

Regn No: _____

Name: _____

(To be written by the candidate)

EXAMINATION FOR COMPETENT PERSONS FOR INSPECTION AND CERTIFICATION OF BOILERS – APRIL - 2011

OPERATION & MAINTENANCE (O & M) COMMISSIONING, NDT, MATERIALS AND ERECTION

Date : 24/4/2011

Time : 14:00 – 17:00 Hrs.

Marks : 150

1. (a) (i) Explain briefly the Natural Circulation and Forced Circulation Boilers?
(ii) Explain with the help of block diagram the water circuit and steam circuit of a natural circulation boiler?

15 Marks

- (b) (i) Explain with neat diagram the Regenerative Rankine Cycle as employed in a Boiler, covering economizer, water walls and superheater?

15 Marks

OR

- (ii) Write short notes on circulating fluidized bed boiler and reasons for their preference over pulverized fuel fired boilers.

15 Marks

2. (a) Define as per Boilers Act 1923

10 Marks

- (i) Boiler
(ii) Inspecting Authority
(iii) Accident
(iv) Competent Persons
(v) Manufacturer

- (b) What are the procedures to be followed for registration of the boiler

5 Marks

3. (a) Why are de-superheaters used in boilers? 5 Marks
- (b) Why should the flue-gas temperature be observed frequently and logged? 5 Marks
- (c) What is set and reset pressure of safety valve?
How do you establish the discharge capacity of safety valve? 10 Marks
- (d) What is a fusible plug? Explain with neat sketch and where it is located in a horizontal multi tubular boiler? 10 Marks

4. (a) A boiler manufacturer presents you three plates of size 100mm x 3M x 6M have been procured from a well known steel manufacturer confirming to SA515Gr.70 but unable to correlate to material certificate. How to you proceed to test the plates and what criteria you adopt in accepting them under IBR. 10 Marks
- (b) Write the principle and the application of NDT methods UT and MT for detecting the defects in welds? 10 Marks
- (c) Why martensitic steels are preferred to austenitic steel tubes/pipes in modern boilers. Give detailed reasons. 10 Marks

5. (a) What heat treatment is required for headers made up of P22 of thickness of 45mm welded with stubs of T91? How do you control the heat treatment cycle in the furnace? 10 Marks
- (b) You are given a radiograph of the butt weld of a boiler drum of thickness 90mm made by SAW. What are the requirements of the film and what are the acceptance criteria of the weld? 10 Marks
- (c) A manufacturer forgets to stress relieve the production test coupon along with the boiler drum of thickness 80mm of SA 515 Gr 70 made by SAW. However the heat treatment chart is available. What steps you take? What tests you conduct on the test coupon along with the criteria for acceptance? 10 Marks

6. (a) What are the essential variables in procedure qualification of C Mn steel of 63mm thick SA299 by SAW. What are the tests that are to be conducted on the test coupon and acceptance criteria? 10 Marks
- (b) Choose the appropriate answer: Each question carry 1 Mark.
- i) In a water tube boiler of D type the upper drum is supported by:
- a) Boiler structures
 - b) Two 'U' rods
 - c) Front and rear wall tubes
 - d) Bank tubes

- i) In a recovery boiler the water wall tubes are made of :
- a) C-Mn seamless tubes
 - b) ½ MO seamless tubes
 - c) C-Mn seamless tubes with stainless steel extrusion
 - d) Stainless steel tubes
- iii) Fuel used in recovery boiler is:
- a) Furnace Oil
 - b) Black liquor
 - c) Pulverized coal
 - d) Green liquor
- iv) Angle beam UT is preferred for inspecting thick wall welds compared to RT because:
- a) UT detects all slag
 - b) UT detects all linear indications
 - c) UT picks up all internal defects
 - d) None of the above
- v) A technician qualified under ASNT Level II in RT can:
- a) Write RT procedures and qualify personnel
 - b) Evaluate RT films
 - c) Interpret marginal cases and rewrite RT procedures
 - d) Can only supervise Level I technicians

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