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1. Post weld heat treatment of vessel welds generally results in:
 - a. Reduction in hardness
 - b. Increase of tensile strength
 - c. Increase of both strength and ductility
 - d. None of the above

 2. A pressure vessel fabricated in 1960 was in service. It has been decided to remove the top head and extend the height and replace the dish head with a new one. The proposal is:
 - a. The proposal can be accepted for review by authorized inspector
 - b. No modification is allowed on this vessel
 - c. A pressure vessel engineer should be consulted for approval
 - d. None of the above

 3. Vessels that are known to have a remaining life of over _____ years or that are protected against external corrosion need not have insulation removed for the periodic external inspection.
 - a. 10
 - b. 15
 - c. 5
 - d. 20

 4. After an inspection interval is completed and if calculations indicate that an inaccurate rate of corrosion has been assumed initially, how do you determine the corrosion rate for the next inspection period?
 - a. Check the original calculations to find out what the error is in the original assumption.
 - b. Unless the corrosion rate is changed by Jurisdiction, the initial rates shall be used.
 - c. The corrosion rate shall be adjusted to agree with the actual rate found.
 - d. Call in a corrosion specialist

 5. If a vessel is made up of unknown materials and computations must be made to determine the MAWP what
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can the inspector or the vessel engineer do to establish the MAWP?

- a. The lowest grade material and highest joint efficiency in the applicable code may be assumed for calculations.
 - b. Assume MOC as SA 283 Gr. C and joint efficiency = 0.7
 - c. The vessel made of the unknown material must be removed from service and vessel of known material must be installed.
 - d. The vessel of unknown material shall be subjected to hydrostatic tests while having strain gages on it to determine its yield strength and thus allowable stress.
6. RBI assessment can be used to alter the inspection strategy provided:
- a. The degradation methods are identified and evaluated
 - b. The RBI is fully documented.
 - c. A third party conducts the RBI
 - d. Both A and B above
7. What climatic area may require a very active program for corrosion under insulation?
- a. Cooler dry locations.
 - b. Very cold locations with year round temperature less than 25°F
 - c. Warmer, wet locations
 - d. Warmer dry locations
8. Soil-to-air (S/A) interfaces for partially buried vessels are a location where localized corrosion may take place. If the buried part is excavated for inspection, how deep should the excavation be to determine if there is hidden damage?
- a. 12 to 18 inches
 - b. 6 to 12 inches
 - c. 12 to 24 inches
 - d. 6 to 18 inches
9. 2 Common way to minimize temper embrittlement is to limit
- a. 'J' factor for weld metal.
 - b. 'X' factor for base metal.
 - c. 'J' factor for base & 'X' factor for weld metal.
 - d. 'X' factor for base & 'J' factor for weld metal
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10. The minimum hydro test temperature for in-service vessel of 2" thickness is:
- a. MDMT+10°F
 - b. MDMT+30°F
 - c. MDMT+ 0°C
 - d. MDMT+ 0°C
11. "Clam shell" type crack failure having concentric rings called "beach marks" showing "waves" of crack propagation is typically the description of
- a. Fatigue cracks.
 - b. Creep cracks.
 - c. Stress corrosion cracks.
 - d. Hydrogen induced cracks.
12. Minimum Design thickness for a vessel shell is 10 mm. Following four plates were received with actual thickness equal to: 10.2 mm, 9.7mm, 10.3mm, and 9.6 mm. As per ASME Sec. VIII Div.1, how many plates will you release for vessel fabrication?
- a. 1
 - b. 2
 - c. 3
 - d. All 4
13. What type of repairs and procedures may the inspector give prior general authorisation to continue (provided the inspector is satisfied with the competency of the repair organization)?
- a. Major repairs and minor procedures
 - b. Limited or routine repairs
 - c. Major alterations and re-ratings
 - d. Minor re-ratings and alterations
14. A vessel in service has different zones of corrosion. The next inspection frequency will be decided by:
- a. Zone with highest rate of corrosion
 - b. Zone with lowest remaining life
 - c. Average rate of corrosion shall be taken into consideration
 - d. Average remaining life of the vessel shall be considered
15. Resistance to sulphidation is generally achieved by
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- a. Upgrading to higher nickel alloys
 - b. Upgrading to higher chromium alloys
 - c. Upgrading to higher copper based alloys
 - d. All of the above.
16. Characteristic SCC in Austenitic S.S. generally will be
- a. Transgranular, branching and aggravated by increasing temperature
 - b. Intergranular and unidirectional (straight) and aggravated at low temperature
 - c. Independent of chloride content
 - d. None of the above
17. In planning for an internal inspection of a vertical vessel that has acidic corrodents, what type of corrosion would you expect to find on the vessel shell from inside?
- a. Hydrogen blistering near liquid level
 - b. Hydrogen blistering on top dished head
 - c. Hydrogen blistering near the bottom of vessel
 - d. None of above
18. H_2S in sour crude is more harmful in presence of:
- a. Oxygen
 - b. Water (*i.e.*, Wet H_2S)
 - c. Sulphur
 - d. a and c above
19. The leak tightness of the relief valves is tested on the test block at a pressure equal to:
- a. Same as set pressure
 - b. 90% of the set pressure
 - c. Same as reseal pressure
 - d. None of the above
20. The principal reason for inspecting a pressure relief device is to determine:
- a. Condition of pressure relief device and if it is functioning properly
 - b. The remaining life of pressure relief device.
 - c. The spring coil diameter.
 - d. The body thickness.
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21. Which of the following tests must be conducted on a valve as soon as it has been received in the shop for inspection?
- a. Visual inspection
 - b. Hydrotesting of valve body
 - c. Radiographic testing
 - d. Check set-pressure
22. API 576 does not address:
- a. Valve testing on test benches in shop
 - b. Application of rupture discs
 - c. Training requirements for mechanics involved in inspection and repair of pressure relieving devices
 - d. All of the above
23. For vessels which are supported on concrete saddles and working in an area where the humidity is high which areas on them are typically susceptible to external corrosion?
- a. At the anchor bolts in the foundation
 - b. At the Points of contact of the metal surface with the concrete
 - c. All of the above
 - d. None of the above
24. Inspection records contain the following information for a TML on a dished head. (Thk. in inches) On the basis of this information, the long-term corrosion rate for the location is:

<i>Thickness</i>	<i>Year</i>
0.500	0
0.425	5
0.400	10

- a. 1 ½ mils per year
 - b. 5 mils per year
 - c. 10 mils per year
 - d. 100 mils per year
25. A certain C. S. vessel which required impact testing was required to have PWHT initially according to code requirement. After 10 years when repaired by welding PWHT is to be carried out.
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Performing PWHT is found to be impracticable. Which of the following is relevant (as per API-510)?

- a. PWHT may be exempted, if proper NDE is carried out.
 - b. Carry out temper-bead welding as alternative to PWHT.
 - c. Carry out both hydro-testing and pneumatic testing in lieu of the PWHT.
 - d. Carry out preheating to minimum 200°F
26. A cylindrical shell with thickness = 4.0", ID=96", S=17100 and E=0.85 and C. A. = 1/8" showed metal loss of 1/4" within the areas lying 8" on either side of the longitudinal welds. You analysis of situation is:
- a. Recalculate shell thickness t'_{minimum} considering E=1.0
 - b. The thinned area is on or within weld area hence (a) above can not be adopted
 - c. Prepare repair procedure and restore the metal loss as per API -510
 - d. b and c above
27. Materials used for making repair by welding in carbon steel vessels shall have the following limitations?
- a. They shall meet the requirements stipulated in NACE Standard.
 - b. The carbon content shall not be over 0.35%
 - c. Welding repair shall be done by using only the GTAW process
 - d. All of the above
28. For non-continuous corrosive service with remaining life 25 years, external inspection shall be performed not later than:
- a. 10 years
 - b. 12.5 years
 - c. 5 years
 - d. None of above
29. An ellipsoidal head has an internal diameter of 76 inches and depth of 21 inches (including a straight face dimension of 2 inches). What should its spherical (crown) radius be?
- a. 76.9 inches
 - b. 15.6 inches
 - c. 68.4 inches
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- d. All of the above
30. For carrying out temper – bead welding technique in lieu of PWHT, apart from other requirements, which of the following is acceptable?
- a. The root and final pass of weld shall be radiographed.
 - b. Weld metal shall be deposited for second pass while the first pass below the second pass is still not cooled down and its cooling rate is retarded due to the heat of second pass.
 - c. After depositing each layers of the weld, the weld shall be PT checked.
 - d. Both b and c
31. Calculate the remaining life and external insp. interval of a vessel given the following data:
- Actual thickness = 0.955 inch
Minimum thickness required = 0.759 inch
Thickness at previous inspection 5 years prior to present inspection = 1.025 inch
- a. 20 years, 10 years
 - b. 14 years, 5years
 - c. 28 years, 10 years
 - d. None of the above
32. As per API 510, the organization who carry out PRV repair, testing has to be:
- a. Needs to be a certified company to perform all repair work in accordance to ASME.
 - b. Needs to have have documented quality control procedure
 - c. Needs to have qualified personnel to carry out the job within scope of repair
 - d. Only b and c above
33. A vessel which was inspected six years ago and had shell thickness = 0.870". As on today the thickness as reported by filed inspection is 0.786. What was the corrosion rate over last six years?
- a. 10 mpy
 - b. 12 mpy
 - c. 14 mpy
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- d. none of above
34. If the vessel in above question has minimum permissible thickness = 0.618" for the present design conditions. What will be estimated remaining life of the vessel if corrosion rate remains same?
- a. 10 years
 - b. 12 years
 - c. 14 years
 - d. None of above
35. For a vessel, remaining life is estimated as 22 years from now, next planned internal and external inspection shall not be later than:
- a. 11 Years, 5 Years
 - b. 10 Years, 5 Years
 - c. 5 Years, 5 Years
 - d. None of the above
36. What is the maximum defect permitted on the convex surface of a welder qualification bend test after bending?
- a. ¼ inch
 - b. 1/8 inch
 - c. 1/16 inch
 - d. 3/16 inch
37. Certification of contaminants shall be obtained for all PT materials used on:
- a. Carbon steels
 - b. Ferritic stainless steels
 - c. Austenitic stainless steels
 - d. None of the above
38. The scope of the ASME Boiler and Pressure Vessel, Code, Section V includes:
- a. NDE acceptance criteria
 - b. How to perform NDE to achieve a desired result
 - c. Where to do NDE (i.e. what welds to examine)
 - d. All of above.
39. For Ammeter calibration for magnetizing equipment, the allowable tolerance is:
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- a. $\pm 5\%$
 - b. $\pm 10\%$
 - c. $\pm 15\%$
 - d. $\pm 20\%$
40. Which of the following are commonly preferred to know the process side degradation of pressure vessels?
- a. On -stream inspection.
 - b. Internal inspection
 - b. External inspection as alternative to internal inspection
 - c. Any of above is OK
41. For MT examination by Prod technique the magnetizing current required depends on:
- a. Prod Spacing
 - b. Thickness of item under Inspection
 - c. a & b above
 - d. None of above
42. While deciding the governing thickness for crown portion for corroded 2:1 ellipsoidal head, API 510 stipulates that & crown thickness shall be calculated:
- a. According to relevant ellipsoidal dished head formula
 - b. According to code formula for spherical heads with head radius equal to 0.9 D, where D is shell dia meter.
 - c. Thickness of crown shall be same as knuckle thickness.
 - d. None of the above
43. For a vertical column, Int. dia. = 48" and height (T-T) = 80ft, The vessel MAWP is 60 psi. Minimum vessel part MAWP for bottom dished head (2:1 Ellip type) shall be:
- a. 94.6 psi
 - b. 82.8 psi
 - c. 95.5 psi
 - d. None of above
44. How is hammer testing utilized?
- a. As a preliminary survey for thinned areas
 - b. As a independent test method for which ASNT Certification in NDT is available
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- c. As a important tool in the hands of the Authorized inspection only
 - d. To carry out Carpy impact test
45. Which of the following represent grouping of weld-metals in ASME IX?
- a. P – Nos.
 - b. F – Nos.
 - c. S – Nos.
 - d. A – Nos.
46. Which is/are advantage of magnetic particle testing over penetrant testing?
- a. It can detect surface discontinuities with foreign material imbedded in them.
 - b. It is faster on individual parts.
 - c. It can detect near-surface discontinuities.
 - d. All of the above
47. Double wall Double image technique is used for the radiography of:
- a. Plate welds
 - b. Tubular products with outer diameter less than 3.5 inch
 - c. Large pipes with outer diameter 200 mm and above
 - d. Heavy castings
48. As per ASME Sec. VIII Div. 1, if permanent deformation is observed due to over pressure during hydrotesting:
- a. The inspector should ask for re-test using proper test pressure and new pressure gauges.
 - b. Follow-up the hydro-testing by a pneumatic test at proper pressure, taking suitable precautions as given in code
 - c. The inspector may ask for providing additional stiffening rings around vessel and carry out re-hydro test at proper test pressure.
 - d. The inspector may reject the vessel.
49. The size of a properly deposited equal fillet weld is shown as 10 mm. The throat dimension for this weld will be approximately:
- a. 10 mm
 - b. 8 mm
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- c. 7 mm
 - d. 9 mm
50. If any setting is noticed on a vessel, which of the following should be done:
- a. Conduct RT after 48 hours of observing the defective condition
 - b. Nozzles and adjacent shell areas should be inspected for distortion and cracking
 - c. Use acoustic emission monitoring
 - d. All of the above
51. Identify the correct statement (s)
- a. SSC is aggravated due to wet H₂S
 - b. Hydrogen blistering may occur on I.D, O.D, or any where within wall thickness of the pressure vessel.
 - c. High hardness & High strength steels are more likely to undergo damage due to SCC compared to low strength/ low hardness steels
 - d. All of the above are correct statements
52. Cracks and laminations look similar from surface however, generally:
- a. Cracks run normal to vessels surfaces
 - b. Lamination runs slant or parallel to surface
 - c. a and b above
 - d. None of above
53. High temperature hydrogen attack is typically due to
- a. Methane gas formation
 - b. Wet H₂S formation
 - c. Temper embrittlement
 - d. Presence of molybdenum in alloy steels.
54. The nonmetallic coating disbonding in a vessel can be better detected by:
- a. Eddy current testing
 - b. Holiday detection
 - c. Ultrasonic testing
 - d. Acoustic emission testing
55. External inspection of a pressure vessel starts with:
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- a. Ladder, stairs, walkway and platforms of the vessel
 - b. Insulation, skirt and foundation
 - c. The external surfaces, of vessel
 - d. Dimensional check of the vessel
56. Before carrying out an inter service inspection on a vessel put in-service for quite some time what the inspector should do first?
- a. Check the material in which it is constructed.
 - b. Check the permanent file of the vessel.
 - c. Check the progressive history file of the vessel.
 - d. Check the original thickness report.
57. Post weld heat treatment of vessel welds generally results in:
- a. Improvement in ductility
 - b. Increase of tensile strength
 - c. Increase of strength and ductility
 - d. None of the above
58. The _____ shall be responsible to the owner-user for determining that the requirements of API 510 for inspection, and testing are met.
- a. Vessel engineer
 - b. Authorised inspector
 - c. Repair organisation
 - d. Operating personnel
59. Environmental cracking of austenite stainless steels is caused many times by:
- a. Exposing areas to high-velocity and high-turbulence streams
 - b. Excessive cyclic stresses that are often very low
 - c. Exposure to chlorides from salt water
 - d. Creep of the material by long time exposure to high temperature and stress
60. Where can fatigue cracking typically be first detected?
- a. At points of low-stress intensification such as reinforced nozzles
 - b. At points of high-stress intensification such as branch connections
 - c. At points where cyclic stresses are very low
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- d. At points where there are only the primary stresses
61. The term "away from weld" for recalculating the required thickness (Vessels with $E < 1$), means area lying away from weld _____ on either side of the weld or _____ times the minimum measured thickness on either side of the weld, whichever is greater.
- a. 1", 4
 - b. 1", 2
 - c. 2", 2
 - d. 2", 4
62. Temper embrittlement is:
- a. Brittleness due to low temperature operation
 - b. Brittleness due to Hydrogen Sulphide attack at high temperatures (exceeding 700°F)
 - c. Loss of ductility in Cr-steels due to incorrect PWHT and High temperature service
 - d. None of above
63. Sour crude is more corrosive than sweet crude because:
- a. Sour crude is heavier than is sweet crude
 - b. Sweet crude has more waxing tendency (compared to sour crude) which forms protective layer on metallic surfaces hence sweet crudes are less corrosive.
 - c. Sour crude contains high content H_2S and sulphur compared to sweet crude which lead to several types of corrosion
 - d. None of the above
64. HCl is more corrosive in refining sour crudes because:
- a. In presence of H_2S , corrosion of iron by HCl becomes cyclic reaction regenerating HCl.
 - b. HCl liberates chlorine in presence of sulphur which causes stress corrosion cracking
 - c. HCl liberates Hydrogen in presence of sulphur causing Hydrogen embrittlement.
 - d. None of the above
65. Vessel containing lethal substance with shell thickness of 20mm requires:
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- a. Spot radiography (RT-3)
- b. Full length radiography (RT-1)
- c. No radiography (RT-4)
- d. Penetrant is sufficient if radiography testing is not available

66. The rate of erosion varies as:

- a. Square of fluid velocity
- b. Linearly with velocity
- c. Varies as cube of velocity
- d. Varies as square root of velocity

67 The pH of an acidic solution is:

- a. Less than 7
- b. Greater than 7
- c. It is 7
- d. Greater than 10

Q.	ANS.	REFERENCE	Q.	ANS.	REFERENCE
1	A	General Knowledge	36	B	ASME IX, QW - 163
2	C	API 510, 7.1.1	37	C	ASME V, Art. 6, App. II
3	A	API 510, 6.3	38	B	ASME V, Art. 1, Scope
4	C	API 510, 6.4	39	B	ASME V, Art. 7, T-761
5	B	API 510, 6.7	40	B	API 510, 6.1
6	D	API 510, 6.2	41	C	ASME V, Art. 7, T-752.2
7	C	API 572, 8.2.1	42	B	API 510, 5.7 (e)
8	B	API 572, 8.2.9	43	C	BOK, 80 + 82 x 0.433
9	C	API 571, 4.2.3	44	A	API 572, 10.8.1
10	A	API 510, 6.5	45	D	ASME IX, Table QW - 442
11	A	API 571 4.2.16.5(a)	46	D	ASME V, Art. 7, Scope & Gen. Knowledge
12	C	ASME VIII, UG - 16 (c)	47	B	ASME V, Art. 2, T-271 (b)

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13	B	API 510, 7.11		48	D	ASME VIII, UG - 99
14	B	API 510, 6.4		49	C	BOK, $10 \times 0.7 = 7$ mm
15	B	API 571 4.4.2.6.a		50	B	API 572, 10.38
16	A	API 571 4.5.1.3(b) and 4.5.1.5.c,d		51	D	API 571, 5.12.3.1 a, d and 5.1.2.3.4(d)
17	A	API 572, Page 29		52	C	API 572, Page 31
18	B	API 572, Page 28		53	A	API 571, 5.1.3.1.1 (a)
19	B	API 576, 6.2.15		54	B	API 572, 10.4.6
20	A	API 576, 6.1		55	A	API 572, 10.3.2
21	D	API 576, 6.28		56	C	API 572, 10.4.3
22	C	API 576, Scope		57	A	General Knowledge
23	B	API 572, 10.3.5		58	B	API 510, 4.4
24	C	API 510, 6.4		59	C	IRE II, 202.064
25	B	API 510, 7.2.3.2		60	B	API 510, 5.2
26	D	API 570, 5.7 (d)		61	B	API 510, 5.7 (d)
27	B	API 510, 7.2.8		62	C	API 510, 5.2
28	C	API 510, 6.3		63	C	IRE, Ch. II, 202.023
29	C	API 510, 5.7 (e)		64	A	IRE, Ch. II, Page 12
30	B	API 510, 3.19		65	B	ASME VIII, UG - 11 (a)
31	B	API 510, 6.3, 6.4		66	C	IRE II, 203.02
32	D	API-510 6.6		67	A	IRE II, Page 10
33	C	API 510, 6.4		-		
34	B	API 510, 6.4		-		
35	B	API 510, 6.3, 6.4		-		
