

BOILER OPERATION ENGINEERS EXAMINATIONS,**FEBRUARY 2008****BOILERS-I****Time: 3 Hours****Marks: 100***Note:*

1) Candidate should attempt six (6) questions subject to alternative or limitations, if any mentioned herein, or in each question. If more are answered, the last extra questions will be ignored.

2) Parts of same question must be answered together and must not be interposed by answer(s) to other question(s).

3) Question No. ONE is compulsory.

4) Candidates should answer the paper in ENGLISH only.

1. a) What is Natural circulation and Forced circulation of water in boiler? What are the advantages of Forced circulation? 5
- b) Explain the phenomenon of Super heater starvation. 5
- c) What is Bagasse? Discuss about effects of moisture in Bagasse. 5
- d) What are different methods available for cleaning condenser tubes and discuss about merits and demerits of each method briefly. 5
2. a) A hollow shaft of 1" outside diameter and 34 inch inside diameter is subjected to a torque of 40 Nm. Find the shear stress at the outside and inside diameter of the shaft. 10
- b) Find the maximum stress produced in a round steel bar 50mm in diameter and 9 meter long due to its own weight when it is simply supported at its ends. Steel weighs at 77000 N/m³? 10
3. How many types of basic water level controls are in use? Classify them and discuss in detail illustrating merits and demerits of each. 16
4. a) What are the probable causes of failure of water tubes? 4
- b) Discuss about 'Economiser Thermal shock! 4
- c) Write about water treatment in Reverse Osmosis method. 8
5. a) What safety precautions should be taken for protection of equipment and personnel during boiler operation? 8
- b) What are the methods used for controlling superheat temperature? Discuss them briefly. 8
6. a) What is draught and why it is necessary? 4
- b) Why balanced draught is preferable? 4
- c) How draught is controlled in response to the boiler load? 8
7. Name important boiler accessories provided in a modern boiler plant and explain about working of any two of them. 16
8. a) How do you act if you find fire in coal bunker? Suggest precautionary methods to avoid such accidents. 8
- b) FD fan of a chemical firing boiler was lifted and thrown to a distance of 1km. in an accident. What would be probable causes and how do you avoid such accidents. 8
9. a) How much water will be discharged in liters per minute by a centrifugal pump with 200 mm discharge and velocity of boiler feed water at the discharge opening of 3m/sec.? 4
- b) A coal having a calorific value of 3500 Kcal/kg.is supplied to power station. The boiler, Turbine, and Generator efficiency are 83%, 32%, 97% respectively. If the coal consumption of the power station is 30 T/hr., determine the capacity of power plant in MW. 6
- c) Estimate the total cost of insulation of 250 NB steam pipeline of total length of 525 meters with 75 mm thick, if the cost of insulation including fitting charges is Rs.600/m³. 6

BOILER OPERATION ENGINEERS EXAMINATIONS,**FEBRUARY 2008**

BOILERS-II

Time: 3 Hours

Marks: 100

Note:

- 1) Candidate should attempt SIX (6) questions subject to alternative or limitations, if any mentioned here in, or in each question. If more are answered, the last extra questions will be ignored.
 2) Parts of same question must be answered together and must not be interposed by answer(s) to other question(s).
 3) Question No. ONE is compulsory. 4) Candidates should answer the paper in ENGLISH only.

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| 1. a) What are the causes account for damage of safety valve? | 4x 5 = 20 |
| b) Explain the phenomenon of water hammer and how do you avoid it. | |
| c) What is an Economiser? Classify economizers. | |
| d) Compare Globe valves and Gate valves used in boiler house | |
| 2. a) Explain about Pulverised coal firing. | 6 |
| b) What are the types of pulverised coal firing systems and discuss them in detail. | 16 |
| 3. What is Deaeration? Describe the operation of Deaerator and its classification. | 16 |
| 4. a) What is meant by Priming and Foaming? Discuss about it's cause and how to prevent it. | 8 |
| b) What is Caustic Embrittlement and how do you prevent it? | 8 |
| 5. a) What is primary air and secondary air? | 5 |
| b) Why flue gas is to be analysed and how excess air effects the flue gas analysis? | 5 |
| c) How do you avoid formation of smoke and soot when firing coal? | 5 |
| 6. What are the commonly used instruments used in a power plant and discuss about their role for safe and economical operation? | 16 |
| 7. What are the different latest systems available for disposal of ash and discuss each in detail with diagrams. | 16 |
| 8. a) What is the difference between Atmospheric pressure fluidised bed combustion and Circulating fluidised bed combustion system? Discuss in detail about the merits and de-merits of both. | 12 |
| b) Calculate the absolute temperature of steam if it's temperature is 500° F. | |
| 9. Assume that two nos of water tube boilers of different capacities generating steam at pressures of 49 kg/ sq.cms. and 68 kg/sq.cms. If steam mains of both are to be connected to single steam turbine which is operated at 45 kg/sq.cms. Explain how you connect the two steam mains to turbine with a neat sketch showing all basic fittings to be provided .And also state the precautions to be taken while charging the mains. | 16 |

BOILER OPERATION ENGINEERS EXAMINATIONS, FEBRUARY-2008

BOILER DRAWING READING

AP-2008 Time : 1 Hour

Marks : 50

*Note:**Answer all the questions.**Answer the questions in English only.*

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| 1. Name the steam pipe fittings shown in Fig. 1 | 9 |
| 2. Name the parts of steam pipe shown in Fig. 2 | 7 |
| 3. Name the pipe joints shown Fig. 3 | 4 |
| 4. Read the pressure assembly drawing of typical water tube boiler and all the questions. | |

2 x 15 = 30

- a) At what height water wall top header (Right hand side) is located with reference to economizer bottom header?
- b) What is the pitch of water wall tubes ?
- c) How many bends are provided in each secondary super heater coil ?
- d) What is the distance between steam drum centre and second attemperator vertical axis ?
- e) How many water wall tubes are provided in right side water wall panel?
- f) At what height steam drum is located with reference to steam outlet header?
- g) How many economizer coils are provided in total ?
- h) What type of economiser is provide ?
- i) What is the gap between front water wall panel top header and rear water wall panel top header?
- j) At what distance convection bank bottom headers are located ?
- k) At what angle rear water wall tube is vertically bent near primary super heater bottom to form goose neck with reference to steam drum vertical axis ?
- l) At what height Attemperator -I is located from convection bank bottom headers ?
- m) At what height convection bank top headers are located from economiser top header?
- n) In how many stages steam is super heated in this boiler?
- o) At what height steam drum is located with reference to secondary super heater outlet header.



