Questions and Answers

Levels I, II, and III

Visual and Optical Testing Method

Supplement to
Recommended Practice
No. SNT-TC-1A
Book I

The American Society
for Nondestructive Testing, Inc.

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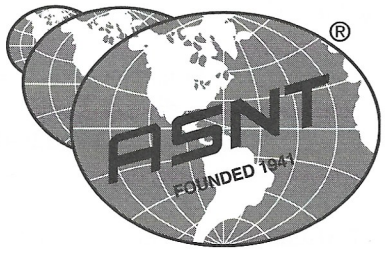

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ASNT exists to create a safer world by promoting the profession and technologies of nondestructive testing.

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Recommended Training References
Visual and Optical Testing

The following references were used in formulating the questions contained in this book.

A.* *ASM Handbook*, ninth edition, Volume 17, *Nondestructive Evaluation and Quality Control*, Metals Park, OH: ASM International, 1989.

B. *Hobart Institute of Welding Technology Welding Guide*, Troy, OH, Hobart Institute of Welding Technology, 1995.

C.* *Nondestructive Testing Handbook*, first edition, Robert C. McMaster, ed. Columbus, OH, The American Society for Nondestructive Testing, Inc., 1959.

D. *Visual Examination Technology: Competency Area 101 (Level I) Practical/Specific*, Charlotte, NC, EPRI NDE Center, December, 1996.

E.* *Nondestructive Testing Handbook*, second edition: Volume 8, *Visual and Optical Testing*, Michael Allgaier, Stanley Ness, technical eds., Paul McIntire and Patrick O. Moore, eds., Columbus, OH, The American Society for Nondestructive Testing, Inc., 1993.

F. *Visual Examination Technology: Competency Area 102 (Level II) General*, Charlotte, NC, EPRI NDE Center, December, 1996.

G. *Welding Handbook: Welding Technology*, Volume 1, eighth edition, Miami, FL, American Welding Society, 1987.

* Available from The American Society for Nondestructive Testing, Inc.

Each question found in this book contains bold letter(s) and page number(s) immediately following the answers. For example,

6. A discontinuity associated with metal overflow during forging is called a:

   a. seam.
   b. flake.
   c. lap.
   d. lamination.

A.493

In this example, the letter "A" refers to Reference A in the list provided above and "493" is the specific page range in Reference A where the answer to the question can be found. Always select the "most correct" answer.

Reference Usage List

Reference A: Total = 8
Level I (4)
Level II (4)
Level III (0)

Reference B: Total = 2
Level I (0)
Level II (2)
Level III (0)

Reference C: Total = 7
Level I (4)
Level II (3)
Level III (0)

Reference D: Total = 40
Level I (29)
Level II (11)
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Reference E: Total = 168
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Reference F: Total = 32
Level I (7)
Level II (26)
Level III (0)

Reference G: Total = 27
Level I (5)
Level II (22)
Level III (0)

Level I Questions
Visual and Optical Testing Method

1. Steel mill products may have:

   a. stress cracks.
   b. die burns.
   c. arc drags.
   d. laminations.

   A.549

2. A high-intensity source of light may cause an inspection problem because:

   a. it produces excessive glare.
   b. it produces considerable heat.
   c. it has a short bulb life.
   d. the lamp head cannot be adjusted.

   E.54-55

3. A common inspection instrument that is used to visually inspect internal bore surfaces is a:

   a. magnifying glass.
   b. borescope.
   c. phototube.
   d. microscope.

   C.11-12

4. Glare can be reduced on an inspection surface by using:

   a. visible light.
   b. spectral light.
   c. screens.
   d. polarized light.

   C.10-3

5. A discontinuity associated with metal overflow during forging is called a:

   a. seam.
   b. flake.
   c. lap.
   d. lamination.

   A.493

6. A jagged, nonintegrally bonded piece of metal that leaves a depression in another metal after it is removed, is called a:

   a. seam.
   b. blister.
   c. scab.
   d. gouge.

   A.549 and 568

7. The physical characteristics of color are:

   a. hue, purity, and brightness.
   b. wavelength, spectrum, and contrast.
   c. acuity, perception, and distance.
   d. none of the above.

   C.10-2

8. When scale is partially rolled into the surface of a steel plate it is called:

   a. scabs.
   b. rolled-in-scale.
   c. pits.
   d. tears.

   E.226

9. A valve that provides linear motion during operation is called:

   a. a gate valve.
   b. a ball valve.
   c. a butterfly valve.
   d. all of the above.

   D.3PS:4/20

10. An attachment to a component that is welded, cast, or forged is called:

    a. a nonintegral attachment.
    b. an integral attachment.
    c. a restraint.
    d. a clamp.

    D.5PS:5/27

11. Devices that restrict the movement of hanger springs and prevent damage during installation are called:

    a. clips.
    b. travel stops.
    c. shims.
    d. grout.

    D.6PS:16/19

12. The combined static and friction head (vertical difference in elevation) is called:

    a. pump head.
    b. total head.
    c. brake horse power.
    d. maximum head.

    D.4PS:10/12

13. Wear due to erosion/corrosion on a valve is typically found in:

    a. the valve body.
    b. the valve seating area.
    c. the valve disk.
    d. all of the above.

    D.3PS

14. Which of the following is a type of component support?

    a. Plate and shell.
    b. Linear.
    c. Component support standards.
    d. All of the above.

    D.5PS:8/27

15. A valve is a mechanical device that:

    a. moves fluids or gases.
    b. controls flow.
    c. is rarely used in a nuclear power plant.
    d. is always welded into a system.

    D.3PS:3/20

16. Devices that limit or allow no motion in one or more directions are called:

    a. hangers.
    b. supports.
    c. restraints.
    d. clamps.

    D.5PS:8/27

17. Bolting failures typically occur at:

    a. the thread root area.
    b. the head to shank area.
    c. nicks or gouges.
    d. all of the above.

    D.2PS

18. The two major categories of pumps are:

    a. static and friction head.
    b. dynamic and displacement.
    c. single stage and multi-stage.
    d. turbine and condensate.

    D.4PS:7/12

19. A mechanical device that raises, transfers, or pressurizes fluids is:

    a. a valve.
    b. a snubber.
    c. an electric motor.
    d. a pump.

    D.4PS:3/12

20. A discontinuity that is not associated with welds is:

    a. undercut.
    b. overlap.
    c. laminations.
    d. underfill.

    D.1PS:7/10

21. During an examination of a groove weld, which of the following dimensions is normally measured?

    a. The root opening.
    b. Weld reinforcement.
    c. Base material thickness.
    d. All of the above.

    D.1PS:6/10

22. A welding symbol over the reference line refers to:

    a. the area on the arrow side.
    b. the area near the end of the arrow.
    c. the area opposite of the arrow.
    d. a field weld.

    D.1PS:4/10

23. A valve that uses linear motion, which is used to regulate flow, is called a:

    a. butterfly valve.
    b. globe valve.
    c. swing check valve.
    d. ball valve.

    D.3PS:4/20

24. A device that restricts movement during an abnormal or seismic event is called a:

    a. restraint.
    b. snubber.
    c. hanger.
    d. support.

    D.5PS:8/27

25. A centrifugal pump is classified as:

a. a dynamic pump.
b. a reciprocating pump.
c. a displacement pump.
d. all of the above.

D.4PS:7/12

26. The device in a pump that moves or compresses fluid is called:

a. a pump casing.
b. a packing gland.
c. a disk.
d. an impeller.

D.4PS:8/12

27. The closure element of a diaphragm valve is called:

a. the weir.
b. a flexible elastomer.
c. the bonnet.
d. the disk.

D.3PS:15/20

28. Component supports are divided into groups. Which of the following is not considered to be a group of component supports?

a. Hangers.
b. Supports.
c. Integral attachments.
d. Snubbers.

D.5PS:5/27

29. During a visual examination, a welding discontinuity that could not be detected would be:

a. undercut.
b. underfill.
c. cracks.
d. side wall lack of fusion.

D.1PS:7/10

30. For component supports, the principal movement axis is:

a. the horizontal axis.
b. the vertical axis.
c. the longitudinal axis.
d. all of the above.

D.5PS:4/27

31. A device that is typically installed vertically with the support member in tension is called a:

a. support.
b. restraint.
c. snubber.
d. hanger.

D.5PS:6/27

32. A valve subassembly that is considered to be part of the pressure vessel assembly is called the:

a. drive.
b. stem.
c. body.
d. disk.

D.3PS:6/20

33. A device that raises, transfers, or pressurizes fluids by pressing, forcing, or throwing the fluid through apertures or pipes is called a:

a. valve.
b. pump.
c. snubber.
d. bolt.

D.4PS:3/12

34. Valves that use rotational motion to make a seal are called:

a. ball valves.
b. gate valves.
c. globe valves.
d. all of the above.

D.3PS:16/20

35. Service-induced discontinuities can be the result of:

a. vibration.
b. stress risers.
c. corrosion.
d. all of the above.

D.2PS:9/15

36. A device that is typically installed vertically with the support member in compression is called a:

a. support.
b. hanger.
c. snubber.
d. spring can.

D.5PS:7/27

37. Typical reportable discontinuities for component supports include:

a. drawing anomalies.
b. workmanship.
c. operational.
d. all of the above.

D.8PS:12/21

38. A physical attribute that cannot be visually inspected during welding is:

    a. the welding process.
    b. the acceptability of the weld, with regard to its appearance.
    c. alignment and fit-up.
    d. joint preparation.

    A.469

39. An inherent discontinuity in forgings that cannot be detected using visual testing is:

    a. bursts.
    b. cracks.
    c. seams.
    d. laps.

    E.274-275; F.4G:5/11

40. Every inspector is affected differently by perception, fatigue, and attitude. In visual inspection, these factors are classified as:

    a. physiological factors.
    b. uncontrolled factors.
    c. production factors.
    d. classic distress factors.

    E.57-62

41. To examine areas around bends inside a pipe section, the visual examiner uses a:

    a. telescope.
    b. fiberoptic borescope.
    c. borescope.
    d. microscope.

    F.3G:8/19

42. On a thickness gage, twenty thousandths of an inch is represented by:

    a. 0.2
    b. 0.02
    c. 0.002
    d. 0.0002

43. In a casting, a visual examiner could expect to find:

    a. laminations.
    b. stringers.
    c. bursts.
    d. hot tears.

    E.276

44. Porosity is:

    a. material used during the welding process.
    b. gas entrapped below the surface of a material.
    c. gas entrapped below or at the surface of a material.
    d. foreign crystallized material entrapped below the surface of a material.

    F.4G:10/11

45. A visual examiner could expect to find a crater crack:

    a. at the beginning of the weld.
    b. somewhere between the beginning and the end of the weld.
    c. at either the beginning or the end of the weld.
    d. at the end of the weld.

    G.368

46. A discontinuity with a small star-shaped pattern where a weld starts or stops is usually an indication of:

    a. surface porosity.
    b. undercut.
    c. a crater crack.
    d. slag.

    F.6G:14/18

47. During the visual examination of a full penetration double bevel weld joint, visual examination cannot locate:

    a. undercut.
    b. underfill.
    c. crater cracks.
    d. insufficient penetration.

    F.6G

48. The initiation of a fatigue crack could occur at:

    a. weld toes.
    b. notches.
    c. section changes.
    d. thread roots.
    e. all of the above.

    F.7G

49. A welding discontinuity typically referred to as distortion is caused by:

    a. the use of a tungsten electrode in the GTAW welding process.
    b. the uncontrolled heating and cooling of the weld metal.
    c. exposure to radiation and other NDE techniques.
    d. the excess amount of porosity in the weld metal.

    G.241 and 261

50. When measuring plate thickness, the most accurate reading is given by a:

    a. steel ruler.
    b. steel tape.
    c. mechanical gage (micrometer).
    d. feeler gage.

    F.3G:17/19

51. When choosing a magnifier, major consideration should be given to:

    a. power or magnification.
    b. working distance.
    c. field of view.
    d. all of the above.

    C.11-1

52. Visual inspection is the most extensively used inspection method on weldments because:

    a. it is simple and relatively inexpensive.
    b. it does not normally require special equipment.
    c. it gives important information about conformity to specifications.
    d. all of the above.

    G.469

53. In order to render valid results, visual examination must include a:

    a. trained operator.
    b. procedure for conducting the tests.
    c. standard for interpreting and reporting the results.
    d. all of the above.

    G.469

54. The maximum diameter of a borescope that can be used for the test is determined by:

    a. object depth.
    b. entry port size.
    c. objective distance.
    d. direction of view.

    E.74-75

55. A device that provides the means for comparing a test surface to a standard surface finish is called a:

    a. measuring magnifier.
    b. surface calibrator.
    c. surface comparator.
    d. surface magnifier.

    E.76-81

56. An instrument that can be equipped with forward oblique, right angle, or retrospective visual systems is called:

    a. an angulated borescope.
    b. a microscope.
    c. a panoramic borescope.
    d. a stereoscope.

    E.82-91

57. The use of chemical solutions to attack material surfaces in order to improve the visibility of discontinuities for visual inspection at normal and low power magnification is called:

    a. microetching.
    b. macroetching.
    c. replication.
    d. vibroetching.

    E.118-123

58. A "charged coupled device chip" is used with:

    a. a fiberoptic borescope.
    b. an angulated borescope.
    c. a video imaging device.
    d. a profile gage.

    E.128-130

59. Cracks, suckback, undercut, and overlap are discontinuities found in:

    a. castings.
    b. forgings.
    c. extrusions.
    d. weldments.

    E.128-130

60. In welding, weld metal protrusion beyond the fusion line at the weld toe is called:

    a. overlap.
    b. undercut.
    c. reinforcement.
    d. incomplete fusion.

    E.163-175

61. In accordance with *SNT-TC-1A*, certification of visual NDT personnel is the responsibility of:

    a. ASNT.
    b. the employer.
    c. the NDT Level III.
    d. an outside agency.

    E.181-187

62. The ability of metal to return to its original size and shape after being loaded and unloaded is called:

    a. plastic deformation.
    b. elastic deformation.
    c. tensile strength.
    d. stress-strain deformation.

    E.194

63. Cracking under the combined action of corrosion and tensile stress is referred to as:

    a. fatigue cracking.
    b. creep cracking.
    c. stress corrosion cracking.
    d. tensile stress cracking.

    E.209

64. A groove formed at the toe or root of a weld when the base metal is melted away and left unfilled by weld metal is referred to as:

    a. underfill.
    b. cold lap.
    c. crack.
    d. undercut.

    E.260

65. Excessive clearance in pumps will result in:

    a. accelerated corrosion.
    b. increased cavitation.
    c. reduction in pump efficiency.
    d. increased impeller wear.

    E.269

66. A mechanical device that controls flow into, inside of, or out of a piping system is called a:

    a. blind flange.
    b. pump.
    c. valve.
    d. flow controller.

    E.270

67. Hot tears, inclusions, porosity, and cold shuts are:

    a. forging discontinuities.
    b. casting discontinuities.
    c. welding discontinuities.
    d. processing discontinuities.

    E.276

68. The distance a magnifier can be moved toward or away from a subject while keeping it in good focus is called:

    a. depth of field.
    b. field of view.
    c. focal spot.
    d. magnification distance.

    E.292-300

69. Radiant energy that excites the retina and produces a visual sensation is called:

    a. vision.
    b. light.
    c. spectrum.
    d. color.

    E.30

70. The visible portion of the electromagnetic spectrum extends from:

    a. 100-400 nm.
    b. 210-370 nm.
    c. 380-770 nm.
    d. 570-891 nm.

    E.30

71. Photometers used to measure the reflectance of materials or surfaces in specialized ways are called:

    a. radiometers.
    b. glossmeters.
    c. spectrophotometer.
    d. reflectometers.

    E.30

72. The portion of the eye that regulates the quantity of light admitted is called the:

    a. iris.
    b. pupil.
    c. retina.
    d. cones.

    E.60

73. In general, the total magnification of borescopes is in the range of:

    a. 3×-4×.
    b. 2×-8×.
    c. 4×-10×.
    d. 5×-15×.

    E.88

74. A method used for copying the topography of a surface that cannot be moved or one that would be damaged in transferal is called:

    a. NDT.
    b. in-situ NDT.
    c. replication.
    d. surface metallography.

    E.108

75. Replication is used for:

    a. the analysis of fracture surfaces and microstructure.
    b. the evaluation of yield and tensile strengths of metals.
    c. the evaluation of corrosion damage and wear.
    d. both a and c above.

    E.108

76. Temperature indicating materials can take the form of:

    a. sticks.
    b. pellets.
    c. liquids.
    d. all of the above.

    E.114

77. As related to photographic techniques for recording visual testing results, the range of distance over which a camera gives satisfactory definition when its lens is in the best focus for a certain specific distance is referred to as:

    a. depth of vision.
    b. depth of field.
    c. depth of focus.
    d. field of vision.

    E.142

78. Cameras used in video pipe testing may be transported inside the pipe by:

    a. pushing.
    b. pulling.
    c. carrying.
    d. all of the above.

    E.149

79. In general, visual weld inspection is performed:

    a. before welding.
    b. during welding.
    c. after welding.
    d. all of the above.

    E.156

80. The testing of certain numbers less than the total in a production run is called:

    a. random sampling.
    b. partial sampling.
    c. specified sampling.
    d. random specified sampling.

    E.160

81. The undesirable removal of material from contacting surfaces by mechanical action is referred to as:

    a. corrosion.
    b. erosion.
    c. wear.
    d. grinding.

    E.197

82. The deterioration of a metal resulting from electrochemical reactions with environment is referred to as:

    a. erosion.
    b. corrosion.
    c. wear.
    d. fatigue.

    E.206

83. All of the following are weld joints except:

    a. a butt joint.
    b. an edge joint.
    c. a groove joint.
    d. a lap joint.

    E.247

84. Joint penetration in which the weld metal fills the groove and is fused to the base metal throughout its thickness is referred to as:

    a. complete penetration.
    b. partial penetration.
    c. incomplete penetration.
    d. complete fusion.

    E.247

85. A process in which materials are joined by heating them to a suitable temperature and by using a filler metal, which liquifies above 449 °C (840 °F) and below the solidus of the base metal, is called:

    a. welding.
    b. soldering.
    c. brazing.
    d. solid state welding.

    E.249

86. In a typical groove weld, the angle formed between the prepared edge of a member and a plane perpendicular to the surface of the member is called:

    a. groove angle.
    b. bevel angle.
    c. angle of preparation.
    d. weld angle.

    E.254

87. Bursts, laps, and cracks are discontinuities that are found in:

    a. castings.
    b. welds.
    c. forgings.
    d. extrusions.

E.274

88. The science of obtaining quantitative measurements of physical objects through processes of recording, measuring, and interpreting photographic images is called:

    a. photography.
    b. photometry.
    c. photogrammetry.
    d. stereophotography.

E.314

Level I Answers
Visual and Optical Testing Method

1.	d	23.	b	45.	c	67.	b
2.	a	24.	b	46.	c	68.	a
3.	b	25.	c	47.	d	69.	b
4.	d	26.	d	48.	e	70.	c
5.	c	27.	b	49.	b	71.	d
6.	c	28.	c	50.	c	72.	a
7.	a	29.	d	51.	d	73.	b
8.	b	30.	d	52.	d	74.	c
9.	a	31.	d	53.	d	75.	d
10.	b	32.	c	54.	b	76.	d
11.	b	33.	b	55.	c	77.	b
12.	b	34.	a	56.	a	78.	d
13.	d	35.	d	57.	b	79.	d
14.	d	36.	a	58.	c	80.	b
15.	b	37.	d	59.	d	81.	c
16.	c	38.	b	60.	a	82.	b
17.	d	39.	c	61.	b	83.	c
18.	b	40.	a	62.	b	84.	a
19.	d	41.	b	63.	c	85.	c
20.	c	42.	b	64.	d	86.	b
21.	d	43.	d	65.	c	87.	c
22.	c	44.	c	66.	c	88.	c

Level II Questions
Visual and Optical Testing Method

1. Localized reduction in an area of a bolt that is under overload conditions is referred to as:

   a. sizing.
   b. necking down.
   c. erosion.
   d. elongation.

   E.274

2. The least common location for fastener failure is:

   a. in the head to shank fillet.
   b. throughout the first thread inside the nut on threaded fasteners.
   c. in the midgrip.
   d. at the transition from the thread to the shank.

   E.273

3. Discontinuities that are produced during the hot or cold working of the ingot into rod or bar to make studs are called:

   a. inherent discontinuities.
   b. primary processing discontinuities.
   c. secondary processing discontinuities.
   d. service-induced discontinuities.

   E.273

4. Service-induced discontinuities in bolting systems may be produced by:

   a. vibration.
   b. over-tensioning.
   c. corrosion.
   d. all of the above.

   E.273

5. The fillet weld size is based on the:

   a. effective fillet weld throat.
   b. length of fillet weld.
   c. theoretical throat.
   d. length of fillet weld leg.

   E.163

6. A convex weld surface:

   a. curves inward.
   b. curves outward.
   c. contains a hollow.
   d. does both a and c above.

   E.258

7. During the solidification of metal, a hole produced due to escaping gases is called a:

   a. burst.
   b. cold shut.
   c. flaking.
   d. blow hole.

   A.514

8. Weldments might contain:

   a. shrinkage.
   b. incomplete penetration.
   c. seams.
   d. laps.

   F.6G

9. A discontinuity typically found in forgings is:

   a. shrinkage.
   b. bleed-out.
   c. laps.
   d. undercut.

   E.274

10. Embrittlement, caused by a physical or chemical change in the metal, is a reduction in:

    a. ductility.
    b. hardness.
    c. hydrogen.
    d. all of the above.

    F.7G:10/21

11. The deterioration of a metal by chemical or electrochemical reaction with its environment is called:

    a. corrosion.
    b. erosion.
    c. IGSCC.
    d. none of the above.

    E.206

12. The roughest surface finish is indicated by a measurement of:

    a. 64 µin.
    b. 150 µin.
    c. 250 µin.
    d. 380 µin.

13. A basic metallurgical joint configuration that is used for complete joint penetration is called:

    a. a butt joint.
    b. a fillet joint.
    c. a lap joint.
    d. none of the above.

    E.247

14. The welding process that is sometimes referred to as "stick welding" is:

    a. SAW.
    b. SMAW.
    c. GMAW.
    d. GTAW.

    E.250

15. The welding process in which there is a higher degree of probability of entrapping slag is:

    a. GMAW.
    b. GTAW.
    c. SMAW.
    d. all of the above.

    E.251

16. Tungsten inclusions are found during:

    a. GMAW.
    b. GTAW.
    c. SMAW.
    d. none of the above.

    E.251-252

17. The portion of base metal that has not been melted but where mechanical properties or microstructure have been altered by the heat of welding is defined as:

    a. the fusion zone.
    b. the heat-affected zone.
    c. both a and b above.
    d. none of the above.

    G.108-111

18. The difference between discontinuities and defects is that:

    a. a defect is a rejectable discontinuity.
    b. discontinuities affect the base metal, whereas defects affect the weld metal.
    c. there should be no distinction between discontinuities and defects.
    d. a discontinuity is a rejectable defect.

    E.342

19. The gage that provides measurements of internal misalignment on 76 mm (3 in.) diameter pipe is:

    a. a Cambridge gage.
    b. a fillet weld gage.
    c. a hi-lo welding gage.
    d. both a and b above.

    E.255

20. In a borescope, the image is brought to the eyepiece by:

    a. an objective lens.
    b. relay lenses.
    c. an eyepiece lens.
    d. all of the above.

    E.83

21. In welding, temperature indicating sticks are used to monitor:

    a. preheat temperatures.
    b. postheat temperatures.
    c. interpass temperatures.
    d. all of the above.

    E.117

22. To measure the diameter of a 76 mm (3 in.) stud most accurately, use:

    a. a 51-76 mm (2-3 in.) inside mechanical gage (micrometer).
    b. an outside caliper.
    c. a 152 mm (6 in.) dial caliper.
    d. mechanical (micrometer) depth gage.

    F.3G

23. A discontinuity that appears as a series of remelted dots beside a weld, resembling a trail left in striking a match is called:

a. linear porosity.
b. arc strikes.
c. undercut.
d. slag.

E.362

24. A protrusion or rollover of weld metal beyond the toe or root is called:

a. overlap.
b. undercut.
c. reinforcement.
d. overfill.

E.164

25. Chevrons may occur in:

a. plates.
b. weldments.
c. bar stock.
d. valve castings.

A.550

26. A discontinuity that is found in bars and forgings, which is caused by the rupture of metal forged at either too low or too high temperatures, is called:

a. pipe.
b. seam.
c. cupping.
d. internal burst.

E.341

27. A cause for undercut that occurs during the welding process is called:

a. excessive voltage or current.
b. slow travel speed.
c. excessive travel speed.
d. both a and c above.

G.359

28. When the weld is to be placed on the arrow side of the joint, the weld symbol in the drawing will be:

a. below the line.
b. above the line.
c. in the tail.
d. at the end of the arrow.

G.196

29. The brazing process is commonly defined as a liquid-solid phase joining method accomplished at a temperature above:

a. 232 °C (450 °F).
b. 343 °C (650 °F).
c. 449 °C (840 °F).
d. 504 °C (940 °F).

G.23

30. To be acceptable, a concave fillet weld must have an actual leg dimension that is:

a. longer than the size.
b. shorter than the size.
c. equal to the size.
d. equal to the throat.

E.163

31. The melting and fusing of the filler metal and base metal into a straight continuous weld pass is called a:

a. multipass weld.
b. depressed bead.
c. stringer bead.
d. weave pattern.

E.253

32. A depression on the face of a fillet weld that reduces the cross section of the weld when measured at the depression is called:

a. depressed bead.
b. excessive convexity.
c. insufficient throat.
d. insufficient leg.

E.164

33. When visually examining an arc strike, the inspector should inspect for:

a. lack of fusion.
b. craters.
c. whiskers.
d. cracks.

E.261

34. Pitting is one type of:

a. occluded cell corrosion.
b. stress corrosion.
c. general corrosion.
d. galvanic corrosion.

F.7G:18/21

35. Joint profiles of finished welds are controlled by:

a. acceptance standards.
b. workmanship standards.
c. design requirements.
d. all of the above.

E.275

36. Which of the following weld symbols represents a fillet weld?

a. 

b. 

c. 

d. 

B.5; G.195

37. Which of the following weld symbols represents a "U Joint?"

a. 

b. 

c. 

d. 

B.5; G.195

38. Electronic aids to vision are based primarily on:

a. photosynthetic devices.
b. photothermal devices.
c. photoelectric devices.
d. photostat devices.

C.11-25

39. In order to obtain light of a specific wavelength, use:

a. filters.
b. shades.
c. reflectors.
d. diffractive screens.

C.10-4

40. The three physical characteristics of color include:

a. saturation, brightness, and glare.
b. hue, saturation, and brightness.
c. reflective index, spectral range, and hue.
d. tone, shade, and hue.

C.10-2

41. Horizontal indications on the edge of a 76 mm (3 in.) plate are on several levels and do not extend along the whole edge. The most likely cause of these visual indications is:

a. pipe.
b. poor burning practice.
c. laminations.
d. porosity.

E.275

42. A process that uses a filler metal with a liquidus state that does not exceed 449 °C (840 °F) and that does not melt the base material is:

a. SMAW.
b. brazing.
c. soldering.
d. resistance welding.

E.249

43. The angle(s) for the fore-oblique direction of view borescope is/are:

a. 0 degrees.
b. 1-89 degrees.
c. 90 degrees.
d. 91-110 degrees.

F.3G:12/19

44. The mechanism for soldering and brazing is:

a. wetting.
b. alloying.
c. capillary action.
d. all of the above.

E.248-249

45. A rounded discontinuity that occurs in the weld and is then distributed in line, parallel with the weld is called:

a. melt-through.
b. linear porosity.
c. cluster porosity.
d. a crack.

G.355

46. A wide angle of view for a borescope provides:

a. illumination.
b. high magnification.
c. shorter depth of field.
d. greater depth of field.

F.3G:11/19

47. An optical aid used in visual examination that brings the image to the eyepiece by a lens train is called:

a. a fiberoptic borescope.
b. a borescope.
c. a mirror.
d. an image guide.

E.82

48. A remote visual examination aid that is used for viewing around corners with a flexible distal end is called:

a. an optiscope.
b. a fiberoptic borescope.
c. a mirror.
d. an image guide.

E.82

49. An inherent discontinuity associated with the original solidification of metal in the ingot is called:

a. a seam.
b. thermal fatigue.
c. a hot tear.
d. porosity.

F.4G:9/11

50. A narrow angle of view in a borescope is required for:

a. high magnification.
b. low magnification.
c. a greater depth of field.
d. greater reflectivity.

F.3G:11/19

51. Discontinuities associated with the casting process are:

a. inclusions
b. hot tears
c. porosity.
d. all of the above.

F.4G:9/11

52. Which of the following is a primary processing method?

a. Forging.
b. Machining.
c. Heat treating.
d. All of the above.

F.4G:4/11

53. A reduction in ductility due to in-service or pre-service environments is called:

a. embrittlement.
b. hydrogen fatigue cracking.
c. thermal fatigue.
d. intergranular stress corrosion cracking.

F.7G:10/21

54. Metals that become weaker due to continuing deformation under steady stress at elevated temperatures demonstrate:

a. thermal fatigue.
b. stress corrosion cracking.
c. corrosion reduction.
d. creep.

F.7G:19/21

55. Which of the following is a basic joint configuration?

a. A tee joint.
b. A single *V* joint.
c. A single *J* joint.
d. All of the above.

E.247

56. A nonfusion discontinuity that is located at the root area of a welded joint is called:

a. porosity.
b. a hot tear.
c. incomplete joint penetration.
d. all of the above.

E.261

57. In the casting process, a chaplet is:

a. a device that supports the core material.
b. a device that is used as a heat sink.
c. a ragged, irregularly shaped discontinuity.
d. all of the above.

F.4G:10/11

58. The three stages to fatigue are:

a. initiation, propagation, and failure.
b. initiation, branching, and expansion.
c. stress, temperature, and propagation.
d. none of the above.

F.7G:5/21

59. Discontinuities that originate during the melting and original solidification of the metal in the ingot are categorized as:

a. forming discontinuities.
b. inherent discontinuities.
c. process discontinuities.
d. service-induced discontinuities.

F.4G:3/11

60. A welding process in which shielding is provided by the electrode covering is called:

    a. SMAW.
    b. GTAW.
    c. GMAW.
    d. brazing.

    G.4-5

61. A slag-type discontinuity is produced by:

    a. SMAW.
    b. GTAW.
    c. GMAW.
    d. brazing.

    G.365

62. Weld metal that completely fills the groove and is fused to the base metal throughout its total thickness is called:

    a. partial joint penetration.
    b. plate thickness.
    c. theoretical throat.
    d. complete joint penetration.

    G.153, 585

63. All casting discontinuities are considered to be:

    a. inherent.
    b. primary processing.
    c. secondary processing.
    d. service-induced.

    F.4G:3/11

64. A disadvantage of the GMAW process is:

    a. that slag removal is required.
    b. that there is an excessive amount of post-weld cleaning.
    c. that shielding gas must be protected from drafts.
    d. all of the above.

    G.7

65. A condition of excessive offset of the inside diameter surface is called:

    a. underfill.
    b. misalignment.
    c. overlap.
    d. excessive reinforcement.

    E.168

66. Failure to adequately penetrate the weld root of a groove weld is called:

    a. lack of fusion.
    b. excessive penetration.
    c. incomplete joint penetration.
    d. undercut.

    G.359

67. Repeated fluctuating stress having a maximum value less than the tensile strength of the material is called:

    a. a crack.
    b. mechanical fatigue.
    c. thermal fatigue.
    d. stress corrosion cracking.

    F.7G:5/21

68. Cracks can occur in:

    a. forgings.
    b. castings.
    c. welds.
    d. all of the above.

    F.4G and 6G

69. The structure or shape of mechanical fatigue type cracking is best described as:

    a. multiple indications or brazing.
    b. relatively straight and non-branched.
    c. multiple intergranular indications.
    d. all of the above.

    F.7G:8/21

70. The fundamental reason that a bimetallic thermometer operates is:

    a. that metals change volume as temperature changes.
    b. that metals have the same coefficients of expansion.
    c. that thin strips of metal with different coefficients of expansion are placed next to each other.
    d. all of the above.

    F.3G:17/19

71. Recording information from a visual examination is accomplished using:

    a. a videotape recording of the examination area.
    b. photographs.
    c. a subjective report.
    d. all of the above.

    F.3G:16/19

72. One of the principal characteristics of a hanger is that the:

    a. support member is in compression.
    b. component is supported from below.
    c. support member is in tension.
    d. component weight is lateral to the hanger.

    D.5PS:7/27

73. On a welding symbol, the flag symbol indicates:

a. a shop weld.
b. a repair weld.
c. a field weld.
d. weld-all-around.

G.196

74. A crater crack is formed:

a. at the junction between weld beads.
b. at the start and stop of a weld bead.
c. in the base material during the rolling process.
d. in the base material during the forging process.

G.360

75. A visual examination of the rubber elastomer seating material is performed on:

a. a gate valve.
b. a check valve.
c. a diaphragm valve.
d. all of the above.

D.3PS:15/20

76. The leg of a concave fillet weld is:

a. the same as the size of a concave fillet weld.
b. larger than the size of a concave fillet weld.
c. equal to the actual throat dimension.
d. not applicable to a fillet weld.

F.5G

77. An overload condition of a component support is indicated by:

a. twisted, elongated, or bent parts.
b. improperly torqued bolts.
c. missing parts.
d. discolored or burned parts.

D.8PS:7/21; F.2G

78. A common processing discontinuity for a bolt is:

a. a burst.
b. porosity.
c. necking down.
d. all of the above.

E.273

79. The type of corrosion that occurs when dissimilar metals are in contact or are electrically connected in a corrosive medium is called:

a. selective leaching corrosion.
b. galvanic corrosion.
c. crevice corrosion.
d. stress corrosion.

E.207

80. A mechanical device that controls flow is called:

a. a pump.
b. a valve.
c. a snubber.
d. all of the above.

E.270

81. A visual examination of a swing check valve would include:

a. an examination of the hinge pin.
b. an examination for wear on the disc.
c. an examination for wear on the seat.
d. all of the above.

E.271-272

82. The component support that allows normal thermal movement but restrains movement during a seismic event is called a:

a. hanger.
b. support.
c. snubber.
d. restraint.

D.7PS:3/28

83. An employer shall establish a qualification and certification program based on:

a. education and experience.
b. training and testing.
c. evaluation.
d. all of the above.
e. both a and b above.

E.254

84. The most common location for fastener failure is:

a. at the head to shank fillet.
b. at the shank to thread transition.
c. an axial crack that runs the length of the bolt.
d. all of the above.
e. at both a and b above.

E.273

85. On a welding symbol, the horizontal line connecting the arrow and the tail is called the:

a. main line.
b. reference line.
c. symbol line.
d. AWS line.

G.195

86. Operationally, valves are categorized as linear and:

a. rotational.
b. stop/start.
c. regulatory.
d. unidirectional.

D.3PS:4/20

87. A destructive force that occurs in components is:

a. water hammer.
b. vibration.
c. corrosion.
d. all of the above.
e. both b and c above.

D.8PS:14/21

88. The formation and collapse of gas bubbles in fluids is called:

a. water hammer.
b. corrosion.
c. cavitation.
d. erosion.

F.7G:17/21

89. A restraint:

a. allows only expansive movement.
b. allows for only thermal movement.
c. allows limited or no motion in one or more directions.
d. does all of the above.

D.6PS:3/19

90. A typical inadequate construction practice involving component supports involves:

a. the use of different or wrongly sized parts.
b. elongated bolt holes.
c. corrosion.
d. stress corrosion cracking.

D.8PS:8/21

91. Excessive clearance in gate valve guide ribs may lead to:

a. erosion.
b. misalignment.
c. wear.
d. all of the above.

E.270-271

92. For a given size weld, the theoretical throat for a concave fillet weld is:

a. the same for a convex fillet weld.
b. larger for a convex fillet weld.
c. smaller for a convex fillet weld.
d. equal to the effective throat.

G.155

93. A device that transmits the load from a piping system to the building structure is called:

a. a pipe clamp.
b. a riser clamp.
c. a component support.
d. an integral attachment.

D.6PS

94. The gage that is typically used to measure the face reinforcement of a butt joint is:

a. a Cambridge gage.
b. a Tempil™ gage.
c. a fillet weld gage.
d. all of the above.

E.256

95. Primarily, piping leaks occur at components such as:

a. integral attachments.
b. bolted connections.
c. valves.
d. all of the above.
e. both b and c above.

D.2PS and 3PS

96. A hanger assembly that is attached to a pipe with a pipe clamp is considered to be:

a. a class 1 component support.
b. an integral attachment.
c. a restraint assembly.
d. a nonintegral attachment.

D.6PS:6/19

97. The theoretical throat dimension for a 10 mm (0.4 in.) leg fillet weld is:

a. 5 mm (0.2 in.).
b. 7 mm (0.3 in.).
c. 10 mm (0.4 in.).
d. 13 mm (0.5 in.).

G.155

98. Overlap is a weld profile condition where the angle formed at the junction between the weld and base material is:

a. less the 90 degrees from the plate surface.
b. equal to 90 degrees from the plate surface.
c. greater than 90 degrees from the plate surface.
d. an internal flaw only detectable with ultrasonic testing.

G.358-359

99. A service-induced failure for a component support could be caused by:

a. cracking or chipped concrete.
b. loose nuts or improper thread engagement.
c. bent or deformed bolts.
d. damage resulting from overloading.
e. all of the above.

F.7G

100. Visual inspection is easy to apply, quick and relatively inexpensive, and requires no special equipment other than:

a. a clean work area.
b. 25× magnification.
c. good eyesight.
d. 2152 lx (200 ftc) of illumination.

G.469

101. The human eye cannot always distinguish clearly the fine differences between contact angles and states of wetting when inspecting soldered joints. To improve the inspector's ability to distinguish these differences, it is recommended that the inspector use magnification in the range of:

a. 200×-300×.
b. 300×-400×.
c. No more than 10×.
d. 100×-200×.

A.605

102. Direct visual examination is possible when the eye can be placed within:

a. 305 mm (12 in.) of the inspection surface.
b. 381 mm (15 in.) of the inspection surface.
c. 610 mm (24 in.) of the inspection surface.
d. 762 mm (30 in.) of the inspection surface.

A.647

103. During the performance of a visual examination, the borescope is used to:

a. determine inside pipe diameter dimensions.
b. examine external parts of welds.
c. determine outside diameter dimensions.
d. examine internal parts of pipes and components.

E.86

104. During the typical operation of a fiberoptic borescope, adequate lighting:

a. is about the same as for reading.
b. is often enhanced by mirrors.
c. must be provided by artificial means.
d. is not a problem since most work spaces generally have adequate illumination.

F.3G:8/19

105. Visual examination tools that use flexible glass strands to transfer the image are called:

a. telescopes.
b. fiberoptic borescopes.
c. borescopes.
d. binoculars.

E.82

106. When an ingot is rolled, a lamination can result if it contains piping or:

a. inclusions.
b. seams.
c. glass.
d. arc strikes.

E.275

107. During the visual examination of a forging, a folded thin flap of metal was observed. This is typically called:

a. forging porosity.
b. a cold shut.
c. a crack.
d. a surface lap.

E.275

108. Arc strikes are typically caused by:

a. molten particles splashed that are splashed out of the molten puddle.
b. excessive heat during the welding process.
c. the use of improper or wet electrodes.
d. welding operator error.

G.555

109. The heat-affected zone is the portion of the:

a. metal that is added to produce the weld joint.
b. base metal that has been melted and solidified.
c. base metal that has not been melted but where properties have been altered by the welding heat.
d. original metal that is welded.

G.108-111

110. The most critical part of any weld is:

a. the weld reinforcement.
b. correct heat input.
c. polarity.
d. the root pass.

G.471

Level II Answers
Visual and Optical Testing Method

1.	b	29.	c	57.	a	85.	b
2.	c	30.	a	58.	a	86.	a
3.	b	31.	c	59.	b	87.	d
4.	d	32.	c	60.	a	88.	c
5.	d	33.	d	61.	a	89.	c
6.	b	34.	a	62.	d	90.	a
7.	d	35.	d	63.	a	91.	d
8.	b	36.	d	64.	c	92.	a
9.	c	37.	a	65.	b	93.	a
10	a	38.	c	66.	c	94.	a
11.	a	39.	a	67.	b	95.	e
12.	d	40.	b	68.	d	96.	d
13.	a	41.	c	69.	b	97.	b
14.	b	42.	c	70.	a	98.	a
15.	c	43.	b	71.	d	99.	e
16.	b	44.	d	72.	c	100.	c
17.	b	45.	b	73.	c	101.	c
18.	a	46.	d	74.	b	102.	c
19.	c	47.	b	75.	c	103.	d
20.	d	48.	b	76.	b	104.	c
21.	d	49.	d	77.	a	105.	b
22.	c	50.	a	78.	a	106.	a
23.	b	51.	d	79.	b	107.	d
24.	a	52.	a	80.	b	108.	d
25.	c	53.	a	81.	d	109.	c
26.	d	54.	d	82.	c	110.	d
27.	d	55.	a	83.	d		
28.	a	56.	c	84.	e		

Level III Questions
Visual and Optical Testing Method

1. Luminous energy tests are primarily for testing exposed or accessible surfaces of opaque test objects and for:

   a. testing interior of transparent test objects.
   b. testing interior of test objects.
   c. verifying the adequacy of available light source.
   d. verifying the capability of a system to detect small discontinuities.

   E.2

2. A device that uses synchronized pulses of high-intensity light to permit viewing of objects moving with a rapid periodic motion is called:

   a. stereophotometer.
   b. stereoscope.
   c. stroboscope.
   d. spectrophotometer.

   E.2

3. The intensity of florescence in relation to the intensity of the ultraviolet radiation that excites it is:

   a. inversely proportional to the intensity of the ultraviolet radiation.
   b. directly proportional to the intensity of the ultraviolet radiation.
   c. directly proportional to the square of the intensity of ultraviolet radiation.
   d. not dependent upon the ultraviolet radiation.

   E.21

4. The principal biological effect of infrared radiation is:

   a. thermal fatigue.
   b. hyperthermia.
   c. blue hazard.
   d. ultraviolet hazard.

   E.23

5. The light from common sources, particularly light from incandescent lamps, is often compared with light from a theoretical source. This theoretical source is called a:

   a. graybody.
   b. photometer.
   c. blackbody.
   d. light comparator.

   E.31

6. The simultaneous comparison of a standard lamp and an unknown light source is called:

   a. absolute photometry.
   b. relative photometry.
   c. direct photometry.
   d. substitution photometry.

   E.38

7. The measurement of radiant energy in the visible spectrum, based on a standard observer response, is called:

   a. photometry.
   b. spectrometry.
   c. geniometry.
   d. spectrodiometry.

   E.36, 39

8. The term used for dark adaptation vision using only the rods in the retina when differences in brightness can be detected but differences in the hue cannot is called:

   a. photopic vision.
   b. mesopic vision.
   c. scotopic vision.
   d. fovea vision.

   E.36

9. The illumination at a point on a surface in relation to the luminous intensity of the source and the distance between the source and the point varies directly with the intensity and:

   a. the distance.
   b. inversely with the distance.
   c. inversely with the square of the distance.
   d. the square of the distance.

   E.37

10. According to the Illuminating Engineering Society, the minimum light required for critical work should be:

    a. 500 lx (46 ftc).
    b. 1100 lx (102 ftc).
    c. 2152 lx (200 ftc).
    d. 5382 lx (500 ftc).

    E.55

11. The restriction on the angle between the eye and the test surface for general visual testing should be:

    a. less than 60 degrees.
    b. more than 60 degrees.
    c. more than 30 degrees.
    d. less than 30 degrees.

    E.56

12. The function of daylight vision for color and detail is performed by the:

    a. rods.
    b. cones.
    c. fovea.
    d. retina.

    E.61

13. The element of light related to the characteristics of tone, purity, and brightness are called:

    a. vision.
    b. daylight vision.
    c. color.
    d. illumination.

    E.61

14. The brightness of a diffusely reflecting colored surface depends on the quantity of incident light and:

    a. the reflecting factor.
    b. the quality of incident light.
    c. light intensity.
    d. the amount of reflected glare.

    E.62

15. Variable(s) other than lighting and target size that affect vision acuity include:

    a. inspector attitude.
    b. target movement and target angle.
    c. target angle.
    d. target movement and brightness.

    E.64

16. The ability of the eye and brain to work together to discriminate patterns from the background is called:

    a. near vision acuity.
    b. neural acuity.
    c. vision acuity.
    d. pattern recognition.

    E.69

17. In visual testing, using borescopes with a narrow field of view produces:

    a. high magnification and greater depth of field.
    b. low magnification and greater depth of field.
    c. high magnification and shallow depth of field.
    d. low magnification and shallow depth of field.

    E.75

18. In visual testing, using borescopes with a wide field of view:

    a. reduces magnification (smaller depth of field).
    b. reduces magnification (greater depth of field).
    c. increases magnification (greater depth of field).
    d. increases magnification (smaller depth of field).

    E.75

19. A laboratory microscope equipped with top or vertical illumination to permit viewing of opaque materials is called:

    a. metallographic microscope.
    b. phase contract microscope.
    c. metallurgical microscope.
    d. shop microscope.

    E.79

20. Magnification of a borescope optical system depends on the:

    a. middle lens and ocular.
    b. object lens.
    c. object lens and ocular.
    d. object lens, middle lens, and ocular.

    E.88

21. When performing the etching process, surface finish requirements are determined by the:

    a. etchant and its strength.
    b. material to be tested and etchant strength.
    c. discontinuities to be found and etched material.
    d. etchant, its strength, material, and discontinuities.

    E.119

22. Pipe crawlers are not considered to be robotic systems because they:

    a. are transported to a given location without operator intervention.
    b. operate on open loop control logic and respond to input from an outside source.
    c. have closed loop control logic and respond to the environment in which they operate.
    d. are pushed and pulled manually by an operator.

    E.128

23. High speed film requires:

    a. less light but can produce less graininess.
    b. more light but can produce more graininess.
    c. less light but can produce more graininess.
    d. more light but can produce less graininess.

    E.144

24. Camera systems used in a remote internal video test of pipe are available for black and white or color viewing. In comparison, black and white systems:

    a. have higher resolution and require lower light levels than color systems.
    b. have lower resolution and require higher light levels than color systems.
    c. have higher resolution and require higher light levels than color systems.
    d. and color systems have the same resolution and require same light levels.

    E.149

25. In planning for visual testing, a particular frequency or sequence of sample selection is prescribed, such as the selection of every fifth unit starting with the fifth unit. This system is referred to as:

    a. partial sampling.
    b. random sampling.
    c. specified partial sampling.
    d. random partial sampling.

    E.160

26. Discontinuities associated with welds may be classified as:

    a. dimensional, process, and mechanical.
    b. process, mechanical, and base metal.
    c. mechanical, dimensional, and process.
    d. dimensional, process, mechanical, and base metal.

    E.163

27. Documents having significant influence on public health and safety are sometimes accepted by legislative bodies or Federal regulation agencies. In those jurisdictions, such documents become law and are referred to as:

    a. standards.
    b. practices.
    c. codes.
    d. specifications.

    E.178

28. When particles in a fluid or other carrier slide and roll at relatively high velocity against a surface, it is called:

    a. gouging wear.
    b. grinding wear.
    c. erosion wear.
    d. abrasive wear.

    E.198

29. When high temperature alloys cannot tolerate contact with liquid metal because high temperatures cause the precipitation of chromium carbide in the grain boundaries, the condition is called:

    a. sensitization.
    b. carburization.
    c. thermal fatigue.
    d. erosion.

    E.214

30. The surface roughness of cold rolled steel determines:

    a. glossiness, weldability, and coating properties.
    b. plating, weldability, and workability.
    c. coating, weldability, and plating.
    d. glossiness, coating, plating properties, and workability.

    E.236

31. A condition that is caused by unintentional rapid heating of the base metal or weld metal and subsequent rapid cooling of the molten material, which results in extremely high heat input and causes localized hardness and cracking, is called:

    a. undercut.
    b. ark strike.
    c. weld spatter.
    d. overlap.

    E.261

32. During the visual inspection of impeller vanes, it was noted that the vanes are exhibiting abnormal wear and are porous. This condition is most likely due to:

    a. corrosion.
    b. erosion.
    c. cavitation.
    d. carburization.

    E.269

33. In a gate valve, the most likely place for erosion and wear are:

    a. downstream seat of wedge and upstream body seat.
    b. upstream seat of wedge and downstream body seat.
    c. upstream seat of wedge and upstream body seat.
    d. downstream seat of wedge and downstream body seat.

    E.270

34. Corrosion of a metal caused by the concentration of dissolved salts, metal ions, oxygen, or other gasses, which occurs in pockets remote from the principal fluid stream with a resulting build up of differential cells that ultimately cause deep pitting, is called:

    a. crevice corrosion.
    b. erosion corrosion.
    c. galvanic corrosion.
    d. stress corrosion.

    E.274

35. Folds of metal forced into the surface of the component during forging, which can vary from a tight straight linear discontinuity to a wide U-shaped indication, are called:

    a. bursts.
    b. seams.
    c. laps.
    d. flakes.

    E.275

36. During the visual inspection of castings, chills and chaplets appear as:

    a. rounded indications.
    b. *U* shaped indications.
    c. chills appear as rounded indications but chaplets will appear as *U* shaped.
    d. no definite description of these discontinuities is possible.

    E.276

37. Magnification of a single lens (in inches) is determined by:

    a. multiplying the focal distance of the lens by ten.
    b. the focal distance of the lens.
    c. dividing ten by the focal length of the lens.
    d. multiplying the magnification power by the focal length.

    E.292

38. The accuracy of distance measurements from photogrammetry is related to:

    a. camera internal orientation.
    b. lens distortion, focal length, and object-to-lens distance.
    c. photographic base length and precision of plotting method.
    d. all of the above.

    E.316

39. Visual testing of low stress applications, such as the sheets of composite material bonded to a honeycomb core, may reveal:

    a. cracks and voids.
    b. cracks and delamination.
    c. large voids and delamination.
    d. cracks, large voids, and delamination.

    E.330

40. To determine the maximum percent defect that for the purpose of sampling test can be considered satisfactory as a process average, use the:

    a. acceptable quality level.
    b. acceptable outgoing quality level.
    c. control chart curve.
    d. operating process curve.

    E.340

41. When the point of focus is beyond the plane of the retina, this condition is called:

    a. astigmatism.
    b. nearsightedness.
    c. scotopic vision.
    d. farsightedness.

    E.11

42. To determine the maximum percent defective for the tolerance of an outgoing lot of parts, use:

    a. process control variables.
    b. acceptable outgoing level.
    c. average outgoing quality level.
    d. acceptable quality level.

    E.161

43. Compact arc sources, metal vapor, and florescent lamps are sources of:

a. ultraviolet hazards.
b. infrared hazards.
c. electromagnetic hazards.
d. visible hazards.

E.23

44. When a flexible fiber optic is bent at an angle greater than approximately 45 degrees, the image produced:

a. remains round and sharp.
b. becomes elliptical.
c. becomes obliterated.
d. softens but remains round.

E.4

45. Erosive wear is caused by:

a. sliding one surface against one another.
b. high-pressure particle movement.
c. particles that adhere under pressure and heat.
d. particles that are in motion and in fluid.

E.198

46. Visible light is defined as that portion of the electromagnetic spectrum with wavelengths between:

a. 280 nm and 560 nm.
b. 320 nm and 650 nm.
c. 325 nm and 780 nm.
d. 380 nm and 770 nm.

E.30

47. Most color deficiencies are hereditary and occur in:

a. the brown-green range.
b. the red-green range.
c. the blue-yellow range.
d. the blue-green range.

E.14

48. Color deficiencies can be hereditary and/or acquired. Acquired color deficiencies can include:

a. trichromatism (three colors).
b. protanopia (red lacking).
c. tritanopia (blue lacking).
d. protan-deuton (red-yellow).

E.15

49. To form reliable images, the lens of the eye focuses light rays onto the:

a. retina.
b. optic nerve.
c. sclera.
d. cornea.

E.11

50. The condition when the point of focus is short of the retina is called:

a. farsightedness.
b. scotopic vision.
c. nearsightedness.
d. astigmatism.

E.11

51. When a primary color is mistaken for another primary color, this is an error in:

a. discrimination.
b. perception.
c. color vision.
d. sensation.

E.15

52. Exposure to high frequency visible light at intensities and durations that may damage the retina, and does not elevate retinal temperatures enough to cause thermal hazard is called:

a. hyperthermia.
b. thermal shock.
c. blue hazard.
d. birefringence.

E.26

53. The temperature at which a blackbody must be operated, so that it's output is the closest approximation to a perfect color match with the output of the selective radiator is called:

a. blackbody temperature.
b. correlated temperature.
c. selective temperature.
d. color temperature.

E.32

54. The instrument used to measure radiation power of specified frequencies is called a:

a. radiometer.
b. photometer.
c. raster.
d. spectrophotometer.

E.43-44, 350

55. The angle of vision and the distance of the eye from the test surface determine the minimum angular separation of two points resolvable by the eye. This is known as the eye's:

a. sensitivity.
b. resolving power.
c. vision power.
d. discrimination.

E.56

56. A tool that uses the wavelength of light as a unit to measure the surface contour is called:

    a. surface comparator.
    b. metallurgical microscope.
    c. interference microscope.
    d. polarized microscope.

    E.81

57. The principle of solid state image devices is based on:

    a. photoelectric effect and the free electrons that are created in a region of silicon illuminated by photons.
    b. generation of a train of electrical pulses that represent light intensities present in an optical image.
    c. the amount of charge in each packet that stays substantially the same.
    d. an electron beam that is used to scan a photoconductive target.

    E.95

58. The ratio between stress and strain in a material deformed within its elastic range is called:

    a. the yield point.
    b. yield stress.
    c. the modulus of elasticity.
    d. the monochromator.

    E.194-195, 348

59. When a metal is at an elevated temperature, the:

    a. modulus of elasticity is decreased.
    b. modulus of elasticity is increased.
    c. yield and tensile strength are increased.
    d. stiffness of the metal increases.

    E.196

60. Erosive wear of materials can be recognized by:

    a. the general removal of soft surface coating on material.
    b. grooving or channeling of the material.
    c. the rounding of corners.
    d. all of the above.

    E.198

61. A form of pitting caused by vibration and movement in a liquid environment is called:

    a. subcase fatigue.
    b. cavitation fatigue.
    c. spalling fatigue.
    d. subsurface fatigue.

    E.205

62. A type of corrosion caused by the electrochemical differences between contacting metals or a metal and its environment is called:

    a. galvanic corrosion.
    b. uniform corrosion.
    c. crevice corrosion.
    d. stress corrosion.

    E.207

63. The depletion of chromium from the grain boundaries of metals due to the rapid combination of carbon with chromium is called:

    a. sensitization.
    b. carburization.
    c. corrosion-erosion.
    d. creep.

    E.213

64. Gradual and permanent change of shape in a metal under constant load, usually at elevated temperature is called:

    a. thermal fatigue.
    b. carburization.
    c. creep.
    d. plastic deformation.

    E.211-212, 342

65. In the steel industry, the term "surface measurement" covers:

    a. gloss and reflectance.
    b. dimensional measurement.
    c. surface roughness and properties related to roughness.
    d. both a and c above.

    E.236

66. For concave fillet welds, the size of the weld as compared to the leg of the weld is:

    a. equal to the leg.
    b. larger than the leg.
    c. smaller than the leg.
    d. not related to the leg.

    E.253

67. In convex fillet welds, the shortest distance from the root of the weld to the face of the weld is called:

    a. actual throat.
    b. theoretical throat.
    c. effective throat.
    d. throat.

    E.253

68. A typical location for fastener failures is:

a. in the head-to-shank fillet.
b. through the first thread inside the nut on thread fasteners.
c. at the transition from the thread to the shank.
d. all of the above.

E.273

69. Machine vision technology is used in the automobile industry to:

a. verify colors.
b. calibrate speedometers.
c. design lighting systems.
d. all of the above.

E.279

70. The gage used in the visual testing of threads in oil country tubular goods is called:

a. an LC gage.
b. a thread gage.
c. a profile gage.
d. a pin gage.

E.325

71. One of the main principles of visual and optical testing is described by:

a. access, contact, or preparation.
b. indication or recording method.
c. process control applications.
d. dimension and metrology.

E.52

72. When documenting the results of a visual examination, reducing the aperture opening on a photographic lens results in:

a. an increase in depth of field.
b. a decrease in depth of field.
c. no change in depth of field.
d. a decrease in field resolution.

E.143

73. Several factors can reduce image contrast of a display (cathode ray tube). A source of this interference could be:

a. fogging.
b. photoconduction.
c. halitation.
d. refraction.

E.140

74. When visual inspection of finished weldments is required, the inspector should:

a. examine the weld with a low powered magnifier.
b. examine the weld with liquid penetrant.
c. verify the qualification of the welder.
d. visually examine the weld with sufficient illumination.

E.156

75. When visually accepting a finished weld, the following factor(s) should be considered:

a. weld appearance.
b. welder's stencil mark.
c. dimensional conformance to specification.
d. both a and b above.
e. both a and c above.

E.157

76. An indication of a crater crack at the start-stop of a weld was observed. This condition:

a. would be cause for rejection of the weld.
b. is acceptable for all weldments when the length is less than 4 mm (0.15 in.).
c. may be acceptable if allowed by specification.
d. may be acceptable if reviewed by an owner's representative.

E.173

77. The actual size of a groove weld is:

a. one-half of the cap width dimension.
b. 0.7 of the short leg dimension.
c. the average width of the weld.
d. the groove prep plus penetration.

E.163

78. The visual inspector evaluating the welding process should consider the following factor(s):

a. preheat temperatures.
b. filler metal control and handling.
c. joint fit-up and bevel angle.
d. all of the above.

E.179

79. Visual surface condition for the final acceptance of weldments:

a. is the only item to be considered.
b. may not indicate the actual condition of the weld.
c. is based on mechanical testing of the weld.
d. none of the above.

E.159

80. A material that emits light when excited by illuminated areas of a test object is said to be:

    a. photovoltaic.
    b. luminescent.
    c. photoresistant.
    d. radiescent.

    E.132

81. Two aspects of a display (cathode ray tube) that are most important to visual interpretation are:

    a. halitation and reflections.
    b. fluorescence and refractions.
    c. brightness and contrast.
    d. hue and color.

    E.140

82. A type of corrosion that occurs under fasteners such as bolted or riveted joints if moisture can penetrate and remain is called:

    a. galvanic corrosion.
    b. crevice corrosion.
    c. creep corrosion.
    d. uniform corrosion.

    E.208

83. A type of wear caused by high-pressure impact that lifts large fragments from a metal surface is called:

    a. abrasive wear.
    b. erosive wear.
    c. grinding wear.
    d. gouging wear.

    E.200

84. A type of wear that frequently occurs in stationary joints that are fixed from shrinking or pressing by interference fits or bolts, pins, rivets, or other mechanisms and also at various contact points in antifriction or rolling elements known as:

    a. adhesive wear.
    b. fretting wear.
    c. gouging wear.
    d. erosive wear.

    E.201

85. Devices such as phototubes or multiplier phototubes that emit electrons under the influence of light are called:

    a. photoelectric.
    b. photoemissive.
    c. photocathode.
    d. photovoltaic.

    E.131

Level III Answers
Visual and Optical Testing Method

1.	a	23.	c	45.	d	67.	a
2.	c	24.	a	46.	d	68.	d
3.	b	25.	c	47.	b	69.	d
4.	b	26.	d	48.	d	70.	c
5.	c	27.	c	49.	a	71.	b
6.	c	28.	c	50.	c	72.	a
7.	a	29.	a	51.	b	73.	c
8.	c	30.	d	52.	c	74.	d
9.	c	31.	b	53.	d	75.	e
10	b	32.	c	54.	a	76.	c
11.	c	33.	b	55.	b	77.	d
12.	b	34.	a	56.	c	78.	d
13.	c	35.	c	57.	a	79.	b
14.	a	36.	d	58.	c	80.	b
15.	b	37.	c	59.	a	81.	c
16.	b	38.	d	60.	d	82.	b
17.	c	39.	c	61.	b	83.	d
18.	b	40.	a	62.	a	84.	b
19.	c	41.	d	63.	b	85.	b
20.	d	42.	c	64.	c		
21.	d	43.	a	65.	d		
22.	b	44.	c	66.	c		

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