magnesium (or creium) in the ladle. Graphite is in nodular or spheroidal form and is well dispersed throughout the material
(*e*) none of the above.

14.126. Cold rolled steel sheets contain carbon of the following order
(*a*) 0.1% (*b*) 0.2%
(*c*) 0.4% (*d*) 0.6%
(*e*) 0.8%.

14.127. Pipes for bicycle frames are made of
(*a*) cold rolled steel
(*b*) hot rolled steel
(*c*) forged steel
(*d*) cast steel
(*e*) carbon-chrome steel.

14.128. Large forgings, crank shafts, axles normally contain carbon upto
(*a*) 0.05 to 0.20%
(*b*) 0.20 to 0.45%
(*c*) 0.45 to 0.55%
(*d*) 0.55 to 1.0%
(*e*) 1.0 to 1.2%.

14.129. Heavy duty leaf and coil springs contain carbon of the following order

(*a*) 0.2% (*b*) 0.5%
(*c*) 0.8% (*d*) 1.0%
(*e*) 1.5%.

14.130. Taps, dies and drills contain carbon
(*a*) below 0.5% (*b*) below 1%
(*c*) above 1% (*d*) above 2.2%
(*e*) nil.

14.131. Drop forging dies contain carbon of the order of
(*a*) 0.1 to 0.2% (*b*) 0.25 to 0.5%
(*c*) 0.6 to 0.7% (*d*) 0.7 to 0.9%
(*e*) 1.0 to 1.2%.

14.132. 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*) easily weldable characteristics
(*e*) uniform strength in all directions.

14.133. 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
(*e*) none of the above.

14.134. Balls for ball bearings are made of
(*a*) cast iron
(*b*) mild steel
(*c*) stainless steel
(*d*) carbon-chrome steel
(*e*) high carbon steel.

14.135. Malleable 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. It is almost unmachinable
(*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 the nodular or spheroidal form and is well dispersed throughout the material
(*e*) none of the above.

14.136. Preheating is essential in welding
(*a*) cast iron
(*b*) high speed steel
(*c*) all non-ferrous materials
(*d*) all of the above
(*e*) none of the above.

14.137. The hardness of steel primarily depends on
(*a*) %age of carbon
(*b*) %age of alloying elements
(*c*) heat treatment employed
(*d*) method of manufacture
(*e*) shape of carbides and their distribution in iron.

14.138. Steel made from phosphatic iron is
(*a*) brittle (*b*) hard
(*c*) ductile (*d*) tough
(*e*) malleable.

14.139. Ductile 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. It is almost unmachinable
(*c*) is produced by annealing process. It is soft, tough and easily machined metal
(*d*) is produced by small additions of magnesium (or creium) in the ladle. Graphite is in nodular or spheroidal form and is well dispersed throughout the material
(*e*) none of the above.

14.140. Brass contains
(*a*) 70% copper and 30% zinc
(*b*) 90% copper and 10% tin
(*c*) 85–92% copper and rest tin with little lead and nickel
(*d*) 70–75% copper and rest tin
(*e*) 70% copper and 30% tin.

14.141. The crystal structure of brass is
(*a*) F.C.C.
(*b*) B.C.C.
(*c*) H.C.P.
(*d*) Orthorhombic crystalline structure
(*e*) none of the above.

14.142. The composition of silver solder is

(*a*) silver, copper, zinc
(*b*) silver, tin, nickel
(*c*) silver, lead, zinc
(*d*) silver, copper, aluminium
(*e*) silver, lead, tin.

14.143. Which one of the following metals would work-harden more quickly than the others?
(*a*) copper (*b*) brass
(*c*) lead (*d*) silver
(*e*) aluminium.

14.144. A specimen of aluminium metal when observed under microscope shows
(*a*) B.C.C. crystalline structure
(*b*) F.C.C. crystal structure
(*c*) H.C.P. structure
(*d*) a complex cubic structure
(*e*) orthorhombic crystalline structure.

14.145. The usual composition of a soldering alloy is
(*a*) tin, lead and small percentage of antimony
(*b*) tin and lead
(*c*) tin, lead and silver
(*d*) tin and copper
(*e*) tin, copper and lead.

14.146. Admiralty brass used for steam condenser tubes contains copper and zinc in the following ratio
(*a*) 50 : 50 (*b*) 30 : 70
(*c*) 70 : 30 (*d*) 40 : 60
(*e*) 60 : 40.

14.147. Corrosion resistance of steel is increased by adding
(*a*) chromium and nickel
(*b*) nickel and molybdenum
(*c*) aluminium and zinc
(*d*) tungsten and sulphur
(*e*) none of the above.

14.148. Corrundum contains more than 95%
(*a*) steel (*b*) Al_2O_3
(*c*) SiO_2 (*d*) MgO
(*e*) german silver.

14.149. Alnico, an alloy used extensively for permanent magnets contains iron, nickel, aluminium and cobalt in the following ratio
(*a*) 50 : 20 : 20 : 10
(*b*) 40 : 30 : 20 : 10
(*c*) 50 : 20 : 10 : 20
(*d*) 30 : 20 : 30 : 20
(*e*) 50 : 10 : 20 : 20.

14.150. If a refractory contains high content of silicon, it means refractory is
(*a*) acidic (*b*) basic
(*c*) neutral (*d*) brittle
(*e*) none of the above.

14.151. Bell metal contains
(*a*) 70% copper and 30% zinc
(*b*) 90% copper and 10% tin
(*c*) 85–92% copper and rest tin with little lead and nickel
(*d*) 70–75% copper and rest tin
(*e*) 70–75% copper and rest zinc and tin.

14.152. Which of the following is used for bearing liner
(*a*) gun metal (*b*) bronze
(*c*) bell metal (*d*) babbit metal
(*e*) brass.

14.153. The correct sequence for descending order of machinability is
(*a*) grey cast iron, low carbon steel, wrought iron
(*b*) low carbon steel, grey cast iron, wrought iron
(*c*) wrought iron, low carbon steel, grey cast iron
(*d*) wrought iron, grey cast iron, low carbon steel
(*e*) grey cast iron, wrought iron, low carbon steel.

14.154. Structural steel contains following principal alloying elements
(*a*) nickel, chromium and manganese
(*b*) tungsten, molybdenum and phosphorous
(*c*) lead, tin, aluminium
(*d*) zinc, sulphur, and chromium
(*e*) none of the above.

14.155. Aluminium bronze contains aluminium and copper in the ratio of
(*a*) 50 : 50 (*b*) 40 : 60
(*c*) 60 : 40 (*d*) 10 : 90
(*e*) 90 : 10.

14.156. Bronze contains
(*a*) 70% copper and 30% zinc
(*b*) 90% copper and 10% tin

(*c*) 85–92% copper and rest tin with little lead and nickel
(*d*) 70–75% copper and rest tin
(*e*) 90% copper and 10% zinc.

14.157. Muntz metal contains copper and zinc in the ratio of
(*a*) 50 : 50 (*b*) 40 : 60
(*c*) 60 : 40 (*d*) 20 : 80
(*e*) 80 : 20.

14.158. Gun metal contains
(*a*) 70% copper and 30% zinc
(*b*) 90% copper and 10% tin
(*c*) 85–92% copper and rest tin with little lead and nickel
(*d*) 70–78% copper and rest tin
(*e*) 85–92% copper and rest zinc.

14.159. Perminvar alloy having constant permeability is an alloy of
(*a*) nickel, copper and iron
(*b*) nickel, copper and zinc
(*c*) copper, nickel and antimony
(*d*) iron, zinc and bismuth
(*e*) antimony, copper and zinc.

14.160. The alloy used for making electrical resistances and heating elements is
(*a*) nichrome (*b*) invar
(*c*) magnin (*d*) elinvar
(*e*) perminvar.

14.161. Monel metal contains
(*a*) 63 to 67% nickel and 30% copper
(*b*) 88% copper and 10% tin and rest zinc
(*c*) alloy of tin, lead and cadmium
(*d*) malleable iron and zinc
(*e*) none of the above.

14.162. Permalloy is a
(*a*) kind of stainless steel
(*b*) none ferrous alloy
(*c*) polymer
(*d*) cutting tool material
(*e*) nickel and iron alloy having high permeability.

14.163. Phosphor bronze contains
(*a*) 0.5% of phosphorous
(*b*) 1% phosphorous
(*c*) 2.5% phosphorous
(*d*) 5% phosphorous
(*e*) none of the above.

14.164. Free cutting steels
(*a*) are used where ease in machining is the criterion
(*b*) contain carbon in free form
(*c*) require least cutting force
(*d*) do not exist
(*e*) can be cut freely even under adverse conditions.

14.165. Delta metal is an alloy of
(*a*) copper, zinc and iron
(*b*) iron, nickel and copper
(*c*) iron, lead and tin
(*d*) iron, aluminium and magnesium
(*e*) copper, zinc and antimony.

14.166. Admiralty gun metal contains
(*a*) 63 to 67% nickel and 30% copper
(*b*) 88% copper, 10% tin and rest zinc
(*c*) alloy of tin, lead and cadmium
(*d*) iron scrap and zinc
(*e*) none of the above.

14.167. Which of the following alloys does not contain tin
(*a*) white metal (*b*) solder admiralty
(*c*) fusible metal (*d*) phosphor bronze
(*e*) gun metal.

14.168. Which is false statement about properties of aluminium
(*a*) modulus of elasticity is fairly low
(*b*) wear resistance is very good
(*c*) fatigue strength is not high
(*d*) creep strength limits its use to fairly low temperatures
(*e*) corrosion resistance is good.

14.169. Addition of copper to aluminium results in
(*a*) improvement of casting characteristics
(*b*) improvement of corrosion resistance
(*c*) one of the best known age and precipitation-hardening systems
(*d*) improving machinability
(*e*) none of the above.

14.170. Addition of manganese to aluminium results in
(*a*) improvement of casting characteristics
(*b*) improvement of corrosion resistance
(*c*) one of the best known age and precipitation-hardening systems
(*d*) improving machinability

(*e*) none of the above.

14.171. Elinvar, an alloy used in precision instruments, hair springs for watches, etc. contains the following element as principal alloying element
(*a*) iron (*b*) copper
(*c*) aluminium (*d*) zinc
(*e*) nickel.

14.172. Which of the following alloys does not have copper as one of the constituents
(*a*) delta metal (*b*) monel metal
(*c*) constantan (*d*) nichrome
(*e*) silicon bronze.

14.173. Addition of lead and bismuth to aluminium results in
(*a*) improvement of casting characteristics
(*b*) improvement of corrosion resistance
(*c*) one of the best known age and precipitation-hardening systems
(*d*) improving machinability
(*e*) none of the above.

14.174. Addition of silicon to aluminium results in
(*a*) improvement of casting characteristics
(*b*) improvement of corrosion resistance
(*c*) one of the best known age and precipitation-hardening systems
(*d*) improving machinability
(*e*) none of the above.

14.175. Constantant an alloy used in thermocouples is an alloy of
(*a*) copper and tin
(*b*) copper and zinc
(*c*) copper and iron
(*d*) copper and nickel
(*e*) copper and chromium.

14.176. White metal contains
(*a*) 63 to 67% nickel and 30% copper
(*b*) 88% copper and 10% tin and rest zinc
(*c*) alloy of tin, lead and cadmium
(*d*) silver and chromium
(*e*) malleable cast iron and silver.

14.177. Y-alloy contains
(*a*) 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe
(*b*) 92.5% aluminium and 40% copper, 2% nickel and 1.5% Mg
(*c*) 10% aluminium and 90% copper
(*d*) 90% magnesium and 9% aluminium with some copper
(*e*) 92.5% aluminium, and 7.5% zinc.

14.178. German silver contains
(*a*) 1% silver (*b*) 2.5% silver
(*c*) 5% silver (*d*) 10% silver
(*e*) 100% silver.

14.179. Which of the following has highest specific strength of all structural materials
(*a*) magnesium alloys
(*b*) titanium alloys
(*c*) chromium alloys
(*c*) magnetic steel alloys
(*e*) none of the above.

14.180. Dow metal contains
(*a*) 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe
(*b*) 92.5% aluminium and, 4% copper, 2% nickel and 1.5% Mg
(*c*) 10% aluminium and 90% copper
(*d*) 90% magnesium and 9% aluminium with some copper
(*e*) 90% magnesium and 10% tin.

14.181. Foundry crucible is made of
(*a*) mild steel (*b*) german silver
(*c*) lead (*d*) cast iron
(*e*) graphite.

14.182. Age-hardening is related with
(*a*) stainless steel
(*b*) gun metal
(*c*) german silver
(*d*) duralumin
(*e*) cast iron.

14.183. Aluminium bronze contains
(*a*) 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe
(*b*) 92.5% aluminium, 4% copper, 2% nickel, and 1.5% Mg
(*c*) 10% aluminium and 90% copper
(*d*) 90% magnesium and 9% aluminium with some copper
(*e*) 10% aluminium and 90% tin.

14.184. Babbit metal is a
(*a*) lead base alloy
(*b*) tin base alloy
(*c*) copper base alloy
(*d*) all of the above
(*e*) (*a*) and (*c*) above.

14.185. The correct composition of Babbit metal is
(*a*) 87.75% Sn, 4% Cu, 8% Sb, 0.25% Bi
(*b*) 90% Sn, 2% Cu, 4% Sb, 2% Bi, 2% Mg
(*c*) 87% Sn, 4% Cu, 8% Sb, 1% Al
(*d*) 82% Sn, 4% Cu, 8% Sb, 3% Al, 3% Mg
(*e*) none of the above.

14.186. Duralumin contains
(*a*) 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe
(*b*) 92.5% aluminium, 40% copper, 2% nickel, and 1.5% Mg
(*c*) 10% aluminium and 90% copper
(*d*) 90% magnesium and 9% aluminium with some copper
(*e*) 94% aluminium and 6% tin.

14.187. Neutral solution is one which has pH value
(*a*) greater than 7
(*b*) less than 7 (*c*) equal to 7
(*d*) pH value has nothing to do with neutral solution
(*e*) none of the above.

14.188. Acidic solution is one which has pH value
(*a*) greater than 7
(*b*) less than 7 (*c*) equal to 7
(*d*) pH value has nothing to do with neutral solution
(*e*) none of the above.

14.189. Which is correct curve (Fig. 14.1) to show relationship between conductivity and alloy of copper and nickel at various percentages

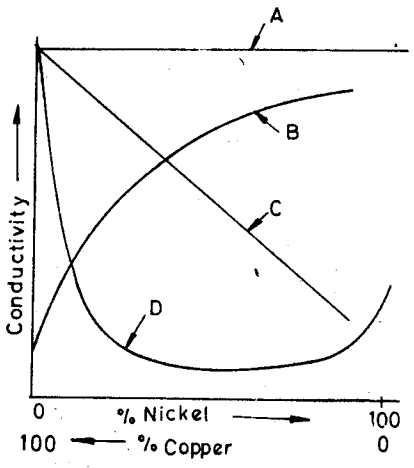


Fig. 14.1.

(*a*) *A* (*b*) *B*
(*c*) *C* (*d*) *D*
(*e*) none of the above.

14.190. Basic solution is one which has pH value
(*a*) greater than 7 (*b*) equal to 7
(*c*) less than 7
(*d*) pH value has nothing to do with basic solution
(*e*) none of the above.

14.191. Following elements have face-centred cubic structure
(*a*) gamma iron (910° to 1400°C), Cu, Ag, Au, Al, Ni, Pb, Pt
(*b*) Mg, Zn, Ti, Zr, Br, Cd
(*c*) α iron (below 910°C and between 1400 to 1539°C), W
(*d*) all of the above
(*e*) none of the above.

14.192. Recrystallisation temperature can be lowered by
(*a*) purification of metal
(*b*) grain refinement
(*c*) working at lower temperature
(*d*) all of the above
(*e*) none of the above.

14.193. Pearlite is a combination of
(*a*) ferrite and cementite
(*b*) cementite and gamma iron
(*c*) ferrite and austenite
(*d*) ferrite and iron graphite
(*e*) pearlite and ferrite.

14.194. Austenite is a combination of
(*a*) ferrite and cementite
(*b*) cementite and gamma iron
(*c*) ferrite and austenite
(*d*) ferrite and iron graphite
(*e*) pearlite and ferrite.

14.195. The transistor is made of
(*a*) silver (*b*) gold
(*c*) copper (*d*) germanium
(*e*) german silver.

14.196. Lead is poured into the joint between two pipes. These pipes may be made of
(*a*) cast iron (*b*) vitrified clay
(*c*) asbestos cement
(*d*) concrete
(*e*) mild steel.

14.197. Which of the following element is added to steel to impart high strength and toughness
(*a*) magnesium (*b*) manganese
(*c*) phosphorous (*d*) sulphur
(*e*) tungsten.

14.198. Free carbon in iron makes it
(*a*) soft and imparts coarse grained crystalline structure
(*b*) hard and imparts fine grained crystalline structure
(*c*) hard and imparts coarse grained crystalline structure
(*d*) soft and imparts fine grained crystalline structure
(*e*) malleable.

14.199. Combined corrosion in iron makes it
(*a*) soft and imparts coarse grained crystalline structure
(*b*) hard and imparts fine grained crystalline structure
(*c*) hard and imparts coarse grained crystalline structure
(*d*) soft and imparts fine grained crystalline structure
(*e*) malleable.

14.200. Which of the following has better capability to bear sudden and excessive shocks
(*a*) cast iron (*b*) pig iron
(*c*) white iron (*d*) wrought iron
(*e*) stainless steel.

14.201. Among the following materials, the most suitable material for withstanding shock and vibration without danger of cracking is
(*a*) chilled cast iron
(*b*) gray cast iron
(*c*) malleable iron
(*d*) white cast iron
(*e*) graphite.

14.202. Hardenability of stell
(*a*) is the depth of penetration obtained by Vickers test
(*b*) is the ability of steel to resist abrasion, wear and penetration
(*c*) is the property which determines the depth of the hardened zone induced by quenching
(*d*) is achieved throughout its full depth, when the actual cooling rate equals the critical cooling rate
(*e*) is its ability to withstand shocks.

14.203. Following elements have body-centered cubic structure
(*a*) gamma iron (910° to 1400°C), Cu, Ag, Au, Al, Ni, Pb, Pt
(*b*) Mg, Zn, Ti, Zr, Be, Cd
(*c*) α iron (below 910°C and between 1400 to 1539°C), W, V, Mo, Cr, Na, K, Li etc.
(*d*) all of the above
(*e*) none of the above.

14.204. Silicon steel used for electrical equipment contains following percentage of silicon
(*a*) 0.2 to 0.5%
(*b*) 2% (*c*) 3.4%
(*d*) 6.5% (*e*) 8–90%.

14.205. Following elements have hexagonal close-pack structure
(*a*) gamma iron (910° to 1400°C), Cu, Ag, Au, Al, Ni, Pb, Pt
(*b*) Mg, Zn, Ti, Zr, Be, Cd
(*c*) α iron (below 910°C and between 1400 to 1539°C), W, V, Mo, Cr, Na, K, Li etc.
(*d*) all of the above
(*e*) none of the above.

14.206. The four major parts of blast furnace from top to bottom in order are
(*a*) top, stack, hearth, bosh
(*b*) top, stack, bosh, hearth
(*c*) top, bosh, stack, hearth
(*d*) top, bosh, hearth, stack
(*e*) none of the above.

14.207. The purpose of iron ore in the charge for blast furnace is
(*a*) to act as an aggregate of iron-bearing mineral
(*b*) to supply heat to reduce ore and melt the iron
(*c*) to form a slag by combining with impurities
(*d*) to control the grade of cast iron produced
(*e*) none of the above.

14.208. The product of cupola is called
(*a*) pig (*b*) cast iron

(c) mild steel (d) wrought iron
(e) non-ferrous material.

14.209. The purpose of scrap steel in the charge for blast furnace is
(a) to act as an aggregate of iron-bearing mineral
(b) to supply heat to reduce ore and melt the iron
(c) to form a slag by combining with impurities
(d) to control the grade of cast iron produced
(e) none of the above.

14.210. For the same capacity of production
(a) basic converter is smaller than acid converter
(b) acid converter is smaller than basic converter
(c) both are of equal size
(d) size would depend on other factors
(e) none of the above.

14.211. To form basic slag, the following is added
(a) lime (b) coke
(c) scrap (d) manganese
(e) aluminium.

14.212. Sub zero treatment of steel
(a) is used to reduce the retained austenite in hardened steel
(b) increases the ability of steel to work in sub-zero atmospheres
(c) is used to suppress martensite transformation
(d) is performed after hardening operation to induce temper brittleness
(e) is never used.

14.213. The purpose of coke in the charge for blast furnace is
(a) to act as an aggregate of iron-bearing mineral
(b) to form a slag by combining with impurities
(c) to supply heat to reduce ore and melt the iron
(d) to control the grade of cast iron produced
(e) none of the above.

14.214. The quantity of lime required in a cupola for production of 1 tonne of casting is of the order of
(a) 30 kg (b) 50 kg
(c) 100 kg (d) 300 kg
(e) 1000 kg.

14.215. Lime stone is added in blast furnace to flux
(a) MnO_2 (b) SiO_2
(c) carbon (d) NH_3
(e) $KMnO_2$.

14.216. The purpose of lime in the charge for blast furnace is
(a) to act as an aggregate of iron-bearing mineral
(b) to form a slag by combining with impurities
(c) to control the grade of iron produced
(d) to supply heat to reduce ore and melt the iron
(e) none of the above.

14.217. Coal used in cupola is
(a) coke (b) coal dust
(c) charcoal (d) pulverised coal
(e) any one of the above.

14.218. The significance of the yellow flame during the operation of the bessemer converter is
(a) that air is burning out the silicon and manganese resulting in high increase in temperature and searp steel needs to be added to control temperature
(b) that silicon has burned out and carbon has started burning
(c) that the converter must be tilted and air turned off, otherwise iron would oxidise
(d) yellow flame does not occur in operation of bessemer converter
(e) none of the above.

14.219. The quantity of coke required in a cupola for production of 1 tonne of casting is of the order of
(a) 30 kg (b) 300 kg
(c) 700 kg (d) 1000 kg
(e) 1300 kg.

14.220. For better fluidity, the following is added in blast furnace
(a) phosphorus (b) sulphur
(c) carbon
(d) manganese
(e) none of the above.

14.221. Case hardening of steel
(*a*) is the saturation of the surface of steel with carbon by heating it at a high temperature
(*b*) is the saturation of the surface of steel with any element by its diffusion from the surrounding medium at a high temperature
(*c*) is the hardening of the casing or surface of steel by proper heat treatment
(*d*) involves diffusion of carbon and nitrogen in the surface of steel above the critical temperature on heating
(*e*) improves surface finish.

14.222. The hardest known material is
(*a*) ceramic
(*b*) high speed steel
(*c*) diamond
(*d*) cemented carbide
(*e*) alloy steel.

14.223. The significance of the while flame during the operation of the bessemer converter is
(*a*) that air is burning out the silicon and manganese resulting in high increase in temperature and scarp steel needs to be added to control temperature
(*b*) that silicon has burned out and carbon has started burning
(*c*) that the converter must be tilted and air turned off, otherwise iron would oxidise
(*d*) white flame does not occur during the operation of the bessemer converter
(*e*) none of the above.

14.224. Blast furnace uses the following as fuel
(*a*) coal (*b*) coke
(*c*) diesel (*d*) liquid oxygen
(*e*) producer gas.

14.225. The property of corrosion resistance of chromium stainless steels is due to
(*a*) predominating nature of chromium present in stainsteel
(*b*) the formation of a thin film of oxygen and moisture absorbed from the atmosphere
(*c*) the formation of a thin oxide film of Cr_2O_3 on the surface of steel
(*d*) super-fire finish of stainless steel which gives no opportunity for any atmospheric constituent to penetrate into the surface
(*e*) the inderent property of chromium to resist corrosion.

14.226. Presence of sulphur makes steel brittle. Its effect can be reduced by adding
(*a*) copper (*b*) magnesium
(*c*) silicon (*d*) vanadium
(*e*) manganese.

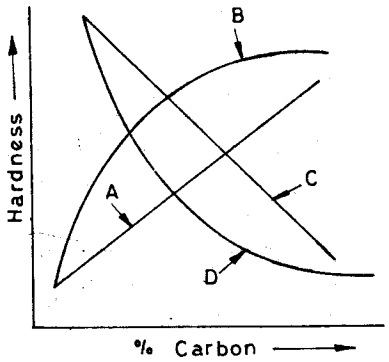
14.227. The significance of dieing down of white flame during the operation of the bessemer converter is
(*a*) that air is burning out the silicon and manganese resulting in high increase in temperature and scarp steel needs to be added to control temperature
(*b*) that silicon has burned out and carbon has started burning
(*c*) that the converter must be tilted and air turned off, otherwise iron would oxidise
(*d*) such a phenomenon does not occur
(*e*) none of the above.

14.228. Diamond has
(*a*) low heat conductivity
(*b*) high electrical conductivity
(*c*) lowest thermal expansion
(*d*) high coefficient of friction against all metals
(*e*) all of the above.

14.229. Nickel is
(*a*) ferroelectric
(*b*) ferromagnetic
(*c*) paramagnetic
(*d*) dielectric
(*e*) semi-conductor.

14.230. Diamagnetic materials
(*a*) are non-magnetic
(*b*) can't be magnetised
(*c*) can be magnetised in one direction only
(*d*) are magnetised in direction opposite to that of applied field
(*e*) can be magnetised by eddy currents.

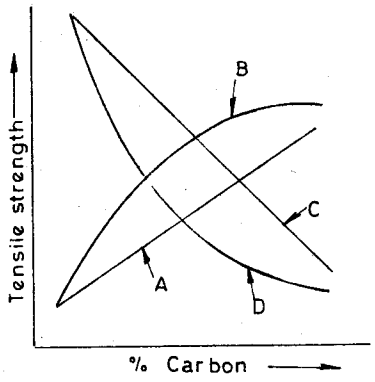
14.231. The relationship between hardness and % carbon for steel (Fig. 14.2) can be expressed by the curve
(*a*) *A* (*b*) *B*
(*c*) *C* (*d*) *D*



14.2.

(*e*) none of the above.

14.232. The relationship between tensile strength and % carbon for steel (Fig. 14.3) can be expressed by the curve



14.3.

(*a*) *A* (*b*) *B*
(*c*) *C* (*d*) *D*
(*e*) none of the above.

14.233. Which of the following is the hardest material
(*a*) hardened steel
(*b*) tungsten carbide
(*c*) alloy steel
(*d*) silicon carbide
(*e*) boron carbide.

14.234. Which of the following steel has almost zero temperature coefficient
(*a*) invar steel
(*b*) platinum steel
(*c*) stainless steel
(*d*) nickel-chromium steel
(*e*) cobalt steel.

14.235. The significance of red flame during the operation of the bessemer converter is
(*a*) that air is burning out the silicon and manganese resulting in high increase in temperature and scarp steel needs to be added to control temperature
(*b*) that silicon has burned out and carbon has started burning
(*c*) that the converter must be tilted and air turned off, otherwise iron would oxidise
(*d*) red flame does not occur during the operation of the bessemer converter
(*e*) none of the above.

14.236. Soaking pit is
(*a*) a controlled temperature pit in which parts are heated
(*b*) an arrangement in which parts are burried underground and packed with coke which is burnt subsequently
(*c*) an oil or gas heated furnace for bringing the temperature of the ingots to a uniform value throughout
(*d*) there is nothing like soaking pit
(*e*) none of the above.

14.237. Lining of open hearth furnace
(*a*) provides insulation to contain heat within the furnace
(*b*) controls impurities in steel
(*c*) acts as structure
(*d*) enhances furnace life
(*e*) none of the above.

14.238. Ingots are
(*a*) as obtained from solidification of molten metal into moulds
(*b*) obtained by passing hot steel through the rolling mills and are of size 150 mm × 150 mm to 350 mm × 350 mm.
(*c*) obtained by further rolling and are of size 50 mm × 50 mm to 125 mm × 125 mm.
(*d*) scraps from blast furnace
(*e*) none of the above.

14.239. Blast furnace gas
(*a*) is used as fuel for other plants
(*b*) is discharged into atmosphere
(*c*) is recirculated back to blast furnace

(*d*) all of the above
(*e*) none of the above.

14.240. Blooms are
(*a*) as obtained from solidification of molten metal in moulds
(*b*) obtained by passing hot ingots through the rolling mills and are of size 150 mm × 150 mm to 350 mm × 350 mm.
(*c*) obtained by further rolling and are of size 50 mm × 50 mm to 125 mm × 125 mm.
(d) scraps from rolling mills
(*e*) none of the above.

14.241. Which of the following is not a structural steel shape
(*a*) *I* (*b*) *T*
(*c*) *O* (*d*) *H*
(*e*) *V.*

14.242. High silicon content means refractory is
(*a*) basic (*b*) acidic
(*c*) neutral
(*d*) no such correlation exists
(*e*) none of the above.

14.243. The mechanical properties of steel castings can be improved by following heat treatment process
(*a*) full annealing (*b*) tempering
(*c*) normalising (*d*) phase annealing
(*e*) incomplete hardening.

14.244. Steels containing low percentages of nickel, tungsten, or chromium are classified as
(*a*) plain carbon steels
(*b*) alloy steels
(*c*) tools steels
(*d*) stainless steels
(*e*) wrought steel.

14.245. Which of the following has least percentage of carbon
(*a*) malleable iron
(*b*) pig iron (*c*) stainless steel
(*d*) wrought iron (*e*) graphite.

14.246. Steels containing high percentages of elements other than carbon are classified as
(*a*) alloy steels
(*b*) stainless steels
(*c*) structural steels
(*d*) high carbon steels
(*e*) tool steels.

14.247. The following element is alloyed with high carbon tool steels to increase the resistance to shock
(*a*) carbon (*b*) tungsten
(*c*) nickel (*d*) vanadium
(*e*) chromium.

14.248. Which of the following is the most ductile material
(*a*) mild steel (*b*) copper
(*c*) zinc (*d*) aluminium
(*e*) nickel.

14.249. A test commonly applied to steel of unknown quality for identification purposes is the
(*a*) acid-etch test (*b*) spark test
(*c*) fracture test
(*d*) dye-penetrant test
(*e*) impact test.

14.250. Which of the following has maximum malleability
(*a*) lead (*b*) brass
(*c*) wrought iron (*d*) copper
(*e*) aluminium.

14.251. High Speed Steel (H.S.S.) belongs to the category of
(*a*) low-carbon steel
(*b*) medium-carbon steel
(*c*) high-carbon steel
(*d*) alloy steel
(*e*) stainless steel.

14.252. Stainless steel contains
(*a*) chromium, iron and nickel
(*b*) chromium and nickel
(*c*) iron and carbon
(*d*) chromium, nickel, iron and carbon
(*e*) tungsten, vanadium and chromium.

14.253. Which of the following materials would readily fracture if hit with a hammer
(*a*) german silver (*b*) lead
(*c*) brass (*d*) bronze
(*e*) cast iron.

14.254. Billets are
(*a*) obtained from solidification of molten metal into moulds
(*b*) obtained by passing hot ingots through the rolling mills and are of size 150 mm × 150 mm to 350 mm × 350 mm

(*c*) obtained by further rolling and are of size 50 mm × 50 mm to 125 mm × 125 mm
(*d*) scraps from unused blooms
(*e*) none of the above.

14.255. Oxygen lance in open hearth furnace is used to
(*a*) measure O_2 content
(*b*) remove O_2
(*c*) introduce O_2 in furnace
(*d*) maintain O_2 at a constant value
(*e*) none of the above.

14.256. As the impurities are oxidised, the melting point of iron
(*a*) increases
(*b*) decreases
(*c*) remains same
(*d*) depends on the type of furnace used
(*e*) unpredictable.

14.257. Following etching solution is used for low-carbon steel and welds
(*a*) nital - 2% HNO_3 in ethyl alcohol
(*b*) picral - 5% picric acid and ethyl alcohol
(*c*) 1% hydrofluoric acid in water
(*d*) 50% NH_4OH and 50% water
(*e*) none of the above.

14.258. In making high silicon content steel, scrap can be used
(*a*) to form slag (*b*) as catalyst
(*c*) to control grade
(*d*) as coolant (*e*) can't be used.

14.259. In making high silicon content steel, scrap can be used
(*a*) to form slag (*b*) as catalyst
(*c*) to control grade
(*d*) as coolant (*e*) can't be used.

14.260. Following etching solution is used for aluminium
(*a*) nital–2% HNO_3 in ethyl alcohol
(*b*) picral - 5% picric acid and ethyl alcohol
(*c*) 1% hydrofluoric acid in water
(*d*) 50% NH_4OH and 50% water
(*e*) none of the above.

14.261. Tar dolomite bricks can withstand temperature upto
(*a*) 750°C (*b*) 1500°C
(*c*) 2000°C and more
(*d*) 5000°C (*e*) none of the above.

14.262. The relationship between tensile strength and hardness for steel can be expressed by the curve (Fig. 14.4)

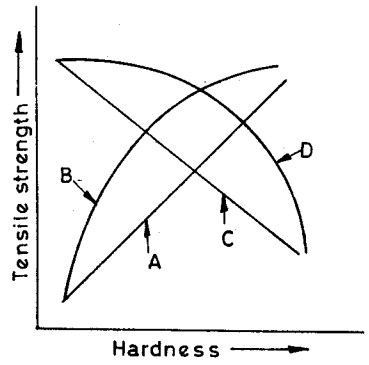


Fig. 14.4.

(*a*) *A* (*b*) *B*
(*c*) *C* (*d*) *D*
(*e*) none of the above.

14.263. The relationship between wear and hardness for steel can be expressed by the curve (Fig. 14.5)

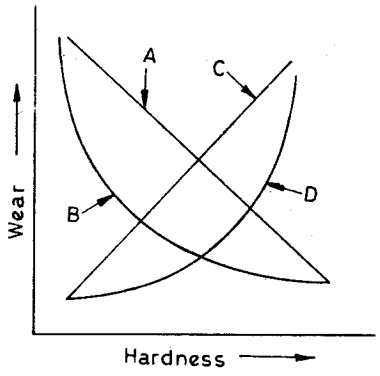


Fig. 14.5.

(*a*) *A* (*b*) *B*
(*c*) *C* (*d*) *D*
(*e*) none of the above.

14.264. Following etching solution is used for copper
(*a*) nital–2% HNO_3 in ethyl alcohol
(*b*) picral–5% picric acid and ethyl alcohol

(*c*) 1% hydrofluoric acid in water
(*d*) 50% NH_4OH and 50% water
(*e*) none of the above.

14.265. The load and standard steel ball used for Brinell hardness number are
(*a*) 300 kg, 1 mm
(*b*) 300 kg, 5 mm
(*c*) 300 kg, 10 mm
(*d*) 3000 kg, 10 mm
(*e*) 3000 kg, 5 mm.

14.266. Rockwell '*C*' scale uses minor increment load of 10 kg and the major increment load and diamond indenter respectively are
(*a*) 100 kg and 118°
(*b*) 140 kg and 118°
(*c*) 150 kg and 120°
(*d*) 140 kg and 120°
(*e*) none of the above.

14.267. On Rockwell '*C*' scale, one Rockwell number is represented by penetration depth of
(*a*) 0.0080 inch (*b*) 0.00080 inch
(*c*) 0.000080 inch (*d*) 0.0000080 inch
(*e*) none of the above.

14.268. Rockwell reading is a measure of the penetration caused by the
(*a*) major load only
(*b*) minor load only
(*c*) both major and minor loads
(*d*) standard load
(*e*) none of the above.

14.269. Two Rockwell readings are 50 RC and 65 RC. What is the increment of penetration between the two readings
(*a*) 0.0012 inch more in first case
(*b*) 0.0012 inch more in second case
(*c*) 0.0006 inch less in first case
(*d*) 0.0006 inch less in second case
(*e*) none of the above.

14.270. Brinell tester uses a hardness steel ball of size
(*a*) 1 mm (*b*) 5 mm
(*c*) 10 mm (*d*) 15 mm
(*e*) 25 mm.

14.271. Moh's scale is used in connection with
(*a*) composition of metal
(*b*) hardness of materials
(*c*) wear criterion of metals
(*d*) tensile strength of metals
(*e*) none of the above.

14.272. Moh's scale has a range of
(*a*) 1 to 5 (*b*) 1 to 10
(*c*) 1 to 12 (*d*) 1 to 15
(*e*) hardness number.

14.273. The hardness number 10 on Moh's scale for hardness is assigned to
(*a*) quartz (*b*) talc
(*c*) topaz (*d*) corundum
(*e*) diamond.

14.274. The hardness number 1 on Moh's scale is assigned to
(*a*) quartz (*b*) talc
(*c*) topaz (*d*) corundum
(*e*) diamond.

14.275. Brinell hardness number is expressed by the equation

(*a*) $\text{BHN} = \dfrac{2L}{\pi D\,(D - \sqrt{D^2 - d^2})}$

(*b*) $\text{BHN} = \dfrac{L}{\pi D\,(D - \sqrt{D^2 - d^2})}$

(*c*) $\text{BHN} = \dfrac{2L}{\pi d\,(D - \sqrt{D^2 - d^2})}$

(*d*) $\text{BHN} = \dfrac{L}{\pi d\,(D - \sqrt{D^2 - d^2})}$

(*e*) none of the above

where L = load in kg, D = dia. of ball in mm, d = dia. of indentation in mm.

14.276. Charpy test is conducted to measure
(*a*) hardness (*b*) fracture stress
(*c*) fatigue resistance
(*d*) brittleness
(*e*) malleability.

14.277. The hardness of lathe bed material should be measured by
(*a*) Rockwell tester
(*b*) Brinell hardness tester
(*c*) Shore Scleroscope
(*d*) Vickers hardness tester
(*e*) Scratch hardness tester.

14.278. Iron alloyed with carbon upto 2% is called
(*a*) cast iron (*b*) steel
(*c*) mild steel (*d*) high carbon steel
(*e*) iron alloy.

14.279. Iron alloyed with carbon in percentage greater than 2% is called
(*a*) cast iron (*b*) steel

(*c*) mild steel (*d*) high carbon steel
(*e*) carbon alloy.

14.280. Pearlitic or eutectoid steels have carbon content
(*a*) equal to 0.83%
(*b*) less than 0.83%
(*c*) more than 0.83% and upto 2%
(*d*) more than 2%
(*e*) more than 6.3%.

14.281. The binding material for cementite carbide tools is
(*a*) iron (*b*) chromium
(*c*) nickel (*d*) cobalt
(*e*) solder.

14.282. Hypoeutectoid steels have carbon content
(*a*) equal to 0.83%
(*b*) less than 0.83%
(*c*) more than 0.83% and upto 2%
(*d*) more than 2%
(*e*) more than 6.3%.

14.283. Phosphorous and sulphur in manufacturing steel can be removed only by
(*a*) acid bessemer converter
(*b*) induction furnace
(*c*) basic bessemer converter
(*d*) neutral bessemer converter
(*e*) none of the above.

14.284. Hypereutectoid steels have carbon content
(*a*) equal to 0.83%
(*b*) less than 0.83%
(*c*) more than 0.83% and upto 2%
(*d*) more than 2%
(*e*) more than 6.3%.

14.285. Cementite phase has carbon content
(*a*) less than 0.83%
(*b*) more than 0.83% and less than 2%
(*c*) more than 2%
(*d*) more than 6.67%
(*e*) none of the above.

14.286. Reinforcing bars used in RCC slabs are made of
(*a*) cast iron
(*b*) wrought iron
(*c*) alloy steel
(*d*) medium carbon steel
(*e*) tool steel or high carbon steel.

14.287. Eutectoid steels have structure of
(*a*) pearlite alone
(*b*) phases of ferrite and pearlite
(*c*) phases of cementite and pearlite
(*d*) phases of ferrite and cementite
(*e*) none of the above.

14.288. Typical examples of products produced by powder metallurgy are
(*a*) refractory metals like tungsten, molybdenum etc.
(*b*) super hard materials like cemented carbides
(*c*) bearings and porous metallic parts
(*d*) all of the above
(*e*) none of the above.

14.289. Metal powder for powder metallurgy process is made by
(*a*) reduction of oxide
(*b*) atomisation
(*c*) electrolytic deposition
(*d*) milling or grinding
(*e*) any one of the above.

14.290. The tensile strength of structural steel with rise in temperature will vary as (Refer Fig. 14.6)

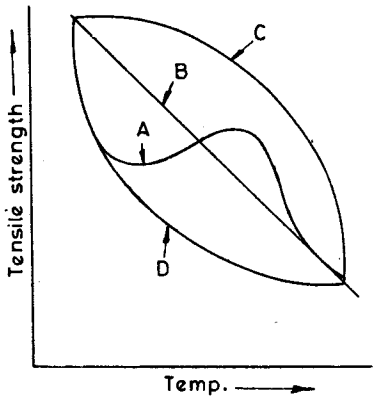


Fig. 14.6.

(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

14.291. The percentage elongation of structural steel with rise in temperature will vary as (Refer Fig. 14.7)
(*a*) curve *A* (*b*) curve *B*

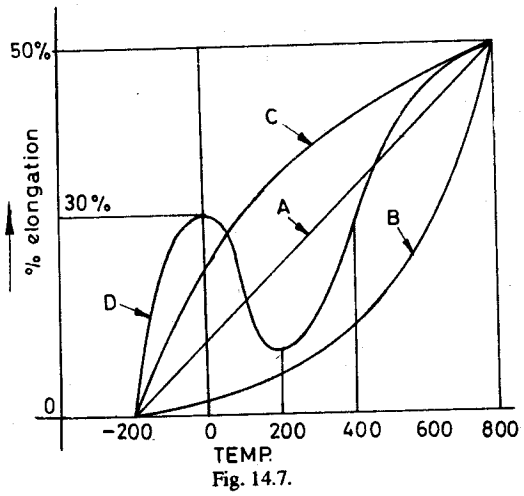


Fig. 14.7.

(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

14.292. Hypoeutectoid steels have structure of
(*a*) pearlite alone
(*b*) phases of ferrite and pearlite
(*c*) phases of cementite and pearlite
(*d*) phases of ferrite and cementite
(*e*) none of the above.

14.293. When steel with 0.8% carbon is cooled from temperature of 950°C the pearlite would occur at the following fixed temperature
(*a*) 910°C (*b*) 850°C
(*c*) 770°C (*d*) 723°C
(*e*) 650°C.

14.294. Copper and aluminium have tendency to absorb following gas at high temperature
(*a*) CO_2 (*b*) N_2
(*c*) NH_3 (*d*) H_2
(*e*) all of the above.

14.295. Hyperecutetoid steels have structure of
(*a*) pearlite alone
(*b*) phases of ferrite and pearlite
(*c*) phases of cementite and pearlite
(*d*) phases of ferrite and cementite
(*e*) none of the above.

14.296. 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 4.30%C
(*d*) 1130°C and 2.00%C
(*e*) 1130°C and 4.30%C.

14.297. The temperature at which new grains are formed in a metal is called
(*a*) recrystallisation temperature
(*b*) lower critical temperature
(*c*) upper critical temperature
(*d*) eutectitc temperature
(*e*) allotropic temperature.

14.298. The temperature and carbon content at which eutectoid reaction occurs in Fe-C equilibrium diagram are
(*a*) 723°C and 0.02%C
(*b*) 723°C and 0.80%C
(*c*) 1130°C and 2.00%C
(*d*) 1130°C and 4.30%C
(*e*) 710°C and 0.69%C.

14.299. Gibb's phase rule is given by the expression F is equal to
(*a*) $C+P$ (*b*) $C-P$
(*c*) $C-P-2$ (*d*) $C+P-2$
(*e*) $C-P+2$.
where F = no. of degrees of freedom
C = no. of components and
P = no. of phases.

14.300. Steel is made from cast iron by removing all excess
(*a*) ferrous carbide
(*b*) carbon (*c*) tungsten
(*d*) sulphur (*e*) oxygen.

14.301. The most important element which controls the physical properties of steel is
(*a*) silicon (*b*) manganese
(*c*) tungsten (*d*) carbon
(*e*) chromium.

14.302. Large amounts of silicon when added to steel will increase the following properties of the steel
(*a*) mechanical (*b*) refractory
(*c*) corrosive (*d*) magnetic
(*e*) machining.

14.303. A semi-conductor material has following number of electrons in outermost orbit
(*a*) 2 (*b*) 4
(*c*) 5 (*d*) 6
(*e*) 8.

14.304. In full annealing process, the hypoeutectoid steel is

(*a*) heated above A_3 line and cooled very slowly in furnace as to refine old structure
(*b*) heated below A_1 line with a view to make steel ductile for cold working
(*c*) heated below A_1 line and cooled slowly with a view to remove internal stresses
(*d*) heated above A_3 line and cooled in air resulting in slight hardening
(*e*) none of the above.

14.305. Machinability of a metal depends on
(*a*) hardness (*b*) tensile strength
(*c*) brittleness (*d*) toughness
(*e*) (*a*) and (*b*) above.

14.306. Pick up wrong property of austenite
(*a*) softness (*b*) malleability
(*c*) magnetism (*d*) ductility
(*e*) none of the above.

14.307. In process annealing process, the hypoeutectoid steel is
(*a*) heated above A_3 line and cooled very slowly in furnace so as to refine old structure
(*b*) heated below A_1 line with a view to make steel ductile for cold working
(*c*) heated below A_1 line and cooled slowly with a view to remove internal stresses
(*d*) heated above A_3 line and cooled in air resulting in slight hardening
(*e*) none of the above.

14.308. The imperfection in the crystal structure of metal is called
(*a*) dislocation (*b*) slip
(*c*) fracture (*d*) impurity
(*e*) cleavage.

14.309. Thermosetting plastics
(*a*) soften on the application of heat and can be repeatedly moulded
(*b*) will not deform when again subjected to heat
(*c*) are produced on a synthetic resin base
(*d*) are synthetic base resins having a predefined setting temperature
(*e*) none of the above.

14.310. Other than elasticity and rubber like material, the important property of polyvinyl chloride (PVC) is
(*a*) odourless (*b*) colourability
(*c*) non-flammable
(*d*) impervious to water
(*e*) appearance.

14.311. Filler is used in plastics to
(*a*) completely fill up the voids created during manufacturing
(*b*) improve plasticity, strengtn and toughness
(*c*) provide colour, strength, impact and resistance and reduce cost
(*d*) to accelerate the condensation and polymerisation
(*e*) all of the above.

14.312. Which of the following moulding methods is generally not used for thermoplastic materials
(*a*) extrusion (*b*) injection
(*c*) casting (*d*) calendering
(*e*) all of the above.

14.313. Hypo-eutectoid steels for hardening purposes are heated by 30–50°C
(*a*) above lower critical temperature
(*b*) below lower critical temperature
(*c*) below upper critical temperature
(*d*) above upper critical temperature
(*e*) in between lower and upper critical temperatures.

14.314. The moulding process employed for thermoplastic material is
(*a*) injection and extrusion methods
(*b*) compression and transfer moulding methods
(*c*) similar to thermosetting plastics except that higher temperature is used
(*d*) similar to thermosetting plastics except that a lower temperature is used
(*e*) die casting.

14.315. Pigments are fine, solid particles used in preparation of
(*a*) varnishes (*b*) plastics
(*c*) chemicals (*d*) paints
(*e*) all of the above.

14.316. One of the main disadvantage of thermosetting and thermo-plastic plastics is that

(*a*) they deform under heat and pressure
(*b*) they are resistant to water upto 100°C only
(*c*) they do not possess a high mechanical strength
(*d*) their shape cannot be changed without application of heat
(*e*) all of the above.

14.317. Polyesters belong to the group of
(*a*) thermoplastic plastics
(*b*) thermosetting plastics
(*c*) phenolics
(*d*) PVC
(*e*) all of the above.

14.318. The dominant property of cellulosics, a form of thermoplastic plastics is
(*a*) ease of working and toughness
(*b*) corrosion resistance and mechanical strength
(*c*) high heat and wear resistance and fine grain structure
(*d*) good colour, finish, texture and light transmissibility
(*e*) all of the above.

14.319. Crystal structure of metals is studied by
(*a*) metallograph techniques
(*b*) X-ray techniques
(*c*) ultrasonic method
(*d*) electron microscopy
(*e*) high powered microscope.

14.320. The grain growth in austenite during heat treatment of steel can be inhibited by adding
(*a*) copper (*b*) aluminium
(*c*) nickel (*d*) manganese
(*e*) magnesium.

14.321. Heat treatment operation involving heating of steel above upper critical temperature and then cooling it in the furnace is known as
(*a*) annealing (*b*) tempering
(*c*) austempering (*d*) normalising
(*e*) stress-relieving.

14.322. Heat treatment operation involving heating of steel above upper critical temperature and then cooling it in air is known as
(*a*) annealing (*b*) tempering
(*c*) austempering (*d*) normalising
(*e*) stress-relieving.

14.323. Tempering temperature of most of the materials is of the order of
(*a*) 100–150°C (*b*) 200–300°C
(*c*) 350–400°C (*d*) 400–500°C
(*e*) 500–650°C.

14.324. Normalising operation is carried out in
(*a*) furnace (*b*) air
(*c*) water (*d*) oil
(*e*) controlled atmosphere.

14.325. The effect of alloying zinc to copper is
(*a*) to raise hardness
(*b*) to impart free-machining properties
(*c*) to improve hardness and strength
(*d*) to increase strength and ductility (if added upto 10–30%)
(*e*) to improve welding characteristics.

14.326. Which of the following is better suited for lighter duty bearings
(*a*) white metal (*b*) phosphor bronze
(*c*) monel metal (*d*) neimonic alloys
(*e*) plastics.

14.327. Which of the following is better suited for heavier duty bearings
(*a*) white metal (*b*) phosphor bronze
(*c*) monel metal (*d*) neimonic alloys
(*e*) plastics.

14.328. The effect of alloying nickel to copper is
(*a*) to raise hardness
(*b*) to impart free-machining properties
(*c*) to improve hardness and strength
(*d*) to increase strength and ductility (if added upto 10–30%)
(*e*) to improve welding characteristics.

14.329. The effect of alloying lead to copper is
(*a*) to raise hardness
(*b*) to impart free-machining properties
(*c*) to improve hardness and strength
(*d*) to increase strength and ductility (if added upto 10–30%)
(*e*) to improve welding characteristics.

14.330. The grain structure obtained by isothermal hardening operation is
(*a*) martensite (*b*) sorbite
(*c*) bainite (*d*) troostite
(*e*) acicular troostite.

14.331. In order to prevent excessive scaling of parts being hardened in heating furnace, following should be properly controlled

(*a*) atmosphere (*b*) temperature
(*c*) fuel (*d*) air-fuel ratio
(*e*) draft.

14.332. In nitriding steel components, the following atmosphere is generally used in the furnace
(*a*) inert (*b*) nascent nitrogen
(*c*) liquid nitrogen
(*d*) carbon
(*e*) ammonia.

14.333. After annealing a non-ferrous metal, surface oxides formed on the metal are
(*a*) removed with coarse emery cloth
(*b*) left on the metal to protect the surface
(*c*) pickled in acid and then removed
(*d*) hammered into the surface
(*e*) polished to give a good colour.

14.334. Pick up the wrong statement. Annealing results in
(*a*) refining grain structure
(*b*) relieving internal stresses
(*c*) improving wear resistance
(*d*) improving machinability
(*e*) all of the above are true.

14.335. The effect of alloying silicon to copper is
(*a*) to raise hardness
(*b*) to impart free-machining properties
(*c*) to improve hardness and strength
(*d*) to increase strength and ductility (if added upto 10–30%)
(*e*) to improve welding characteristics.

14.336. In ductile cast iron, the free carbon is distributed throughout the mass in the form of
(*a*) needles (*b*) flakes
(*c*) nodules (*d*) crystals
(*e*) molecules.

14.337. The portion of the part not to be hardened in nitriding process is covered by a layer of
(*a*) asbestos (*b*) tin
(*c*) copper (*d*) aluminium
(*e*) steel.

14.338. The effect of alloying tin to copper is
(*a*) to raise hardness
(*b*) to impart free-machining properties
(*c*) to improve hardness and strength
(*d*) to increase strength and ductility (if added upto 10–30%)
(*e*) to improve welding characteristics.

14.339. The hardening of machine tool guideways is usually done by
(*a*) induction hardening
(*b*) flame hardening
(*c*) salt bath furnaces
(*d*) vacuum hardening
(*e*) spraying hard metal.

14.340. In stress relieving process, the hypoeutectoid steel is
(*a*) heated above A_3 line and cooled very slowly in furnace as to refine old structure
(*b*) heated below A_1 line with a view to make steel ductile for cold working
(*c*) heated below A_1 line and cooled slowly with a view to remove internal stresses
(*d*) heated above A_3 line and cooled in air resulting in slight hardening
(*e*) none of the above.

14.341. Austempering is the heat treatment process used to obtain greater
(*a*) hardness (*b*) toughness
(*c*) softenss (*d*) brittleness
(*e*) ductility.

14.342. To eliminate the brittleness which occurs due to welding of saw blades, the welded portion must be
(*a*) toughened (*b*) annealed
(*c*) work hardened
(*d*) forged (*e*) tempered.

14.343. Pick up the wrong statement. Normalising results in
(*a*) improving mechanical properties
(*b*) refining coarse grain structure obtained during hot working
(*c*) improving ductility
(*d*) improving yield strength
(*e*) all of the above are true.

14.344. Sheradising is the process in which the objects
(*a*) are electroplated to obtain wear resistant surface
(*b*) are treated before painting
(*c*) are normalised after hardening
(*d*) to be coated are packed in powdered zinc and heated
(*e*) none of the above.

14.345. Selection of a material for a particular use is based on following consideration
(*a*) service requirements
(*b*) fabrication characteristic
(*c*) cost
(*d*) all of the above
(*e*) none of the above.

14.346. Austenite can exist even at sub zero temperature by having high percentage of
(*a*) chromium (*b*) manganese
(*c*) magnesium (*d*) cobalt
(*e*) aluminium.

14.347. Beryllium is used chiefly as an alloy addition to copper to produce
(*a*) precipitation-hardenable alloy
(*b*) corrosion resistant alloy
(*c*) high-strength alloy
(*d*) non-magnetic and non-sparking alloy
(*e*) all of the above.

14.348. Which of the following has maximum hardness
(*a*) austenite (*b*) pearlite
(*c*) troostite (*d*) martensite
(*e*) sorbite.

14.349. Which of the following is not the objective of normalising
(*a*) refine steel structure
(*b*) remove strains caused by cold working of metal
(*c*) remove internal stresses
(*d*) improve tensile strength
(*e*) improve machinability.

14.350. The main purpose of heat treatment of steels is to change the
(*a*) chemical composition
(*b*) mechanical properties
(*c*) corrosion properties
(*d*) surface finish
(*e*) physical properties.

14.351. Low carbon steel can be hardened by
(*a*) hardening
(*b*) heating and quenching in oil
(*c*) heating and quenching in water
(*d*) carburising and cyaniding
(*e*) any of the above.

14.352. The hardening strains are reduced and the toughness of the part increased by the following process after hardening
(*a*) annealing (*b*) carburizing
(*c*) tempering (*d*) anodizing
(*e*) galvanizing.

14.353. Hard alloy and tool steels are made easy machinable by following heat treatment
(*a*) case carburising
(*b*) tempering (*c*) annealing
(*d*) normalising (*e*) spherodising.

14.354. Case hardening is the only method suitable for hardening :
(*a*) high alloy steel
(*b*) high carbon steel
(*c*) low-carbon steel
(*d*) high speed steel
(*e*) tungsten carbides.

14.355. Which of the following element in steel directly affects the critical temperature of the steel to be heat-treated
(*a*) sulphur (*b*) phosphorus
(*c*) carbon (*d*) chromium
(*e*) manganese.

4.356. High alloy steels have to be heated slowly and uniformly for hardening, to avoid
(*a*) scaling (*b*) shrinkage
(*c*) warpage (*d*) segregation
(*e*) local hardening.

14.357. Overheating high alloy steels when pack hardening must be avoided to prevent
(*a*) low hardness and shrinkage
(*b*) extreme hardness and brittleness
(*c*) distortion (*d*) scale formation
(*e*) warpage.

14.358. A small selected portion of the job can be hardened by
(*a*) flame and induction hardening
(*b*) pack hardening
(*c*) cyaniding
(*d*) nitriding
(*e*) case hardening.

14.359. Which of the following is not the objective of annealing
(*a*) remove internal stresses
(*b*) refine grain size
(*c*) refine structure
(*d*) improve machinability
(*e*) reduce softness.

14.360. Which of the following is a case hardening process
(*a*) spherodising (*b*) tempering
(*c*) sheradising (*d*) cyaniding

(*e*) parkerising.

14.361. Which of the following is not the objective of nitriding
(*a*) increase surface hardness
(*b*) increase fatigue limit
(*c*) increase wear resistance
(*d*) refine grain size
(*e*) none of the above.

14.362. In normalising process, the hypoeutectoid steel is
(*a*) heated above A_3 line and cooled very slowly in furnace so as to refine old structure
(*b*) heated below A_1 line with a view to make steel ductile for cold working
(*c*) heated below A_1 line and cooled slowly with a view to remove internal stresses
(*d*) heated above A_3 line and cooled in air resulting in slight hardening
(*e*) none of the above.

14.363. A big advantage of surface hardening by nitriding process is that
(*a*) it is a mass production process
(*b*) it is simple and cheap
(*c*) parts need not be quenched
(*d*) it does not require furnace
(*e*) there is no distortion of hardened parts.

14.364. Martensite is the supersaturated solution of carbon in
(*a*) iron (*b*) steel
(*c*) alpha-iron (*d*) beta-iron
(*e*) gamma-iron.

14.365. Martensite is the structure obtained by
(*a*) quenching austenite
(*b*) quenching austenite and then heating in the range of 200 to 375°C
(*c*) quenching austenite and then heating in the range of 375° to 660°C
(*d*) quenching austenite and then heating in the range of 600° to 700°C
(*e*) none of the above.

14.366. The rollers of a cycle chain are subjected to following type of stress
(*a*) compressive (*b*) tensile
(*c*) bending (*d*) fatigue
(*e*) creep.

14.367. Magnet steel contains high percentage of
(*a*) nickel (*b*) aluminium
(*c*) cobalt (*d*) copper
(*e*) tungsten.

14.368. Hardness of ferrite is of the order of
(*a*) 10 BHN (*b*) 20 BNN
(*c*) 35 BHN (*d*) 50 BHN
(*e*) 75 BHN.

14.369. The percentage of chromium in 18–4–1 HSS is
(*a*) 18% (*b*) 4%
(*c*) 1% (*d*) 0.1%
(*e*) nil.

14.370. Hardness of cementitr is of the order of
(*a*) 100 BHN (*b*) 600 BHN
(*c*) 1100 BHN (*d*) 1400 BHN
(*e*) 1950 BHN.

14.371. Polymerisation is associated with
(*a*) stainless steel (*b*) cast iron
(*c*) aluminium
(*d*) thermosplastic plastic
(*e*) thermosetting plastic.

14.372. The most notable precipitation hardenable alloys are those in which the base metal is
(*a*) copper (*b*) nickel
(*c*) manganese (*d*) aluminium
(*e*) magnesium.

14.373. In order for an alloy system to be capable of precipitation hardening it is essential that the equilibrium diagram shows a decreasing solubility of one component in another
(*a*) constant temperature
(*b*) with decreasing temperature
(*c*) with increasing temperature
(*d*) below room temperature
(*e*) at heat-treatment temperature.

14.374. In structure, all metals are
(*a*) crystalline (*b*) granular
(*c*) wrought (*d*) amorphous
(*e*) combinations of atoms and electrons.

14.375. Which of the following is non-destructive test
(*a*) tensile test (*b*) impact test
(*c*) charpy test (*d*) cupping test
(*e*) radiography test.

14.376. High ratios of surface to mass tend to

(*a*) produce smaller depths of hardening
(*b*) produce greater depths of hardening
(*c*) have no effect on depth of hardening
(*d*) have unpredictability about depth of hardening
(*e*) none of the above.

14.377. Cast iron contains carbon
(*a*) = 2% (*b*) < 0.8%
(*c*) < 2% (*d*) > 2%
(*e*) > 6.3%.

14.378. Spherodite is the structure obtained by
(*a*) quenching austenite
(*b*) quenching austenite and then heating into the range of 200 to 375°C
(*c*) quenching austenite and then heating into the range of 375° to 660°C
(*d*) quenching austenite and then heating into the range of 660 to 700°C
(*e*) none of the above.

14.379. The following structure is obtained by austempering process of heat treatment
(*a*) troostite
(*b*) martensite (*c*) sorbite
(*d*) bainite (*e*) spherodite.

14.380. White cast iron is produced by the following operation on grey cast iron
(*a*) rapid cooling (*b*) slow cooling
(*c*) raped heating (*d*) tempering
(*e*) bright polishing.

14.381. The frequency of supply in induction hardening for heating surface of parts is proportional to
(*a*) its diameter (D)
(*b*) D^2 (*c*) $\frac{1}{D}$
(*d*) $\frac{1}{D^2}$ (*e*) $\sqrt{D}$.

14.382. Troostite is the structure obtained by
(*a*) quenching austenite
(*b*) quenching austenite and then heating into the range of 200 to 375°C
(*c*) quenching austenite and then heating into the range of 375°–660°C
(*d*) quenching austenite and then heating into the range of 660°–700°C
(*e*) none of the above.

14.383. The process in which steel is coated with a thin layer of phosphate is known as
(*a*) phosphorising (*b*) sheradising
(*c*) anodising (*d*) parkerising
(*e*) colorising.

14.384. Steels are primarily designated according to
(*a*) iron content
(*b*) carbon content
(*c*) alloying elements
(*d*) hardness
(*e*) tensile strength.

14.385. The structure obtained by heating a steel above critical point and then quenching in water is
(*a*) martensite (*b*) sorbite
(*c*) acicular (*d*) bainite
(*e*) spherodite.

14.386. Sorbite is the structure obtained by
(*a*) quenching austenite
(*b*) quenching austenite and then heating into the range of 200 to 375°C
(*c*) quenching austenite and then heating into the range of 375°–660°C
(*d*) quenching austenite and then heating into the range of 600°–700°C
(*e*) none of the above.

14.387. Toughness of a material means
(*a*) strength (*b*) machinability
(*c*) stress relieving
(*d*) softening
(*e*) all of the above.

14.388. The constituents of Hayness stellite, having superior performance than HSS are
(*a*) tungsten, chromium and vanadium
(*b*) tungsten, chromium and cobalt
(*c*) tungsten, molybdenum and cobalt
(*d*) cobalt, nickel and aluminium
(*e*) chromium, manganese and cobalt.

14.389. Line A_1 on iron-carbon diagram indicates
(*a*) the beginning of transition from austenite to ferrite
(*b*) completion of austenite transition to ferrite and pearlite
(*c*) limit of carbon solubility in austenite
(*d*) all of the above
(*e*) none of the above.

14.390. Line A_{cm} on iron-carbon diagram indicates
(*a*) the beginning of transition from austenite to ferrite

(*b*) completion of austenite transition to ferrite and pearlite
(*c*) limit of carbon solubility in austenite
(*d*) all of the above
(*e*) none of the above.

14.391. Line A_3 on iron-carbon diagram indicates
(*a*) the beginning of transition from austenite to ferrite
(*b*) completion of austenite transition to ferrite and pearlite
(*c*) limit of carbon solubility in austenite
(*d*) all of the above
(*e*) none of the above.

14.392. Eutectoid composition of carbon steel at room temperature is known as
(*a*) pearlite (*b*) ferrite
(*c*) cementite (*d*) martensite
(*e*) none of the above.

14.393. Grain size increases as temperature goes above A_2 line. Do these grains decrease in size when steel is cooled toward the A_3 line
(*a*) yes (*b*) no
(*c*) will decrease if cooled fast
(*d*) will increase if cooled fast
(*e*) none of the above.

14.394. The alloying element that could make steel austenitic at room temperature are
(*a*) chromium and titanium
(*b*) carbon and sulphur
(*c*) nickel and manganese
(*d*) molybdenum and titanium
(*e*) phosphorus and sulphur.

14.395. The carbon content of the eutectoid with addition of alloying elements will
(*a*) increase (*b*) decrease
(*c*) remain unaffected
(*d*) increase or decrease depending on the alloying element
(*e*) none of the above.

14.396. When observed unetched, the carbon in gray cast iron appears in the form of
(*a*) graphite (*b*) cementite
(*c*) ferrite (*d*) austenite
(*e*) pearlite.

14.397. Cementite in the form of lamellar pearlite appears as follows under microscope
(*a*) dark (*b*) white
(*c*) light (*d*) finger print
(*e*) none of the above.

14.398. Cementite in white cast iron appears as follows under microscope
(*a*) dark (*b*) white
(*c*) light (*d*) finger print
(*e*) none of the above.

14.399. Ferrite appears as follows under microscope
(*a*) dark (*b*) white
(*c*) light (*d*) finger print
(*e*) none of the above.

14.400. Pearlite appears as follows under microscope
(*a*) dark (*b*) white
(*c*) light (*d*) finger print
(*e*) none of the above.

14.401. The basic ingredient of cemented carbide is
(*a*) aluminium oxide
(*b*) vanadium
(*c*) ceramics
(*d*) tungsten oxide
(*e*) non-ferrous cast alloy of cobalt, chromium etc.

14.402. Stellite is a non-ferrous cast alloy composed of
(*a*) cobalt, chromium and tungsten
(*b*) tungsten, chromium and vanadium
(*c*) tungsten, molybdenum and cobalt
(*d*) molybdenum, vanadium and cobalt
(*e*) aluminium-oxide, tungsten oxide and some non-ferrous materials.

14.403. Materials exhibiting time bound behaviour are known as
(*a*) visco elastic (*b*) anelastic
(*c*) isentropic (*d*) resilient
(*e*) shock proof.

14.404. Visco elastic behaviour is common in
(*a*) rubber (*b*) plastics
(*c*) crystalline materials
(*d*) non-crystalline materials
(*e*) non-crystalline organic polymers.

14.405. Diamond's weight is expressed in terms of carats. One carat is equal to
(*a*) 1 mg (*b*) 20 mg
(*c*) 200 mg (*d*) 350 mg
(*e*) 500 mg.

14.406. The degradation of plastics is accelerated by
(*a*) high ambients
(*b*) dampness
(*c*) corrosive atmosphere
(*d*) ultravoilet radiation
(*e*) sun rays.

14.407. Which of the following metals can be easily drawn into wire
(*a*) tin (*b*) copper
(*c*) lead (*d*) zinc
(*e*) cast iron.

14.408. Following element is added to molten cast iron to obtain nodular cast iron
(*a*) Cr (*b*) Mn
(*c*) Cu (*d*) Mo
(*e*) Mg.

14.409. Silicon when added to copper increases its
(*a*) machinability
(*b*) brittleness
(*c*) electrical conductivity
(*d*) hardness and strength
(*e*) malleability.

14.410. Which of the following is an amorphous material
(*a*) mica (*b*) lead
(*c*) rubber (*d*) glass
(*e*) plastic.

14.411. Following etching solution is used for medium and high carbon steel, pearlitic steel, and cast iron
(*a*) nital - 2% HNO_3 in ethyl alcohol
(*b*) picral–5% picric acid and ethyl alcohol
(*c*) 1% hydrofluoric acid in water
(*d*) 50% NH_2 OH and 50% water
(*e*) none of the above.

15

Production Technology

15.1. Joggled welded joints are used
(*a*) where longitudinal shear is present
(*b*) where severe loading is encountered and the upper surface of both pieces must be in the same plane
(*c*) to join two pieces of metal in the same manner as rivet joint metals
(*d*) there is nothing called Joggled welded joint
(*e*) none of the above.

15.2. In arc welding, eyes need to be protected against
(*a*) intense glare (*b*) sparks
(*c*) infra-red rays (*d*) ultraviolet rays
(*e*) infra-red and ultraviolet rays.

15.3. In which type of welding a pool of molten metal is used
(*a*) electroslag (*b*) submerged arc
(*c*) MIG (*d*) TIG
(*e*) thermit welding.

15.4. Plain and butt welds may be used on materials upto approximately
(*a*) 25 mm thick (*b*) 40 mm thick
(*c*) 50 mm thick (*d*) 70 mm thick
(*e*) 90 mm thick.

15.5. The main criterion for selection of electrode diameter in arc welding is
(*a*) material to be welded
(*b*) type of welding process
(*c*) thickness of material
(*d*) voltage used (*e*) current used.

15.6. Which of the following is preferred for welding of non-ferrous metals by arc welding
(*a*) A.C. low frequency
(*b*) A.C. high frequency
(*c*) D.C.
(*d*) all of the above
(*e*) none of the above.

15.7. In arc welding, arc is created between the electrode and work by
(*a*) flow of current
(*b*) voltage
(*c*) material characteristics
(*d*) contact resistance
(*e*) electrical energy.

15.8. Open cricuit voltage for arc welding is of the order of
(*a*) 18–40 volts
(*b*) 40–95 volts
(*c*) 100–125 volts
(*d*) 130–170 volts
(*e*) 190–240 volts.

15.9. The material used for coating the electrode is called
(*a*) protective layer
(*b*) binder
(*c*) slag
(*d*) deoxidiser
(*e*) flux.

15.10. Plug weld joint is used
(*a*) where longitudinal shear is present
(*b*) where severe loading is encountered and the upper surfaces of both pieces must be in the same plane
(*c*) to join two pieces of metal in the same manner as rivet joint metals
(*d*) there is nothing like plug weld joint
(*e*) none of the above.