

CSWIP 3.1 (WELDING INSPECTOR) MULTIPLE CHOICE QUESTIONS

1. When “H2 control” is specified for a manual metal arc welding project, the electrode would normally be:
 - (a) Cellulose
 - (b) Iron oxide
 - (c) Acid
 - (d) Basic**
2. You would with certainty recognize a hydrogen controlled flux covered electrode from its:
 - (a) Colour
 - (b) Length
 - (c) Trade Name
 - (d) AWS / BS639 Code Letter**
3. When manual metal arc welding is being carried out on an open construction site, which group of welders are the most likely to require continuous monitoring?
 - (a) Concrete shuttering welding teams
 - (b) Pipe welding team**
 - (c) Plater welders
 - (d) Plant maintenance welders
4. You notice manual metal arc electrodes, stripped of flux, are being used as filler wire for TIG welding. You would object because:
 - (a) It is too expensive
 - (b) The wire would be too thick
 - (c) The weld metal composition may be wrong**
 - (d) The wire is too short
5. When open site working, serious porosity in metal arc welds is brought to your attention. What would you investigate:
 - (a) Electrode type
 - (b) Power plant type
 - (c) Electrode storage**
 - (d) Day temperature
6. The steel composition in a structural contract is changed from 0.15% carbon, 0.6% manganese to 0.2% carbon, 1.2% manganese. Might this influence the incidence of:
 - (a) Porosity
 - (b) Cracking in the weld area**
 - (c) Undercut for fillet welds
 - (d) Lack of root fusion defects
7. One of the following alloys is non-magnetic. Which?

- (a) 4% Chromium Molybdenum
- (b) 12% Chromium
- (c) Austenitic Stainless Steel
- (d) 9% Nickel Steel

8. When TIG welding Austenitic Stainless Steel pipe, Argon gas baking is called for. This is to:

- (a) Prevent oxidation**
- (b) Prevent under bead cracking
- (c) Prevent porosity
- (d) Control the penetration bead shape

9. Pre-heating a carbon steel manual metal arc welding is carried out to minimize the risk of:

- (a) Scattered porosity
- (b) Worm hole porosity
- (c) Parent metal cracking**
- (d) Lack of penetration

10. In UK practice, BS499 part 2 specifies that the drawing dimension quoted for a fillet weld is the:

- (a) Leg length**
- (b) Actual throat thickness
- (c) Weld length

11. For open site manual metal arc welding the following equipment is available. Which would you choose for safe working?

- (a) Single operator transformer
- (b) Multi operator transformer
- (c) AC / DC composite power unit
- (d) Diesel engine driven motor generator**

12. If Submerged arc welding is to be used to make butt welds, which would you be most critical of?

- (a) The root gap tolerance
- (b) The angle of preparation
- (c) The root face width
- (d) The gas cut finish

13. During CO₂ welding, the arc length is most likely to be affected by:

- (a) The wire diameter
- (b) The current return connection
- (c) The gas flow rate
- (d) The torch to work angle

14. Preheating for arc welding applies to:

- (a) Assembly welding only

- (b) Assembly and tack welding
 - (c) Joints over 25mm thick only
 - (d) Cruciform welds only
15. You see a welder using an oxy-acetylene flame with a long feathered inner cone. What would be the effect of this on a carbon steel?
- (a) The weld could be hard and brittle**
 - (b) The weld metal could be too soft
 - (c) There will be no effect on the weld
 - (d) The weld will have undercut
16. A welder qualification test is to verify:
- (a) Skill of the welder**
 - (b) The quality of the materials
 - (c) The non-destructive test procedures
 - (d) The manufacturing method
17. A fabricating procedure calls for fillet welds to be “blended in” by grinding. This is to influence:
- (a) H A Z cracking
 - (b) Fatigue life**
 - (c) Residual stress
 - (d) Yield strength
18. Bend test specimens have been taken from a 25mm thick carbon steel butt weld. Which would show lack of inter-run fusion:
- (a) Side bend**
 - (b) Root bend
 - (c) Face bend
 - (d) Guided bend
19. Lamellar tearing has occurred in a steel fabrication. Before welding could it have been found by:
- (a) X-ray examination
 - (b) Dye penetrant
 - (c) Ultrasonic inspection
 - (d) It would not have been found by any inspection method**
20. You are to oversee the arc welding of some machined fittings and find they are cadmium plated. Would you:
- (a) Permit it to proceed
 - (b) Permit it to proceed with fume extraction
 - (c) Stop the operation at once**
 - (d) Advise the welder to drink milk and proceed
21. The unit of Joules would be used to measure:

- (a) Tensile strength
 - (b) Impact energy**
 - (c) Hardness
 - (d) Electrical resistance
22. Submerged arc welding is a process that generally gives:
- (a) Slag free welds
 - (b) Low penetration
 - (c) Low dilution
 - (d) High heat input**
23. Which of the following does not require baking or drying:
- (a) E 6010**
 - (b) E 7018
 - (c) Sub arc flux with Basicity Index of 2
 - (d) Sub arc flux with Basicity Index of 3
24. A welder and procedure re-qualification would be required:
- (a) When the run out date of the procedure has been reached
 - (b) Every Year
 - (c) When changing from day to night shift work
 - (d) When there is a change in an essential variable**
25. Tensile strength can be increased in steel by:
- (a) Annealing
 - (b) Galvanising
 - (c) Addition of carbon**
 - (d) Casting
26. Which of the following always occurs in the parent material:
- (a) Hydrogen cracks
 - (b) Laps and laminations**
 - (c) Center line cracks
 - (d) Porosity
27. To prevent the hardening and cracking of High Carbon Steel plate when flame cutting it is advisable to:
- (a) Pre-heat the plate**
 - (b) Soak the plate in oil
 - (c) Cool the plate quickly after cutting
 - (d) Increase the cutting Oxygen pressure
28. Re-crystallization during annealing is used to make steel:
- (a) Softer

- (b) Harder
 - (c) Tougher
 - (d) Stronger
29. You should always refer to a higher authority for guidance when:
- (a) Cracks appear during welding**
 - (b) The welder will not follow your instructions
 - (c) Instructions are missing in the specification or contract documents
 - (d) All of the above
30. Spatter may be finely controlled during MIG / MAG welding by:
- (a) Adjusting the inductance control
 - (b) Using CO₂ gas
 - (c) Increasing the arc voltage
 - (d) Welding with no gas
31. Fatigue testing is used to test welds:
- (a) Under cyclic loading**
 - (b) Under creep stress loading
 - (c) Under impact loading
 - (d) Under static loading
32. Argon + 2% Oxygen is used when welding:
- (a) High carbon steels
 - (b) Austenitic stainless steels
 - (c) Aluminum
 - (d) Martensite stainless steels
33. In BS 639 and BSEN 499 the first digits of the electrode classification indicate:
- (a) Tensile and yield strength**
 - (b) Toughness
 - (c) Electrode coating
 - (d) Electrode efficiency
34. Cellulosic coatings are generally used because of:
- (a) Their low hydrogen content
 - (b) Their high penetration characteristic**
 - (c) Their high strength weld deposit
 - (d) Their high weld toughness values
35. Porosity would mostly occur in which of the following:
- (a) When MMA welding semi de-oxidized steel
 - (b) When MIG / MAG welding fully de-oxidized steel
 - (c) When welding TIG welding non de-oxidized steel
 - (d) When Sub Arc Welding semi killed steel

36. When welds have a depth to width ratio of higher than 2:1 it is possible that:
- (a) Centerline cracks may appear**
 - (b) The fusion boundary will be outside the HAZ
 - (c) The HAZ will be too narrow
 - (d) The weld will be non magnetic
37. On which of the following would you not use MPI inspection?
- (a) A low carbon steel butt welded joint
 - (b) An Austenitic Stainless steel fillet welded T joint**
 - (c) A medium carbon steel fillet welded lap joint
 - (d) All of the above
38. Increasing the arc energy input of a welded joint will:
- (a) Increase the strength of the joint
 - (b) Increase the toughness of the joint
 - (c) Increase the grain size of the weld and HAZ**
 - (d) Decrease the width of the HAZ
39. In Sub Arc Welding, excessive flux melting will result from:
- (a) Increasing the arc voltage**
 - (b) Decreasing the arc voltage
 - (c) Increasing the travel speed
 - (d) Increasing the wire feed speed
40. To BS 499 part 2, which of the following is true for a welding symbol:
- (a) This or arrow side of the joint goes on top of the reference line
 - (b) This or arrow side of the joint goes below the reference line
 - (c) This or arrow side of the joint goes in the middle of the reference line
 - (d) All of the above
41. Internal lack of fusion defects can be normally found by using:
- (a) Penetrant testing
 - (b) Impact tests
 - (c) Side bend test**
 - (d) Hardness test
42. Which of the following steel structures has the highest hardness:
- (a) Martensite**
 - (b) Austenitic
 - (c) Ferritic
 - (d) All have the same hardness
43. An IQI would be used in radiography to assess:
- (a) Image quality**

- (b) Type of steel
 - (c) Density of graph
 - (d) Type of welding process used
44. Poor penetration would be found in MIG / MAG welded steels when using:
- (a) Argon + 20% CO₂
 - (b) CO₂
 - (c) Pure Argon
 - (d) Argon + 5% CO₂
45. In which of the following steels are you most likely to find H₂ induced weld metal cracking after welding:
- (a) Low carbon steel
 - (b) High strength low alloy steel
 - (c) Austenitic stainless steels
 - (d) 1% Nickel steel
46. Silicon is added to electrode coating as:
- (a) A slipping agent
 - (b) A slag former
 - (c) A de-oxidant**
 - (d) A colouring agent
47. The main reason degreasing agents should always be dried from metals prior to welding, is because they are likely to:
- (a) Increase the arc voltage
 - (b) Produce hazardous fumes**
 - (c) Slow down the welding speed
 - (d) Produce lack of fusion defects
48. Which of the following processes would be most prone to lack of fusion defects:
- (a) Pulsed arc MIG
 - (b) Spray transfer MIG
 - (c) Dip transfer MIG**
 - (d) Submerged arc
49. Adjusting the inductance control in dip transfer MIG / MAG welding, will control:
- (a) The pulse rate
 - (b) The gas flow rate
 - (c) The amount of spatter
 - (d) The arc voltage
50. Which of the following is an inspection point in Sub Arc Welding?
- (a) Flux mesh size**
 - (b) Gas type

- (c) Tungsten size
 - (d) Gas flow rate
51. Why is Hot Pass so called?
- (a) Because it is applied to a high amperage
 - (b) Because it is applied when the root is still hot**
 - (c) Because it could cause hot shortness
 - (d) Because it heat treats the root
52. Which of the following is not inert gas?
- (a) Argon
 - (b) Xenon
 - (c) Carbon dioxide**
 - (d) Helium
53. Why is a welding arc shielded?
- (a) To eliminate hydrogen
 - (b) To retard the cooling rate of the weld
 - (c) To eliminate the atmosphere**
 - (d) To ensure maximum heat input
54. Which welding process is considered to be the most versatile?
- (a) SAW
 - (b) TIG
 - (c) MIG / MAG
 - (d) MMA
55. The HAZ associated with a weld is:
- (a) The melted portion of the parent plate
 - (b) The area immediately adjacent to the weld which has undergone a micro structural change
 - (c) The weld area plus the parent plate which has undergone a micro structural change
 - (d) The are in the weld region with the lowest tensile strength
56. A crack in a weld zone:
- (a) Is repairable
 - (b) Always results in a cut out and complete re-weld
 - (c) Is acceptable up to 2mm in length
 - (d) May be repaired or cut out depending on specification requirements
57. If the amperage is too low during the welding of a root bead, the possible result would be:
- (a) Lack of penetration
 - (b) Lack of fusion
 - (c) The freezing of the electrode
 - (d) All of the above

58. Pre-heating prior to welding:
- (a) Must always be carried out
 - (b) Need not be carried out if post heat treatment is to follow welding
 - (c) Is always carried out using gas flames
 - (d) All of the above
 - (e) None of the above
59. Cold lap in another term for:
- (a) Lack of fusion
 - (b) Low amperage
 - (c) Undercut
 - (d) Hydrogen cracking
60. When a medium to high carbon steel is quenched:
- (a) It becomes malleable
 - (b) Its hardness increases
 - (c) It becomes ductile
 - (d) The plasticity is increased
61. The TIG welding process utilizes an electrode that is:
- (a) Cellulosic
 - (b) Non consumable
 - (c) Consumable
 - (d) None of the above
62. Another name for Suckback in the root of a weld is:
- (a) Concavity
 - (b) Convexity
 - (c) LORP
 - (d) Root undercut
63. One of the advantages of a multi-pass MMA weld is that it generally produces a:
- (a) High tensile strength
 - (b) High degree of ductility
 - (c) Coarse grain structure
 - (d) Fine grain structure
64. A Normalising heat treatment process is carried out by:
- (a) Heating the metal just above 650°C
 - (b) Taking the metal above the re-crystallization temperature and allowing to air cool
 - (c) Taking the metal above the re-crystallization temperature and allowing to furnace cool
 - (d) Taking the metal above the re-crystallization temperature and quickly cooling by immersing
65. The extent of the changes in microstructure will depend on the following:

- (a) Material composition
 - (b) Heat input
 - (c) The rate of cooling
 - (d) All of the above
66. The British code for visual inspection requirements is:
- (a) BS 4872
 - (b) BS 499
 - (c) BS 4870
 - (d) None of the above
67. A code of practice for visual inspection should cover the following:
- (a) Before, During and After welding activities
 - (b) Before welding activities only
 - (c) After welding activities only
 - (d) None of the above
68. Incomplete root penetration in a butt joint could be caused by:
- (a) Excessive root face width
 - (b) Excessive root gap size
 - (c) Low current setting
 - (d) Both A & C
69. Incomplete root fusion would certainly be caused by:
- (a) Linear misalignment
 - (b) Incorrect tilt angle
 - (c) Differing root face widths
 - (d) All of the above
70. You notice a very “yeed ” ripple shape. This is most likely caused by:
- (a) Poor consumable choice
 - (b) Welding position
 - (c) Excessive travel speed
 - (d) None of the above
71. “Toe Blending” is important as it may affect:
- (a) Toughness
 - (b) Fatigue life
 - (c) Penetration
 - (d) All of the above
72. Slag inclusions may occur with:
- (a) Manual Metal arc
 - (b) Metal Inert Gas

- (c) Submerged Arc Welding
- (d) Both A & C

73. Undercut is caused by:

- (a) Excessive amps
- (b) Excessive volts
- (c) Excessive travel speed
- (d) All of the above

74. Undercut is normally assessed by:

- (a) Its depth
- (b) Its length
- (c) Its blending
- (d) All of the above

75. A welding procedure is useful to:

- (a) Give information to the welder
- (b) Give information to the inspector
- (c) Give "Confidence" to a product
- (d) All of the above

76. An essential variable may:

- (a) Change the properties of the weld
- (b) Influence the visual acceptability
- (c) Require re-approval of the weld procedure
- (d) All of the above

77. A magnifying glass may be used during visual inspection by typical magnification would be:

- (a) Up to 50 Ø
- (b) 2 – 2.5 Ø
- (c) 50 – 100 Ø
- (d) None of the above

78. When visually inspecting a fillet weld, it would normally be "Sized by":

- (a) The leg lengths
- (b) The actual throat thickness
- (c) The design throat thickness
- (d) Both A & C

79. A planar defect is:

- (a) Incomplete fusion defects
- (b) Slag inclusion
- (c) Incomplete penetration
- (d) Both A & C

80. Penetrant inspection and MPI are mainly used to:
- (a) Aid visual inspection
 - (b) Because the application standard says so
 - (c) To confirm “Visual uncertainties”
 - (d) All of the above
81. Defects outside of the limits specified in a standard should always be:
- (a) Repaired
 - (b) Reported to a “senior person”
 - (c) Radio graphed
 - (d) All of the above
82. MIG welding tends to be susceptible to lack of fusion problems. This is because of:
- (a) Poor maintenance of equipment
 - (b) Incorrect settings
 - (c) Poor inter run cleaning
 - (d) All of the above
83. MMA electrode can be grouped into three main types. These are:
- (a) Basic, Cellulosic and Rutile
 - (b) Neutral, Cellulosic and Rutile
 - (c) Basic, Cellulosic and neutral
 - (d) None of the above
84. The main causes of porosity in welded joints are:
- (a) Poor access
 - (b) Loss of gas shield
 - (c) “Dirty” materials
 - (d) All of the above
85. Cracks in welds may be due to:
- (a) Solidification problems
 - (b) Hydrogen problems
 - (c) Excessive stresses
 - (d) All of the above
86. Welding a single V butt with laminations showing on the side wall may give rise to:
- (a) Lamellar tearing
 - (b) Solidification cracking
 - (c) Martensite
 - (d) Undercut
87. With reference to a root penetration bead, you could certainly assess:
- (a) Root fusion and penetration

- (b) Root concavity
 - (c) Burn through
 - (d) All of the above
88. A fatigue failure is characteristic by the appearance of the fracture surface. It would be:
- (a) Rough and torn
 - (b) “Cheveron” – like
 - (c) Smooth
 - (d) None of the above
89. “Stray arcing” may be regarded as a serious defect. This is because:
- (a) It may reduce the thickness dimension of a component
 - (b) It may cause liquation cracks
 - (c) It may cause hard zones
 - (d) All of the above
90. Overlap in welds could be influenced by:
- (a) Poor welding technique
 - (b) Welding process
 - (c) Welding position
 - (d) All of the above
91. Flame cut preparation may, during welding, increase the likelihood of:
- (a) Cracking
 - (b) Misalignment problems
 - (c) Inclusions
 - (d) All of the above
92. Macroscopic examination requires any specimen to be inspected:
- (a) Once after welding
 - (b) Twice – once before and once after etching
 - (c) Using a microscope
 - (d) None of the above
93. Which of the following may be classed as a “More serious defect”?
- (a) Slag inclusions
 - (b) Fusion defects (Inter run)
 - (c) Fusion defects (Surface)
 - (d) Porosity
94. A code of practice is:
- (a) A standard for workmanship only
 - (b) A set of rules for manufacturing a specific product
 - (c) Levels of acceptability of a weldment
 - (d) None of the above

95. Movement of the arc by magnetic forces in MMA welding is termed:
- (a) Arc deviation
 - (b) Arc misalignment
 - (c) Arc blow
 - (d) Arc eye
96. A metallurgical problem most associated with Submerged Arc welding is:
- (a) Hydrogen cracking in the HAZ
 - (b) Solidification cracking in the weld metal
 - (c) Hydrogen cracking in the weld metal
 - (d) Lamellar tearing in the weld metal
97. Oxy pressure and nozzle size would influence what in flame cutting:
- (a) The temperature required for cut initiation
 - (b) The ability to cut Stainless steel
 - (c) The depth of cut obtainable
 - (d) None of the above
98. The main usage of arc cutting / gouging processes is in:
- (a) The cutting of single bevel preparation
 - (b) The removal of deposited welds
 - (c) The cutting of single U-type preparation
 - (d) The cutting / gouging of non-ferrous materials only
99. Which of the following processes joints metals plastically:
- (a) Friction welding
 - (b) Resistance welding
 - (c) Plasma welding
 - (d) All of the above
100. Which electrode classification would be relevant to AWS A5.1 / 81:
- (a) E 6013
 - (b) E 5133
 - (c) E 7018
 - (d) Fleet weld 5
101. Which of the following coatings associated with “Stove Welding”?
- (a) Rutile
 - (b) Cellulosic
 - (c) Basic
 - (d) Oxidizing
102. A common gas / mixture used in MIG welding nickel alloys to combine good levels of penetration with good arc stability would be:

- (a) 100 % CO₂
 - (b) 100% Argon
 - (c) 80% Argon 20% CO₂
 - (d) 98% Argon 2% Oxygen
103. The type of SAW flux is more resistant to moisture absorption:
- (a) Fused
 - (b) Agglomerated
 - (c) Basic
 - (d) All of the above the same resistance
104. The flame temperature of oxy / acetylene mixture gas is given as:
- (a) 3200* C
 - (b) 2300* C
 - (c) 5000*C
 - (d) None of the above
105. A large grain structure in steels said to produce:
- (a) Low ductility values
 - (b) Low fracture toughness values
 - (c) High fracture toughness values
 - (d) High tensile strength
106. The likelihood of brittle fracture in steels will increase with:
- (a) A large grain formation
 - (b) A reduction of in-service temperature to sub zero levels
 - (c) Ferritic rather than austenitic steels
 - (d) All of the above
107. Repair welding is often more difficult than production due to:
- (a) The material being ingrained with in-service contaminates
 - (b) Restricted access within the repair area
 - (c) The possible position of the weld repair
 - (d) Any of the above
108. Hydrogen cracking in the weld metals is likely when welding:
- (a) Carbon Manganese steels
 - (b) Stainless steels
 - (c) Micro alloyed steels (HSLA)
 - (d) Low carbon steels
109. EN standard 288 would refer to which of the following:
- (a) Welder approval testing
 - (b) Welding equipment
 - (c) Welding procedure approval

(d) Consumables for Submerged arc welding

110. Porosity is caused by:

- (a) Entrapped slag in the solidifying weld
- (b) Entrapped gas in the solidifying weld
- (c) Entrapped metallic inclusions in the solidifying weld
- (d) None of the above

111. In a bend test, the face of the specimen is in tension and root is in compression, the type of test being carried out would be:

- (a) A root bend test
- (b) A side bend test
- (c) A face bend test
- (d) None of the above

112. Ultrasonic testing is of advantage in detecting which of the following weld imperfection over other NDT method:

- (a) Lack of side wall fusion
- (b) Surface undercut
- (c) Incompletely filled groove
- (d) Overlap

113. The process of tempering is often carried out to regain toughness after which of the following processes:

- (a) Annealing
- (b) Normalising
- (c) Hardening
- (d) Stress relieving

114. The presence of iron sulphide in the weld metal is most likely to produce which of the following upon contraction of the weld:

- (a) Solidification cracking
- (b) Hydrogen cracking
- (c) Intergranular corrosion
- (d) Stress corrosion cracking

115. When visually inspecting a completed single V butt cap you would certainly assess:

- (a) Cap height
- (b) Toe blend
- (c) Weld width
- (d) A, B & C

116. Generally the most suitable method of detecting lack of side wall fusion would be:

- (a) UT
- (b) MPI

- (c) RT
- (d) PT

117. Hot shortness is a term used to indicate:

- (a) Lamellar tearing
- (b) Solidification cracking
- (c) Hydrogen cracking
- (d) None of the above

118. The use of cobalt as an isotope would generally be used on:

- (a) Thin material
- (b) Tee joints
- (c) Plate thickness greater than 25mm
- (d) None of the above

119. In welding procedure terms, a change in essential variable means:

- (a) Re-qualification of the weld procedure
- (b) Possible changes in the weld's micro structure
- (c) Possible changes in the mechanical properties
- (d) All of the above

120. Weld symbols placed on a dotted line in accordance with ISO requirements means:

- (a) Weld on "Arrow" side
- (b) Weld on "Other" side
- (c) Weld on site
- (d) Full penetration

121. A welding inspector's main attribute includes:

- (a) Knowledge and experience
- (b) Literacy
- (c) Honesty and integrity
- (d) All of the above

122. The correct term for a joint prepared on one component only is:

- (a) A bevel butt
- (b) A "J" butt
- (c) A "K" butt
- (d) All of the above

123. The correct terminology in the preceding question (7) is:

- (a) -
- (b) -
- (c) -
- (d) -

124. Technically, a code of practice is:
- (a) A standard
 - (b) A “Set of rules for the manufacture of a product”
 - (c) Related to welder and weld procedure approval
 - (d) All of the above
125. The correct term for “cap height” is:
- (a) Reinforcement
 - (b) Cap profile height
 - (c) Excess weld metal
 - (d) All of the above
126. A tensile test will assess:
- (a) Impact values
 - (b) Stress
 - (c) Strain
 - (d) Both B & C
127. The important point of high temperature steels is that:
- (a) They can withstand creep failure
 - (b) They may suffer re-heat cracking problems
 - (c) They may suffer loss of toughness
 - (d) All of the above
128. An austenitic stainless steel may suffer:
- (a) Weld decay
 - (b) Sensitisation
 - (c) Solidification cracking
 - (d) All of the above
129. Carbon equivalent values are useful to determine:
- (a) Weldability aspects
 - (b) Crack sensitivity aspects
 - (c) Typical mechanical properties
 - (d) All of the above
130. A basic electrode would normally:
- (a) Have superior mechanical properties
 - (b) Require baking before use
 - (c) Not be used on low carbon steels
 - (d) Both A & B
131. When referring to TIG welding, the shielding gas could be:
- (a) Argon + Hydrogen

- (b) Argon + Helium
 - (c) Argon + Nitrogen
 - (d) All of the above
132. When referring to MIG welding, the shielding gas could be:
- (a) Argon
 - (b) Argon + 1% oxygen
 - (c) Argon + 20% CO₂
 - (d) None of the above
133. Submerged arc utilizes:
- (a) Deep penetration characteristic
 - (b) High deposition rates on DC +
 - (c) Flat (PA) welding only
 - (d) None of the above
134. Ultrasonic would be preferred over radiography due to:
- (a) Ability to find most defects
 - (b) Lower skill requirement
 - (c) Ability to detect lamination
 - (d) Both A & C
135. The most serious defect types are:
- (a) Planar
 - (b) Cracks
 - (c) Lack of fusion
 - (d) All of the above
136. Which of the following discontinuities could be as a primary processing discontinuity often found in cast material?
- (a) Fatigue crack
 - (b) Stress corrosion crack
 - (c) Porosity
 - (d) Lack of penetration
137. Which of the following discontinuities could be classified as a service induced discontinuity?
- (a) Fatigue crack
 - (b) Porosity
 - (c) Machining tear
 - (d) Lap
138. Which of the following contamination could affect the sensitivity of penetrant?
- (a) Acid
 - (b) Water
 - (c) Salts

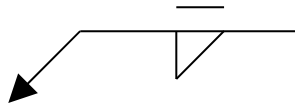
- (d) All of the above
139. Which of the following is a discontinuity that might be found in a forging?
- (a) Shrinkage cracks
 - (b) Laps
 - (c) Cold shuts
 - (d) Insufficient penetration
140. The prime purpose of the black light for fluorescent penetrant inspection:
- (a) To magnify indications
 - (b) To make the indications visible
 - (c) To develop indications
 - (d) To speed up inspection
141. In accordance with BS 5135 which of the following is applicable for scale “C” with regards to hydrogen content per 100g of deposited weld metal?
- (a) $> 15 \text{ ml}$
 - (b) $> 15 \text{ ml} < 25 \text{ ml}$
 - (c) $> 10 \text{ ml} < 15 \text{ ml}$
 - (d) $> 5 \text{ ml} < 10 \text{ ml}$
142. Which is the correct heat input if the amps are 350, volts 32 and travel speed 310 mm / s?
- (a) 2.16 kJ / mm
 - (b) 0.036 kJ / mm
 - (c) 2160 kJ / mm
 - (d) 36 kJ / mm
143. In accordance with BS 5135 what is the minimum distance the pre heat shall be applied from the joint preparation?
- (a) 100 mm
 - (b) 25 mm
 - (c) 75 mm
 - (d) Not specified
144. In accordance with BS 5135 what is the recommended minimum time allowed for the pre heat temperature to equalize?
- (a) 2 Min for each 25 mm of parent material thickness
 - (b) 5 Min for each 25 mm of parent material thickness
 - (c) 2 Min for each 50 mm of parent material thickness
 - (d) 5 Min for each 50 mm of parent material thickness
145. Which of the following best describes the elastic limit?
- (a) The resistance to fracture under impact loading
 - (b) The maximum stress to which a material can be subjected without permanent deformation

- (c) The amount of stress at which point the material will continue to elongate without an increase in force applied
 - (d) The ability of the material to stretch and become permanently deformed without breaking or cracking
146. In accordance with BS 2901 which of the following is classified as triple de-oxidized filler wire?
- (a) A 17 wire
 - (b) A 18 wire
 - (c) A 15 wire
 - (d) All of the above
147. In BS 639 an electrode classified as E51:
- (a) Has an UTS value of 51,000 psi, minimum yield strength of 330 N/mm
 - (b) Has an UTS value of 430 to 550 N/mm, minimum yield strength of 360 N/mm
 - (c) Has an UTS value of 510 to 650 N/mm, minimum yield strength of 360 N/mm
 - (d) Has an UTS value of 510 to 650 N/mm, minimum yield strength of 330 N/mm
148. An E80 electrode would normally be classified in which standard:
- (a) BS EN 499
 - (b) BS 639
 - (c) AWS A5.5
 - (d) AWS A5.1
149. What is an active flux?
- (a) A material used to clean surfaces of the joint through continued chemical reaction
 - (b) A material used to protect the molten weld pool during welding
 - (c) A material used to aid fusion
 - (d) All of the above
150. Which of the following is most likely to reduce the chances of arc blow?
- (a) A change from ac current to dc current
 - (b) A change from dc current to ac current
 - (c) A change from dc electrode +ve to dc electrode -ve
 - (d) A change from dc electrode -ve to dc electrode +ve
151. If a steel has a C_{eq} % of 0.48%:
- (a) PWHT would always be necessary
 - (b) It will probably require a pre-heat temperature above 300°C prior to welding
 - (c) It will probably require a pre-heat temperature above 100°C prior to welding
 - (d) The heat affected zone will be very tough
152. When welding a double V butt joint with SAW process the presence of centerline porosity may be due to:

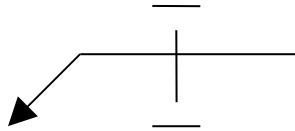
- (a) Damp flux
 - (b) Contaminated joint preparation
 - (c) Incorrect stick out lengths
 - (d) All of the above
153. When considering the advantages of site RT over UT which of the following applies?
- (a) A permanent record produced, good for detecting defects which do not have significant depth in relation to axis of the X-ray beam and defect identification
 - (b) A permanent record produced, good for detecting all surface and sub-surface defects and assessing the through thickness depths of defects
 - (c) A permanent record produced, defect identification not so reliant on operator skill
 - (d) No controlled areas required on site, a permanent record produced and good for assessing the extent of pipe wall thickness reductions due to internal corrosion
154. When ac only is required for welding, the power supply unit is almost always:
- (a) A transformer, rectifier and a means to change the current
 - (b) A transformer, inverter and a means to change the current
 - (c) A rectifier, alternator and a means to change the current
 - (d) A transformer or alternator and a means to change the current
155. The HAZ associated with a fusion weld on steel has up to how many separate regions of micro structure?
- (a) 4
 - (b) 6
 - (c) 1
 - (d) 2
156. The possible effects of having a travel speed too fast:
- (a) Low toughness, slag inclusions and undercut
 - (b) High hardness, slag inclusions and a narrow thin weld bead
 - (c) High hardness, excessive deposition and cold laps
 - (d) Low toughness, poor fusion and slag inclusions
157. What five parameters would be checked when calibrating welding equipment for mechanized MAG welding?
- (a) Joint set up, flux coating, polarity, travel speed and amps / volts
 - (b) Amps / volts, WFS, gas flow rate, polarity and travel speed
 - (c) Amps / volts, WFS, wire diameter, polarity and travel speed
 - (d) Electrode stick out, WFS, amps / volts, polarity and wire diameter
158. Which of the following statements is true when using a flat characteristic power source?
- (a) The electrode is always dc -ve
 - (b) The shielding is always pure argon
 - (c) The wire feed speed remains constant
 - (d) The electrode extension will have no effect on weld quality

159. Which of the following will vary the most, when varying the arc length?
- (a) Voltage
 - (b) Amperage
 - (c) Polarity
 - (d) None of the above
160. Which of the following statement is true?
- (a) The core wire in a MMA electrode has a higher melting point than the flux
 - (b) Electrode dc +ve is used when welding with the MIG / MAG welding process
 - (c) The HAZ of a carbon manganese steel weld usually has a lower ultimate tensile strength than the weld
 - (d) All of the above are true
161. A multi run MMA butt weld made on C/Mn steel consists of 5 passes using 6mm electrodes. A 12 pass weld made on the same joint using 4mm electrodes on the same material will:
- (a) Have a lower heat input and a higher degree of grain refinement
 - (b) Have a lower heat input and a coarser grain structure
 - (c) Have a lower amount of distortion and a higher degree of grain refinement
 - (d) Have a higher amount of distortion and a lower degree of grain refinement
162. The main reason for using a back purge when welding 18-8 stainless steel with the TIG welding process is to:
- (a) Control the root penetration
 - (b) Prevent root bead porosity
 - (c) Improve positional welding
 - (d) Prevent the formation of a dense oxide layer on the root
163. A typical minimum preheat temperature for an MMA weld made on steel with a carbon content of 0.23% and manganese content of 1.3%:
- (a) Preheat would not normally be required
 - (b) Less than 50*c
 - (c) A minimum of 100*c
 - (d) Above 280*c
164. Which is often the hardest part of a multi run weld made using MMA?
- (a) The HAZ of the root
 - (b) The HAZ of the cap
 - (c) The root
 - (d) The cap
165. The HAZ of fusion weld:
- (a) Usually has the highest tensile strength
 - (b) Cannot be avoided
 - (c) Is usually martensite

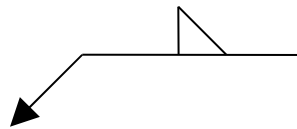
- (d) Both A & B
 - (e) All of the above
166. Which of the following welding processes would you expect to use a collet:
- (a) TIG / TAG
 - (b) MIG / MAG
 - (c) MMA
 - (d) All of the above
167. Which of the following may be used for the TIG / TAG welding of austenitic stainless steel?
- (a) Lanthanum electrode dc -ve
 - (b) Cerium electrode dc -ve
 - (c) Zirconium electrode ac
 - (d) Thorium electrode dc -ve
168. Which of the following standards is entitled electrode wire and fluxes for submerged arc welding process of carbon steel and medium tensile steel?
- (a) BS 639
 - (b) BS 2901
 - (c) BS 2633
 - (d) BS 4165
169. Which of the following processes use a constant characteristic?
- (a) Sub-arc < 1000 amps, MMA, Electro slag
 - (b) TIG / TAG, Sub-arc > 1000 amps, Electro slag
 - (c) Sub-arc < 1000 amps, MIG / MAG, Electro slag
 - (d) MIG / MAG, Sub-arc > 1000 amps, Electro slag
170. What are the possible results of having a too lower heat input?
- (a) An increase in hardness, lower yield strength and lack of fusion
 - (b) A reduction in toughness, hydrogen entrapment and an increase in hardness
 - (c) Entrapped hydrogen, an increase in hardness and lack of fusion
 - (d) Entrapped hydrogen, a reduction in carbon content and lack of fusion
171. What kind of steel is used for making filler rod?
- (a) Killed steel
 - (b) Rimming steel
 - (c) Carbon steel
172. Which of the following is not related to weld?
- (a)



(b)



(c)



173. Which of the following NDT method is not suitable to detect sub surface defect?

- (a) UT
- (b) PT
- (c) RT
- (d) MPI

174. SAW in single pass weld will give:

- (a) Poor profile
- (b) Burn rapidly
- (c) Good penetration
- (d) None of the above

175. In SAW process if voltage and current is increased and travel speed is decreased, what will be the effect in the profile?

- (a) Wider weld
- (b) Higher weld reinforcement
- (c) Concave weld surface

176. What change will occur on the HAZ during heating of metal caused by welding?

- (a) Change in tensile strength
- (b) Change in hardness
- (c) Change in grain crystal structure

177. What types of electrodes needs extra treatment?

- (a) Basic
 - (b) Rutile
 - (c) Cellulosic
178. Applying preheat when welding, carbon manganese steel is normally done to avoid:
- (a) Slag inclusions
 - (b) Hydrogen cracking
 - (c) Lack of side wall fusion
 - (d) Porosity
179. Which of the following mechanical properties of a weld in carbon manganese steel is not affected if the heat per unit length of weld is excessively high?
- (a) Elongation
 - (b) Tensile strength
 - (c) Hardness
 - (d) Toughness
180. You observe centerline cracking in a weld that has been made at one of five work station each making similar components. The first action to take is:
- (a) Impound all welding consumables
 - (b) Report the occurrence to a higher authority
 - (c) Stop all welding
 - (d) Call for full NDT checks
181. Which of the following defects is unlikely to be found by visual inspection?
- (a) Linear misalignment
 - (b) Undercut
 - (c) Overlap
 - (d) Linear slag inclusions
182. Which of the following welding processes uses a resistive heating system to achieve weld metal deposition?
- (a) MMA
 - (b) SAW
 - (c) Electro slag welding
 - (d) Resistance spot welding
183. What two functions in arc welding must be in equilibrium to enable a stable arc to be established?
- (a) Arc voltage
 - (b) Current
 - (c) Wire / Electrode feed rate
 - (d) Metal burn off rate
184. In MMA welding, what parameter is used to control the penetration into the base material?

- (a) Voltage
 - (b) Welding speed
 - (c) Iron powder in the coating
 - (d) Current
185. In the welding of a butt joint made from one side, which of the following controls the profile of the root bead?
- (a) Root face
 - (b) Bevel angle
 - (c) Root gap
 - (d) None of the above
186. What type of power source characteristic is required for manual welding?
- (a) Constant voltage
 - (b) Flat characteristic
 - (c) Drooping Characteristic
 - (d) Motor generator
187. Which of the following destructive test would indicate the toughness of weld metal and parent metal – HAZ?
- (a) Macro
 - (b) Nick break
 - (c) Hardness
 - (d) Charpy vee notch
188. Degreasing components are essential for quality welding but some agents may:
- (a) Cause corrosion problems
 - (b) Give off phosgene gas
 - (c) Leave residues
 - (d) All of the above
189. Which of the following chemical elements has the greater effect on the hardenability of a steel plate?
- (a) Molybdenum
 - (b) Chromium
 - (c) Titanium
 - (d) Carbon
190. In MIG ? CO₂ welding which parameters give the greatest control of weld appearance during dip transfer or short circuiting welding?
- (a) Wire stick out length
 - (b) Amperage
 - (c) Wire feed speed
 - (d) Inductance

191. In MMA welding, the slag produced can be varied to suit the welding position. Which type of slag would be required for welding in the HV position?
- (a) Fluid
 - (b) Viscous
 - (c) None of the above
 - (d) Semi fluid
192. The weld metal deposit of MMA electrodes, achieves its mechanical strength through:
- (a) The core wire
 - (b) The flux coating
 - (c) Iron powders with the flux coating
193. What constituent is needed in a coating of an electrode to prevent the formation of porosity in welding of a rimming steel?
- (a) Iron powders
 - (b) Calcium fluoride
 - (c) Silicon
 - (d) Calcium carbonate
194. Welds made with high heat inputs show a reduction in one of the following properties:
- (a) Ductility
 - (b) Toughness
 - (c) Fatigue strength
 - (d) Mechanical strength
195. In X-ray the quality of radiographic negative is assessed by the:
- (a) Density of the film
 - (b) IQI Indicator
 - (c) KVA available
 - (d) Stand – off distance
196. A steel described as QT will have improved tensile properties because it has:
- (a) Had control of chemical composition
 - (b) Been heat treated
 - (c) Been quality tested
 - (d) Been vacuum melted
197. Which one of the following type of steels would give rise to the formation of porosity when autogenously welded with an arc process?
- (a) Fully killed steel
 - (b) Semi killed steel
 - (c) Rimming steel
 - (d) Fine grained steel
198. In SAW, the use of excessively high voltage would result in:

- (a) Insufficient flux melting
 - (b) Excessive flux melting
 - (c) Slag removal difficulties
 - (d) Spatter
199. The use of cellulosic electrodes is often made when welding the root pass of pipes in the field. This is because:
- (a) H₂ control is needed
 - (b) Iron powders in the electrode
 - (c) Higher arc voltage can be obtained
 - (d) Shorter arc length can be achieved
200. In the welding of austenitic stainless steels, the electrode and the plate material can be purchased with low carbon contents. The reason for this is to prevent:
- (a) Cracking in the HAZ
 - (b) The formation of chromium carbides
 - (c) Cracking in the weld metal
 - (d) Distortion
201. Submerged arc fluxes can be supplied in two forms. These are:
- (a) Sintered and agitated
 - (b) Agitated and fused
 - (c) Crushed and agglomerated
 - (d) Fused and agglomerated
202. In a steel which has improved creep properties at elevated temperature, which one of the following elements helps in this improvement?
- (a) Tungsten
 - (b) Manganese
 - (c) Molybdenum
 - (d) Carbon
203. Welding a steel plate of a CE of 0.45, would require preheating to:
- (a) Prevent the formation of sulphides
 - (b) Prevent hardening in the HAZ
 - (c) Prevent the formation of carbides
 - (d) To improve mechanical properties in the weld
204. Which one of the following processes uses the “Key holing” system of fusion?
- (a) Friction welding
 - (b) Diffusion welding
 - (c) Electron beam welding
 - (d) Autogenous TIG welding
205. In friction welding, is the metal at the interface in the:

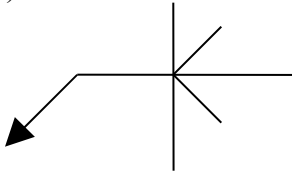
- (a) Liquid state
- (b) Solid state
- (c) Plastic state
- (d) Elastic state

206. Welding procedures may require welds to be deposited at a controlled rate heat input. High heat input would:

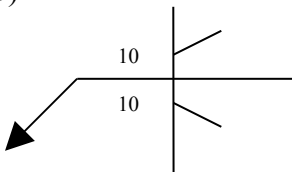
- (a) Have poor profile
- (b) Have larger grain size
- (c) Have high hardness in the HAZ
- (d) Have low elongation properties

207. BS 499 part II communicates by the use of symbols the type of joint preparation to be used. Listed below are four symbols. Which of these indicates the depth of penetration of the weld required on the joint?

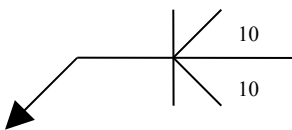
(a)



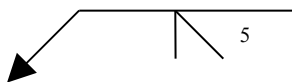
(b)



(c)



(d)



208. In accordance with BS 499 what is the weld junction?

- (a) The area containing HAZ and weld metal
- (b) The weld metal and parent metal
- (c) The boundary between the fusion zone and HAZ

- (d) The part of the weld, which undergoes metallurgical change due to heat from welding
209. Which of the following are essential factors for lamellar tearing?
- (a) High residual stresses, poor through thickness ductility, existing plate Laminations
 - (b) Poor through thickness ductility, fusion face parallel with rolled direction of parent plate, most commonly occurs in butt welds
 - (c) Stress, poor through thickness ductility, fusion face parallel with rolled direction of parent material
 - (d) Tensile stress, deoxidized parent plate, poor through thickness ductility
210. In gas welding, leftward welding is described in BS 499 as:
- (a) The flame is directed towards the welded part and filler material is directed toward un-welded part of the joint
 - (b) The flame and filler material both directed towards welded part of the joint
 - (c) The flame is directed towards the un-welded part and filler material is directed towards welded part of the joint
 - (d) The flame and filler material is both directed towards un-welded part of the joint
211. Which of the following is not a fusion welding process:
- (a) Thermit welding
 - (b) Electro slag welding
 - (c) Laser welding
 - (d) Friction welding
212. When considering the heat treatment process of tempering:
- (a) This is achieved by slowly heating the material to a temperature between 200°C to 650°C and slow cooling in air
 - (b) This is achieved by heating the material to around 200°C and soaking for approximately 10 – 12 hrs and cooling down in air
 - (c) Very fast cooling from the austenite region
 - (d) All of the above could give a temper
213. Which of the following are essential variables for PWHT?
- (a) Heating rate
 - (b) Temperature attained
 - (c) Cooling rate
 - (d) All of the above
214. Most metals expand when heated, the change in length is expressed as:
- (a) Thermal conductivity
 - (b) Modulus of elasticity
 - (c) Coefficient
 - (d) Yielding
215. In TIG welding the nozzle is usually made:

- (a) Copper
- (b) Aluminum
- (c) Ceramic
- (d) Copper / Zinc

216. Which of the following is the odd out?

- (a) Neon
- (b) Xenon
- (c) Argon
- (d) Nitrogen

217. The welding arc could be characterized as:

- (a) A high current, low voltage arc with a flow of electrons from cathode to anode
- (b) A low current, high voltage arc with a flow of electrons flowing from anode
- (c) A medium current and medium voltage with a flow of electrons and +ve ions flowing from anode to cathode
- (d) A voltage which always remains constant at a constant potential with a flow of electrons and -ve ions from cathode to anode

218. Which of the following are considered to be HAZ cracks?

- (a) Solidification cracks, lamellar tearing and reheat cracks
- (b) Reheat cracks, liquation cracks and solidification cracks
- (c) H₂ cracks, solidification cracks and liquation cracks
- (d) Reheat cracks, liquation cracks and H₂ cracks

219. Which of the following standards entitled Visual inspection of fusion welded joints?

- (a) BS 4515
- (b) BS 5289
- (c) BS 5135
- (d) BS EN 440

220. In general it is not easy to mechanise the MMA welding process because:

- (a) Short electrode length, the control of the arc length and the process uses a flat characteristic
- (b) Short electrode length, the control of the arc length and flux coverings
- (c) The control of the arc length, stop start problems and short electrode length
- (d) Flux coverings, short electrode lengths and relationship between amps and volts

221. Which of the following statements is true?

- (a) Oxygen-fuel gas cutting is essentially an oxidization thermal cutting process
- (b) Oxygen-fuel gas cutting is essentially a melting process
- (c) The only fuel gas used is acetylene
- (d) Propane is the preferred fuel gas in oxygen-fuel gas cutting as it produces hotter flame

222. Which of the following best describes a semi automatic welding process?
- (a) The welder is responsible for the arc gap and travel speed
 - (b) The welder is responsible for the travel speed only
 - (c) The welding plant controls both travel speed and arc gap but under constant supervision
 - (d) The welding plant controls both travel speed and arc gap, no supervision required
223. Which sub atomic particle has a +ve charge?
- (a) A proton
 - (b) A photon
 - (c) An electron
 - (d) A neutron
224. Which material is the most susceptible to reheat cracking?
- (a) High carbon steel
 - (b) Killed steel
 - (c) Creep resistant steels
 - (d) Austenitic steels
225. Three essential factors for producing fusion weld are melting, removal of surface oxide from the joint surfaces and elimination of atmosphere from the region of the arc. Name the fourth one:
- (a) The weld must be free from stress
 - (b) The filler material must match that of the weld
 - (c) The completed joint must at least match the mechanical properties
 - (d) An arc for a heat surface
226. Which arc welding process technique is likely to be used to repair localized porosity in a weld?
- (a) MMA – PG position
 - (b) Mechanised arc welding
 - (c) Sub Arc
 - (d) All of the above
 - (e) None of the above
227. A welder qualified in the PG position would normally be qualified for welding:
- (a) All diameters of pipe
 - (b) Welding positions PA, PG and PF
 - (c) In position PG only
 - (d) All pipe wall thickness
228. Name the fourth weld process crack which has a totally different formation mechanism to HICC (H₂ induced cold crack), solidification cracking and lamellar tearing:
- (a) Liquation cracking
 - (b) Reheat cracking
 - (c) Crater cracking
 - (d) Hot tearing

229. Planar defect are best described as:
- (a) Linear from at least one direction
 - (b) Rounded indications
 - (c) Linear from at least one direction with volume
 - (d) May be classed as all of the above
230. Which of the following welding processes is not classed as an arc welding process?
- (a) Electro slag welding
 - (b) Thermit welding
 - (c) Plasma welding
 - (d) Both A and B
 - (e) All of the above
231. Which of the following materials has the poorest weldability?
- (a) Austenitic stainless steel
 - (b) Martensitic stainless steel
 - (c) Carbon manganese steel
 - (d) HSLA steel
232. Which of the following in a fusion weld usually has the highest tensile strength?
- (a) Weld metal
 - (b) Parent material
 - (c) HAZ
 - (d) Fusion zone
233. Which of the following is an alternative name for a crater crack?
- (a) Cold crack
 - (b) Tearing
 - (c) Star crack
 - (d) Fatigue crack
234. What action must the welding inspector request if a lamination is found extending into the bevel face?
- (a) Cut back the material until a lamination free area is found
 - (b) Accept the bevel unless the lamination exceeds 5mm
 - (c) Place a sealing run over the lamination and dress flush, then make the weld as normal
 - (d) Action to take will depend on the agreed specification (or welding engineer/client if specification does not state the action).
235. The deviation of the arc during arc welding due to external magnetic influences is known as:
- (a) Arc strike
 - (b) Arc blow
 - (c) Paramagnetic interference
 - (d) Diamagnetic interference

236. The weldability of a material may be affected by:
- (a) Temperature of the component
 - (b) The C_{eq} % of the material
 - (c) The elements in the material
 - (d) All of the above
237. Which of the following heat treatment processes would be used for grain refinement?
- (a) Annealing
 - (b) Normalizing
 - (c) Quenching
 - (d) H₂ release
238. A repair has been made using MMA on a double V butt weld on a 10 m diameter tank. The defect repaired was lack of inter-penetration and it had been excavated with a disc grinder prior to repair. After repair it was determined that the wrong electrodes had been used. What action should the inspector take:
- (a) Have the repair area ground and re-repair
 - (b) Accept the work if the electrodes were the same flux type
 - (c) Heat treat the area
 - (d) Consult the senior inspector or welding engineer if the specification or procedure does not cover the course of action
239. Which one of the following statements is false?
- (a) Surface breaking defects are usually more detrimental to a weld in comparison with sub-surface defects
 - (b) The HAZ's of a steel weld usually have a higher tensile strength than the weld metal
 - (c) Lamellar tearing may occur within the fusion zone of large fillet welds
 - (d) PWHT may stress relieve
240. What is the possible cause of too much restraint of the parent material during welding?
- (a) Restraint is always desirable
 - (b) It may lead to cracking, especially with small welds between large components
 - (c) It will cause too much distortion
 - (d) It will cause lamellar tearing if it is present on a corner joint
241. Fluctuating loads ie cyclic stresses below the u.t.s on a weld component may lead to:
- (a) Tensile failure
 - (b) Yield failure
 - (c) Fatigue failure
 - (d) Shear failure
242. Which of the following is a method to accurately measure the root radius of a charpy or izod specimen?
- (a) Use a machine called a shadowgraph

- (b) Use pyrometer
- (c) Use a vernier caliper
- (d) Use a densitometer

243. Which of the following statements is true?

- (a) Fillet welds are preferable to butt welds due to high strength
- (b) Fillet welds are normally difficult to assess with NDT in comparison with butt welds
- (c) Fillet welds are only made on steels
- (d) All of the above are true

244. Which of the following is not an inert gas at welding temperature?

- (a) Argon
- (b) Neon
- (c) Carbon dioxide
- (d) Helium

245. Which arc welding process uses a non consumable electrode?

- (a) MIG
- (b) TIG
- (c) SAW
- (d) None of the above

246. Which of the following welding processes is not a fusion welding process?

- (a) Electro slag welding
- (b) Oxy-gas welding
- (c) Forge welding
- (d) TIG welding

247. Which of the following current types would be used for welding aluminum with the TIG welding process?

- (a) Ac
- (b) Dc +ve electrode
- (c) Dc -ve electrode
- (d) All of the above could be used successfully

248. Which of the following statements is true?

- (a) Electrode dc +ve always produces a narrow deep weld pool
- (b) The word Rutile means calcium carbonate
- (c) Porosity is always repairable
- (d) Dc electrode +ve is used for the MAG welding of steel

249. What four criteria are necessary to produce HICC?

- (a) Hydrogen, moisture, martensite and heat
- (b) Hydrogen, poor weld profile, temperature above 200*c and slow cooling
- (c) A grain structure susceptible to cracking, stress, hydrogen and a temperature below 200*c

- (d) Weld defects, pearlite, hydrogen and a temperature above the melting point for the material
250. How many temperature indicating crayons would be required to ensure the preheat temperature was lying within a specified range?
- (a) 1
 - (b) 2
 - (c) 3
 - (d) As many as possible
251. A carbon equivalent of 0.48%:
- (a) Is high for a C-Mn steel and may require a preheat temperature over 100°C
 - (b) Is insignificant for a C-Mn steel and preheat will not be required
 - (c) Is calculated from the heat input formula
 - (d) Is not a consideration for determining preheat temperature
252. A martensite grain structure:
- (a) Is always present in welds on steel
 - (b) Is brittle grain structure
 - (c) Is obtained when the preheat temperature exceeds 200°C
 - (d) All of the above
253. Which of the following is not a type of crack?
- (a) Fissure
 - (b) Lamellar tear
 - (c) Fish eye
 - (d) Reheat crack
254. What do you understand by the term minimum interpass temperature?
- (a) Minimum post heat temperature
 - (b) Minimum stress relief temperature
 - (c) The lowest temperature to be used when normalising
 - (d) The lowest temperature allowed during welding and between passes
255. Which of the following welding processes may be described as a low H₂ process in comparison with MMA welding?
- (a) TIG
 - (b) MIG
 - (c) MAG
 - (d) All of the above
256. Which of the following standards is entitled imperfections in Metallic fusion welds with explanation:
- (a) BS EN 25817
 - (b) BS EN 26520

- (c) BS EN 22553
- (d) BS EN 24165

257. Which of the following could cause root concavity?
- (a) Excessive back purge pressure and very high heat input
 - (b) Excessive back purge pressure and entrapped gas
 - (c) Excessive root grinding and a slow travel speed
 - (d) Excessive root grinding and excessive back pressure
258. High Phosphorous contents in carbon steels may cause:
- (a) Cold shortness
 - (b) Hot shortness
 - (c) An increase in ductility
 - (d) An increase in malleability
259. If arc strikes are found on carbon steel (C eq of .5%), what undesirable grain structure may be present?
- (a) Pearlite
 - (b) Martensite
 - (c) Bainite
 - (d) All of the above are undesirable grain structures in constructional steels
260. How do you convert psi to N/mm²?
- (a) Divide by 144.9
 - (b) Multiply by 25.4
 - (c) Divide by 14.7
 - (d) Multiply by 14.7
261. How many Mpa are equal to 1 N/mm²?
- (a) 144.9
 - (b) 25.4
 - (c) 14.7
 - (d) 1.
262. What is the UTS of a material?
- (a) The proof stress
 - (b) The maximum load a specimen can withstand
 - (c) The limit of proportionality
 - (d) The point of plastic deformation
263. What is a charpy test used for?
- (a) To measure the ductility of a material
 - (b) To test the tensile strength of a material
 - (c) To test the notch toughness of a material
 - (d) To measure crack propagation speed

264. What is a Vickers Pyramidal Indentor used for?
- (a) To measure indentation toughness
 - (b) To measure ductility
 - (c) To measure hardness
 - (d) All of the above
265. What is the main constituent of a rutile electrode flux?
- (a) Cellulosic
 - (b) Titanium dioxide
 - (c) Calcium carbonate
 - (d) Asbestos
266. What does the 70 represent on a E 7010 AWS classified electrode?
- (a) 70 N/mm² minimum uts
 - (b) 70 N/mm² minimum impact strength
 - (c) 70,000 psi minimum uts
 - (d) 70,000 psi minimum impact strength
267. Basic coated electrodes provided in standard packaging:
- (a) Are deep penetrating electrodes
 - (b) Should be heated prior to welding to obtain a low H₂ content in the weld
 - (c) Should be heated to totally eliminate H₂ in the weld
 - (d) Should not be preheated as this will detrimentally effect welding performance
268. Sodium silicate in an MMA electrode flux:
- (a) Stabilizes the arc
 - (b) Binds the ingredients of the flux
 - (c) Forms slag
 - (d) All of the above
269. Which electrodes are very susceptible to causing porosity in the deposited welds if long arc employed?
- (a) Basic
 - (b) Cellulosic
 - (c) Rutile
 - (d) None of the above
270. What is the purpose of a rectifier?
- (a) To adjust the voltage
 - (b) To adjust the amperage
 - (c) To covert ac to dc
 - (d) To reduce the chance of arc strike
271. A welding process using equipment with a flat characteristic:

- (a) Will require a permanent or temporary backing to be pre placed on the root side of the welds
 - (b) Has the advantage of being able to use any type or size of electrode
 - (c) Is likely to be using an electrode less than 2 mm dia.
 - (d) Is likely to be using an electrode more than 2 mm dia.
272. Which of the following best describes the duty of a welding inspector?
- (a) To carry out inspection and NDT in order to find all weld flaws present
 - (b) To attempt to ensure that all welding and any associated actions are carried out in accordance with agreed specification
 - (c) To carry out welding inspection and radiography interpretation with agreed procedure for the work being undertaken
 - (d) To make sure that all the welds are defect free
273. Which of the following butt weld preparation is usually the most susceptible to lack of side wall fusion during MMA welding?
- (a) A double sided U preparation
 - (b) A single V preparation
 - (c) A double sided V preparation
 - (d) It is not possible to induce lack of side wall fusion during MMA welding
274. What is the leg length of a fillet weld?
- (a) The distance from the toe to the face
 - (b) The distance from the root to the face center
 - (c) The distance from the root to the toe
 - (d) The distance from the toe to the toe
275. What is the throat thickness of a mitre fillet weld equal leg length?
- (a) The distance from the toe to the face
 - (b) The distance from the root to the face center
 - (c) The distance from the root to the toe
 - (d) The distance from the toe to the toe
276. Which of the following will vary the most when varying the arc length using the MMA process?
- (a) Voltage
 - (b) Amperage
 - (c) Polarity
 - (d) None of the above
277. What is a possible result if the amperage is too low during the welding of a root bead using an arc welding process with a consumable electrode?
- (a) Incomplete root penetration
 - (b) Lack of root fusion
 - (c) The freezing of the electrode to the work piece

- (d) All of the above
278. Why have a high OCV with MMA welding?
- (a) To initiate
 - (b) To obtain penetration
 - (c) To avoid lack of fusion
 - (d) MMA welding does not have a high OCV
279. What is another term for suck back?
- (a) Concave root
 - (b) Elongated porosity in the root
 - (c) Lack of penetration
 - (d) A slag line above the root pass
280. A center line crack in a fillet weld:
- (a) May be repaired if the welding engineer for the client says so
 - (b) May be related to a poor setup
 - (c) May be related to the way the grains solidify
 - (d) All of the above
281. What is lamellar tearing?
- (a) Strain cracking at the edge of bend test specimen
 - (b) A type of crack occurring in the parent material is associated with poor through thickness ductility especially when large fillet welds or tee butt joints are made on the material
 - (c) A type of crack found in welds which have undergone several thermal cycles either during welding or PWHT
 - (d) It is another name for a plate lamination caused during plate or pipe manufacture
282. What is a crater pipe?
- (a) Another term for concave root
 - (b) Another term for a burn through
 - (c) A type of gas pore found in the weld crater
 - (d) A shrinkage defect which may be found in a weld center
283. Why is a weld procedure qualification test necessary?
- (a) To ensure the welder is able to make sound welds meeting the requirements of the agreed welding procedure
 - (b) To ensure the welder satisfies the NDT and mechanical requirements of the specification
 - (c) To give maximum confidence that the variables used for welding are compatible and will produce sound welds meeting the requirements of the agreed specification
 - (d) To give a guarantee that defect free welds are going to be produced
284. Which of the following is not specified on a typical written welding procedure?
- (a) To make sure the welder can weld
 - (b) To make sure the weld is able to withstand stress

- (c) To give maximum confidence that the welder can produce welds to meet the requirements of the specifications(s)
 - (d) To make sure the welder can produce a weld free from discontinuities
285. A welder qualified in the 6G position would normally be qualified for welding:
- (a) All diameter pipes
 - (b) All metals
 - (c) In all positions for the butt welds and fillet welds
 - (d) All of the above
286. Non-planar defects associated with a weld:
- (a) Are not significant
 - (b) Must be removed
 - (c) Are not usually as significant as planar defects
 - (d) Only exit sub-surface
287. Lamellar tearing:
- (a) Only occurs in the rolled direction of a parent material
 - (b) Is a HAZ type of type of crack
 - (c) Is another term for a lamination
 - (d) All of the above
288. Cold lapping is another term for:
- (a) Lack of fusion at the toe of a weld
 - (b) Low amperage
 - (c) Undercut
 - (d) Hydrogen cracking
289. Which of the following sentences applies to the use of basic MMA electrodes?
- (a) They are used to deposit weld metal in the vertical position only
 - (b) They are used where deep penetration is a primary requirement
 - (c) They are usually used to deposit weld metal of low hydrogen content
 - (d) Basic electrodes are chosen when ease of use is of importance
290. Which of the following would show as light indications on a radiograph?
- (a) Slag inclusions and copper inclusions
 - (b) Tungsten inclusions and excessive penetration
 - (c) Cap undercut and root piping
 - (d) Excessive cap height and incomplete penetration
291. Which of the following welding processes does not use a consumable electrode?
- (a) SAW
 - (b) MMA
 - (c) TIG
 - (d) ESW

292. The hardest grain structure capable of being produced when welding C/Mn steel is:
- (a) Bainite
 - (b) Austenite
 - (c) Pearlite
 - (d) Martensite
293. The presence of too much hydrogen when welding C/Mn steels would be to cause the formation of:
- (a) Porosity
 - (b) Lack of fusion
 - (c) Crack
 - (d) undercut
294. What term applies if a carbon steel weldment is heated up to a temperature which creates austenitic grain growth and then is allowed to cool in air?
- (a) Normalizing
 - (b) Annealing
 - (c) Quenching
 - (d) Tempering
295. Why is stress relief (PWHT) some times carried out on weldments?
- (a) To dissolve entrapped hydrogen
 - (b) To remove residual stresses
 - (c) To fuse planar defects
 - (d) All of the above
296. When welding a double V butt with the SAW process the presence of center line porosity may be due to:
- (a) Damp flux
 - (b) Incomplete penetration
 - (c) Contaminated weld preparation
 - (d) Atmospheric contamination