

- 5) What is IQI (penetrameter) sensitivity and what does it determine? (2pt)

IQI determine the quality of the radiographic techniques used and therefore, will help us in knowing as to what degree of defect can be detected.

- 6) What has occurred if the light image of the letter "B" appears on your radiograph? (2pt)

There is backscatter

- 9) You are monitoring an NDT inspection at a Vendor shop who is using the Magnetic Particle, dry powder prod method. They have located a "weak formation pattern". Where would you expect them to next place the prods to obtain a stronger indication pattern? (Please draw the 2nd location of the prods in relationship to the 1st location. Denote the direction of the defect for both prod placements) (3pt)

- 10) (A) What are the basic differences between a E-6010, E-7010, and an E-7018 electrode? (B) How long should each be dried after removal from their "hermatically sealed" container? (4pt)

a) *E-6010, E-7010 electrodes are non-low hydrogen electrodes, while E-7018 is a low hydrogen electrode.*

b) *E-6010 & E-7010 do not require drying after removal from hermatically sealed container.*

E-7018 does not require drying after removal from hermatically sealed container; however, if this is removed from the sealed container for more than 4 hours then there should be dried or baked for 2 hours.

- 11) Define the following terms "Welder performance qualification", WPS qualification" and "PQR". Explain their inter-relationship (6pt)

a) *This is a test undertaken by a welder to prove his ability or be certified to weld on a certain welding process and procedure.*

b) *WPS is a welding procedure specification. This is a written procedure to weld which states the essential and some non-essential variables. Qualification is performing the welding based on the WPS and performing of the mechanical tests to qualify the procedure.*

c) *PQR - This is the record of the mechanical tests conducted on the test piece welded to a given WPS.*

* *All these are closely related because they refer to testing and qualification.*

12) Please denote the following acronyms: (4pt)

- a) SAW - Submerged Arc Welding
- b) FCAW - Flux Cored Arc Welding
- c) GMAW - Gas Metal Arc Welding
- d) SMAW - Shielded Metal Arc Welding

13) Please draw the completed weld detailed in the following AWS D1.1 WELD symbols and explain each element: (6pt)

15) (a) What is meant by the term "film density", and (b) How is it measured? (2pts):

- a) Is the degree of blackness on the radiograph
- b) This is measured by using a densitometer or comparison with a density strip.

16) What is PWHT and why is it required for some weldments? (2pt):

PWHT is bringing up the temperature of a welded material at a regulated heating rate up to its required soak temperature and held at a required holding time after which cooled down at the required cooling rate. This is required to remove any residual stress after welding.

17) Is it possible to locate defects by magnetic particle or liquid penetrant examination which can not be found by radiography? Explain; (2pt):

Yes, there are near surface or surface that may be ^{parallel} perpendicular with the rays of radiation such as internal lamination and cold laps.

20) What is the basic difference between a DIN and an ASME penetrameters? (2pt)

- a) DIN is a wire penetrometer while an ASME penet is a penny type (a block consisting of holes)

{ not-very DIN → wires
ASME → wires }

b)

22) Denote the three (3) main reasons to use preheat? (3pt)

- a) To reduce the cooling rate during welding
- b) To prevent entrapment of hydrogen gas
- c) To prevent formation of hardenable microstructures that will result in ~~to~~ brittleness.

23. What are radiographic film ARTIFACTS. Give 4 examples ? (3pt):

Film Artifacts are defects formed on the radiograph that are not part of the defect or discontinuity of the material to be tested.

1. *Water Marks*
2. *Crimps*
3. *Scratches on the film*
4. *Disbondment of film emulsion*

24. What does the term "Holiday Detection" mean? (2pt):

This is a test performed to locate a break or discontinuity on a protective coating.

30. What is the purpose of a QC Plan vs. the QA/QC Manual? (3pt)

QC Plan is a list of a quality control activities to be performed in accordance with the approved QA/QC manual on a certain project.

37. What position is the gate to be in during a 'shell' test? Explain why (2pt)

Partially opened position so that any cavity on the valve body can be subjected to the test pressure.

38. What is the ultimate purpose of the backseat test for a gate valve? (2pt)

To ensure that there is no leakage through the bonnet and stem packing.

39. Please see the attached drawing to complete this question.

40. Is the packing gland to be tight during the backseat test of a gate valve? (2pt)

NO

41. Name at least 6 areas that should be checked during the dimensional inspection of a raised face welding neck flange? (2pt)

- *Rating*
- *No. of bolt holes*
- *Thickness of hub and all bend*
- *Soundness of bevel*
- *Ensure that raised face meets the required roughness per standard.*
- *Internal diameter*

45. If a valve body is to be painted, when should shell hydrostatic testing be performed? (1pt)

Before painting.

54. PLEASE FILL IN THE BLANKS:

DFT, is an acronym for Dry Film Thickness, and is normally specified in micrometers. One mil (.001") equals approximately 25 micrometers. (2pt)

55. During painting and coating, what does the term "profile depth" mean, and (b) how it is obtained and measured: (3pt)

a) *Profile is the measurement of the depth of peaks and valleys on the substrate material.*

b) *This is obtained by a profile gauge or a comparator gauge.*

59. What is the "Swedish Standards Institution" normally associated with? (2pts)

Degrees of surface preparation of metal before painting SA 2 $\frac{1}{2}$.

66. Why must alternate paint coats be tinted? (2pts)

To determine the number of coats applied and find areas you may have missed or lightly coated.

97. Which of the following is true? (2pts):

F a) All discontinuities are defects.

F b) Defects that effect the products usefulness are called discontinuities.

T c) Discontinuities that effect the product's usefulness are called defects.

F d) All discontinuities are unacceptable.

98. What do the letters "PSIA" mean ? (2 pts);

a) Pressure referred to National Institute of Standards and Technology's absolute pressure,

b) Pascals per square inch absolute,

c) Pressure standard in absolute units,

d) *Pounds per square inch absolute.*

99. Draw the differences between; (6pts)

(a) "Double-V-groove weld butt joint";

(b) "Double-bevel-groove weld butt joint";

(c) "Single-bevel-groove weld butt joint";