

Regn.No. _____

Name: _____

(To be written by the candidate)

**EXAMINATION FOR COMPETENT PERSONS FOR INSPECTION
AND CERTIFICATION OF BOILERS – OCTOBER 2015
REGULATIONS, WELDING, HEAT TREATMENT AND SAFETY**

Date : 11/10/2015

Time : 11:30 – 12:30 Hrs.

Maximum Marks: 100

Each Question Carry 2 Marks

1. Competent Authority is
 - a) A person who controls competent persons
 - b) An Institution recognised to issue certificate to welders engaged in boilers and its components
 - c) An Institution recognised to issue certificate to boilers during manufacture
 - d) An Institution recognised to issue certificate during annual inspection

2. The chief inspector and all Deputy Chief Inspectors and inspectors deemed to be _____ within the meaning of section 21 of the Indian Penal Code (45 of 1860)
 - a) A boiler inspector
 - b) Competent persons who can inspect the boiler
 - c) Public servants
 - d) Private and Public servants

3. Any equipment which is partially or wholly exposed to flue gases for the purpose of raising the temperature of steam beyond saturation temperature at that pressure is called
 - a) Reheater
 - b) Economizer
 - c) Platen, Low Temperature and final super heater
 - d) Both (a & c)

SEAL

4. Nothing in this The Boilers Act 1923 shall apply to
- Locomotive railway boilers under Railways
 - Any boiler belonging to, or under the control of, the Army, Navy or Air Force
 - Boilers working in the State of Jammu and Kashmir
 - All of the above
5. The boiler can be operated after issue of:
- Form V
 - Form VI
 - Either V or Form VI
 - None of the above
6. Memorandum of inspection is a book which is used for entering all the details of boilers as in format is same as
- Form I
 - a inspection book for entering notes of inspection
 - Both (a & b)
 - a book referred as competent person's record
7. For calculation of fee for inspection of the boilers based on
- The capacity of the boiler
 - The working pressure and temperature of the boiler
 - The area which is exposed to hot flue gas
 - All of the above
8. The permissible variation in minimum wall thickness at any point under nominal wall thickness in hot finished and cold finished seamless carbon steel pipes shall not be more than
- 0.4%
 - 0.79%
 - 4.5%
 - 12.5%

9. All austenitic tubes except H Grade shall be furnished in the following heat treated condition
- Shall be normalized at 1040 degree C minimum and tempered at 730 degree C minimum as a final heat treatment
 - Shall be normalized at 950-980 degree C and tempered at 720-750 degree C for a period of 1 to 3 hours
 - Shall consist of heating the material to a minimum temperature of 1040 degree C and quenching in water or rapidly cooling by other means
 - Minimum solution treating temperatures shall be 1040-1100 degree C
10. For pipes whose diameter exceed 635 mm and whose diameter to wall thickness ratio is 7.0 or less, the bend test shall be conducted as per the procedure instead of the flattening test. Whether the statement
- is correct
 - is not correct
 - is not correct but no test is required
 - none of the above
11. For all types of steel castings confirming to these Indian Boiler Regulations,
- the maximum values of tensile strength shall be 40 – 50 kgf/cm²
 - only the minimum values for tensile strength are fixed
 - the maximum values of tensile strength shall be between 40-50 kgf/mm²
 - Both b) and c)
12. The characteristics and behaviour under ordinary working conditions shall be such that satisfactory weld deposits can be made by a welder
- a good degree of stability of the arc and of the fusing of the covering
 - a fair rate of deposition and depth of penetration
 - a fair contour of weld deposits
 - undue tendency to under-cut
- 1) and 2)
 - 4) and 3)
 - 1), 2) and 3)
 - All of the above

13. The percentage sensitivity required for thick section radioscopic images shall be
- a) 3%
 - b) 2%
 - c) spatial resolutions 3 lines per mm
 - d) 5%
14. Plates which are to be sized for fabrication of boiler can be flame-cut by machine without heat treatment or subsequent grinding or machining
- a) shall not have a carbon content lower than 0.26 per cent
 - b) shall not have carbon content higher than 0.26 per cent
 - c) no limit in the carbon content
 - d) depends on the thickness of the plate
15. The furnace or firebox in top, whether plain or corrugated the thickness of the plate used for construction shall not exceed
- a) 7 inch
 - b) 7/8 inch
 - c) 8 inch
 - d) All of the above
16. During fixing of the stay tubes the thickness of the stay tubes welded into tube plates shall be such that the axial stress on the thinnest part of the tube does not exceed
- a) 170 N/mm²
 - b) 70 N/mm²
 - c) 35 – 60 N/cm²
 - d) 70 kN/mm²
17. For 2.25 Chromium and 1 Molybdenum steel tubes Post Weld Heat Treatment is not necessary under the following condition
- a) a maximum specified Carbon content of 0.15% & Chromium content of 3.0%
 - b) a maximum nominal outside diameter of 102 mm and a maximum thickness of 8 mm
 - c) a maximum pre heat temperature of 150 degree C
 - d) All of the above
18. For a boiler having above 4ft outside diameter the manhole or sight hole size shall be
- a) 14 inches x 10 inches (elliptical in form)
 - b) 16 inches x 12 inches (elliptical in form)
 - c) 12 inches x 09 inches (rectangular in form)
 - d) 15 inches x 11 inches (elliptical in form)

19. The minimum impact value for V-notch specimen shall be
- a) 3.46 kgfm/cm² b) 5.5 kgfm/cm²
c) 4.8 kgfm/cm² d) 6.4 kgfm/cm²
20. For fabrication of seamless forged drums, sulphur and phosphorous percentage in the steel plate shall not exceed
- a) 0.5% b) 0.05% c) 0.005% d) 1%
21. Circularity of the drums during manufacturing when measured internally permitted deviation shall be
- a) 0.5 % of nominal internal diameter
b) 1.25 % of nominal internal diameter
c) 1 % of nominal internal diameter
d) 1.5 % of nominal internal diameter
22. If the plate thickness exceeds 30mm, the tensile test shall be carried out on several reduced section specimens, each having a thickness of at least _____ and a width at the effective cross section of at least _____
- a) 20mm, 30mm b) 30mm, 25mm
c) Any thickness in both width d) All of the above
23. All weld tensile test specimens the diameter shall be the maximum possible consistent with the cross-section of the weld but in no case more than _____
- a) 25 mm b) 30 mm
c) 20mm d) No limit for specimen diameter
24. Magnetic method of flaw detection shall be employed wherever possible for
- a) Austenetic steel b) Non magnetic steel
c) Martenistic steel d) Ferritic steel
25. During loading for heat treatment of the drum the furnace temperature shall not be higher than
- a) 620 degree C b) 400 degree C
c) 300 degree C d) 500 degree C

26. The temperature of the water used as medium of pressure testing
- shall not be less than 30 degree C and more than 55 degree C
 - shall not be less than 20 degree C and more than 50 degree C
 - shall not be less than 10 degree C and more than 65 degree C
 - All of the above
27. High lift safety valve in which the valve head lifts automatically a distance of at least _____ with an over pressure not exceeding 10% of the set pressure.
- D/24
 - D/4
 - D/12
 - D/8
28. The diameter of the tubular water glasses
- shall not be less than 3/8 inch and not more than 7/8 inch outside diameter
 - shall not be less than 1/4 inch and not more than 3/4 inch outside diameter
 - shall not be less than 1/2 inch and not more than 7/8 inch outside diameter
 - shall not be less than 1/2 inch and not more than 3/4 inch outside diameter
29. Dials for pressure gauge shall be of the following requirements
- For the pressure upto and including 35 kg/cm² pressure gauged dials shall be graduated in kg/cm² from zero to twice the pressure as nearly as may be practicable
 - The scale on the dial shall be clearly and permanently marked in kg/cm²
 - The travel of the pointer of the dial gauge shall not exceed 350°C.
 - Both a) and b)
30. Thinning on the tube bends at the bend extrados shall be calculated with the following formula
- $\frac{100}{\frac{4R}{D} + 1}$
 - $\frac{100}{\frac{4R}{D} + 2}$
 - $\frac{100}{\frac{2R}{D} + 2.75}$
 - $\frac{200}{\frac{4R}{D} + 1}$

Where R = mean radius of the bend to the centre line of the tube, mm and
D = outside diameter of the tube, mm

31. Maximum permissible working pressure and temperature of the Molybdenum steel cold drawn pipes, tees shall be
- 21 kg/cm² and 260°C
 - No restriction in pressure and maximum temperature is 621°C
 - No restriction in pressure and temperature is 624°C(max)
 - No restriction in pressure and temperature is 700°C
32. Standard flange size and thickness can be obtained from the
- Appendix B
 - Appendix D
 - Appendix E
 - Appendix J
33. For captive boilers and Waste Heat Boilers (Fired and Unfired) used exclusively in continuous process plants, the inspection shall be carried out in accordance with the provisions of
- Appendix E
 - Appendix JA
 - Appendix J
 - Appendix JB
34. What is the maximum diameter of the mountings and fittings of bronze may be attached directly to steel pipes by screwing when the pressures and temperatures do not exceed 8.5 kg/cm² and 225°C respectively?
- 25mm
 - 50mm
 - 76mm
 - 114.3mm
35. All the components of the boiler in the manufacturer's premises have not been tested hydraulically during manufacturing, the hydro test on completion of erection shall be taken to a test pressure
- 1.50 times the maximum working pressure
 - 1.25 times the maximum working pressure
 - 2.0 times the maximum working pressure
 - 1.15 times the maximum working pressure
36. No steam gauge shall used
- For the boiler whenever the floating test of the safety valve
 - All the gauges are plugged to the seat of the safety valve
 - Without having proper pressure marking in the dial
 - Without a syphon filled with water between it and in the boiler
37. Rating of the boiler means
- Performance canalization of the boiler
 - Determination of the efficiency of the boiler
 - The power load factor of the boiler
 - That shall be the nearest whole number of square meters of heating surface

38. The Inspecting Authority shall maintain the records of boiler approved Forms, Certificates, and copies of the approved drawings for a period of _____. Thereafter these records may be sent to the _____ of the boiler.
- 4 years, owner
 - 3 years, stock room
 - 3 years, owner
 - 5 years, destroyer
39. Elaborate Remnant Life Assessment is not mandatory for
- For the boilers operating at a temperature of 400°C and are in operation for 100,000 hours
 - For the boilers when it completes a life of twenty years
 - Shell type boilers
 - For boilers working at a pressure less than 50 kg/cm^2
40. If the owner of the firm himself shall have a Degree in Mechanical or Welding Engineering for minimum of three years with specialized experience in welding technology and employed welders having valid certificate for Tungsten Inert Gas welding, shall be eligible for servicing as
- Class II repairer
 - Class I repairer
 - Special class boiler repairer
 - Class III repairer
41. Inspection fee for boilers during construction in India
- Shall be calculated four times the registration fee
 - Shall be calculated two times the registration fee
 - Shall be calculated as the sum of the fees paid for the components of the construction boiler manufactured in the manufacturer premises
 - Shall be at the discretion of Inspecting Authority
42. Shell type boiler shall be heat treated before hydraulic test if
- Any plate in the construction of boiler parts exceeds 20mm thickness
 - The steel used for construction having carbon content exceed 0.25%
 - The part thickness exceeds 20 mm and carbon content is 0.20%
 - The classification of both a) and b)

43. The limits of application for Class II shell type boilers as
- If the working pressure does not exceed 105 pounds per square inch
 - If the working pressure in pounds per square inch multiplied by internal diameter in inches does not exceed 5250
 - As approved by the Inspecting Authority
 - Both a) and b)

44. Compensation for openings in Shells are to be provided
- Where the width of any openings in the shell in a direction to the longitudinal axis of the boiler exceeds three and half times the thickness of the shell plate in inches plus 2.25 inches
 - Where the width of any openings in the shell in a direction to the longitudinal axis of the boiler exceeds two and half times the thickness of the shell plate in inches plus 2.75 inches
 - Where the width of any openings in the shell in a direction to the longitudinal axis of the boiler exceeds four and half times the thickness of the shell plate in inches plus 2.25 inches
 - Where the width of any openings in the shell in a direction to the circumferential axis of the boiler exceeds two and half times the thickness of the shell plate in inches plus 2.25 inches

45. The thickness of the tubes under internal pressure shall be calculated as under

a)
$$t = \frac{PDf}{P+2} + C$$

b)
$$t = \frac{PD}{P+f} + C$$

c)
$$t = \frac{PD}{P+2f} + C$$

d)
$$t = \frac{PD}{P+2f} + 2C$$

Where P is internal working pressure, D is outside diameter, f is the allowable stress and C is the corrosion allowance

46. Breathing space between tubes and shells provided in the shell type boilers has
- The space between tubes and shells shall not be less than 40 mm
 - The spaces between the furnaces shall not be less than 200 mm when one more furnace in the construction.
 - Bowling hoop it shall be 59mm as measured from the outside diameter of the hoops.
 - A minimum of 75mm or 3% of the shell inside diameter, whichever is larger, with a maximum requirement of 100 mm.

47. Age and validity of the welder are to be considered by the Competent Authority
- a) Shall not be less than the 18 years of age and for validity is for a period 24 months from the date of issue
 - b) No age limit and for validity is for a period of 24 months from the date of issue
 - c) Shall not be less than the 20 years of age and for validity is for a period of 24 months from the date of issue.
 - d) Shall not be less than the 24 years of age and for validity is for a period of 24 months from the date of issue
48. A shell type boiler generating steam for use external to itself under pressure up to 7 kg/cm^2 and having a volumetric capacity exceeding 25 litres but not exceeding 500 litres and also a coil type boiler or a once through boiler having the conditions of the limitation of pressure shall be 12 kg/cm^2 and the capacity shall be not exceeding 150 litres are called as
- a) Small capacity boilers
 - b) Small Industrial boilers
 - c) Horizontal Multi-tubular Boilers
 - d) None of these
49. For feed water and boiler water, test methods shall be carried out as prescribed in the appropriate clauses as shown below
- a) IS:3025-1964
 - b) IS:3550-1965
 - c) Both a) and b)
 - d) None of the above
50. For welder test the test plate position as plate in a horizontal plane with the weld metal deposited from underneath is called
- a) Horizontal position
 - b) Vertical position
 - c) Overhead position
 - d) Flat position

----- End of Question Paper -----