BOILER OPERATION ENGINEERS EXAMINATIONS, JANUARY-2007
BOILERS –I AP - 2007

Time: 3 Hours Marks: 100

Note:1) Candidates 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 answers will be ignored.

2) Parts of the 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 Precautions to be taken while entering in to a Electro-static Precipitator ? 20
b) Discuss about Island protection in power plants . What happens if it fails?
c) What is meant by pigging in gas pipe lines ?
d) How do you conclude that bank tube of a water tube is punctured ? How do you get it repaired ?

2. a) What is the total upward force on a valve disc 3" in dia. when the boiler steam pressure is 110 kg./sq. cms. 6
b) A hollow steel column of external dia. 250 mm has to support an axial load of 2000 KN .The ultimate stress for steel is 480 N/sq. mm. Find the ID of column if factor of safety is four. 10

3. a) What is "super critical boiler?" Discuss about advantages of it over critical type boilers. 6
b) Draw a neat sketch of layout of steam power plant showing Coal and Ash circuit, Air and Gas circuit, Feed water and steam flow circuits and name all equipment. 10

4. a) A solid shaft of 200 mm dia. has the same cross sectional area as that of a hollow shaft of the same material with ID of 150 mm. Find the ratio of the power transmitted by the two shafts at the same speed. 10
b) A beam 8 mtrs long fixed at both ends carries a uniformly distributed load over the whole span. Find the load intensity on beam if the bending moment is not to exceed 40 KNM and if the max.deflection shall not exceed 1/400 th of the span. 6

5. Explain the working of two drum type water tube boiler with all the features needed with a sketch. 16

6. a) What is the function of Boiler safety valve and What is the difference between boiler safety valve and relief valve ? 6
   b) Explain operation of spring loaded POP safety valve with a neat sketch. 10

7. Discuss about troubles caused by the impurities in water used in steam power plant. Briefly discuss about methods of feed water treatment. 16

8. a) Define 'Air fuel ratio'. Why excess air is required in combustion ? How do you calculate excess air required ? 10
   b) Calculate the mass of min. air required for complete combustion of 1 kg. of carbon. Give the composition of combustion products. 6

9. a) Define steam condenser and how it works. 5
   b) Give the classification of steam condensers. 5
   c) What are the effects of air leak in steam condenser? 6

BOILER OPERATION ENGINEERS EXAMINATIONS, JANUARY-2007

BOILERS –II

AP-2007

Time: 3 Hours

Marks: 100

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3) Question No. ONE is compulsory.

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1.	a) What do you understand by internal treatment for a boiler ? What are the chemicals used for this purpose and why they are used ?	10
	b) Describe the solid wall Boiler setting.	10
2.	a) What type of human errors cause furnace explosions ?	6
	b) What precautions should be observed in the installation of automatic controls in boilers.	10
3.	Discuss about the working of combined cycle gas power plant with neat sketch.	16
4.	a) Why periodical cleaning of boilers required ?	6
	b) Discuss the methods of preserving water tube boilers when not in use .	10
5.	a) What steps do you take to ensure max. efficiency in the operation of a water tube boiler ?	10
	b) Enumerate the locations where energy conservation possible in the power plant you are working.	6
6.	a) What is steam attemperator and how it can be done ?	6
	b) What are the mainly used materials for super heater coils and what are their limitations ?	5
	c) What are the causes of super heater tubes failure ?	5
7.	What are the different types of steam pipe supports and why they are required ? Explain any one type of supports with a sketch.	16
8.	Explain one of the chemical methods of water softening with sketches.	16
9.	What is meant by Fluidized Bed Combustion ? Discuss it in detail with a neat sketch.	16

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BOILER OPERATION ENGINEERS EXAMINATIONS, JANUARY-2007

BOILER DRAWING READING

AP-2007

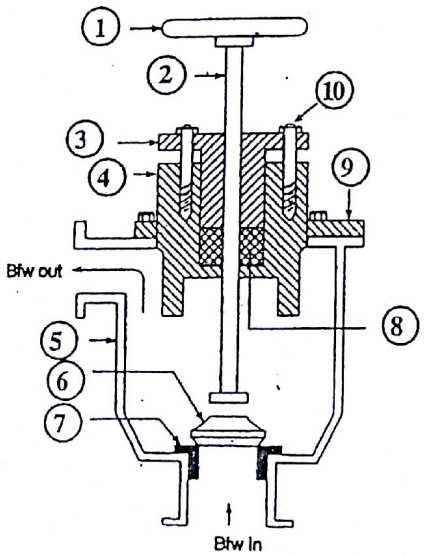
Time : 1 Hour | Marks : 50

Note : 1) Answer all the Questions
2) Candidates should answer the paper in English only.

I. Read the super heater assembly drawing supplied and Answer the Questions. 2x15=30

1. What is the length of the stub of saturation pipe if the OD of steam drum is 1200 mm ?
2. At what hight attemperator is located with reference to centre of mud drum?
3. What is the size of the tube used for super heater coils ?
4. What is the distance between left end super heater coil and water wall ?
5. What is the minimum temperature choosen by the designer in the design of super heater ?
6. How many erection welds are indicated in this drawing ?
7. How many secondary super heater coils are provided for this boiler ?
8. What is the distance between primary super heater inlet header and steam drum ?
9. What is meant by "EL + 13578" ?
10. At what inclination, saturation pipe stub is welded on steam drum ?
11. What is distance between secondary super heater inlet header and outlet header ?
12. What is the total weight of primary and secondary super heater coils ?
13. What is the gap between primary super heater coils and secondary super heater coils ?
14. What is the weight of the attemperator ?
15. At what elevation the steam drum is located with reference to mud drum axis ?

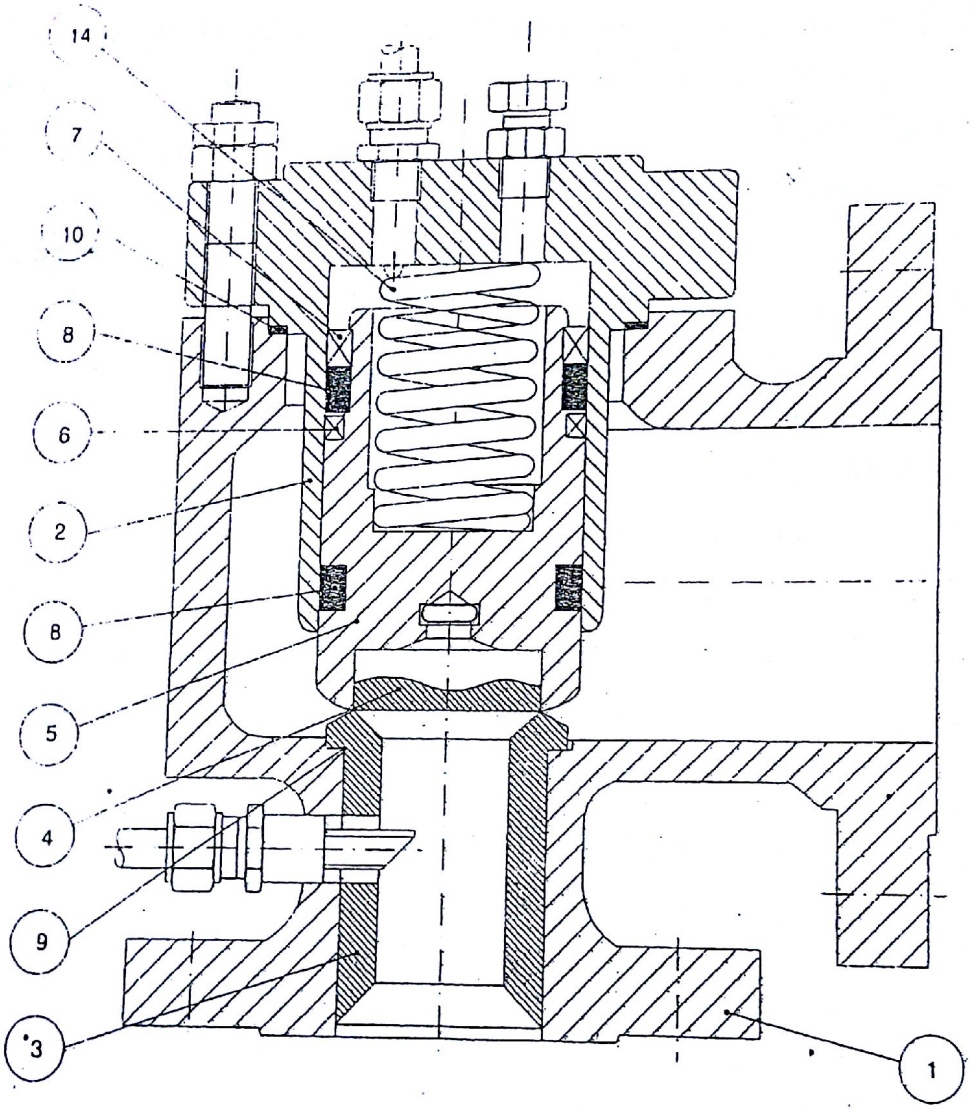
II. Name the parts of Feed Checkvalve shown below. 10



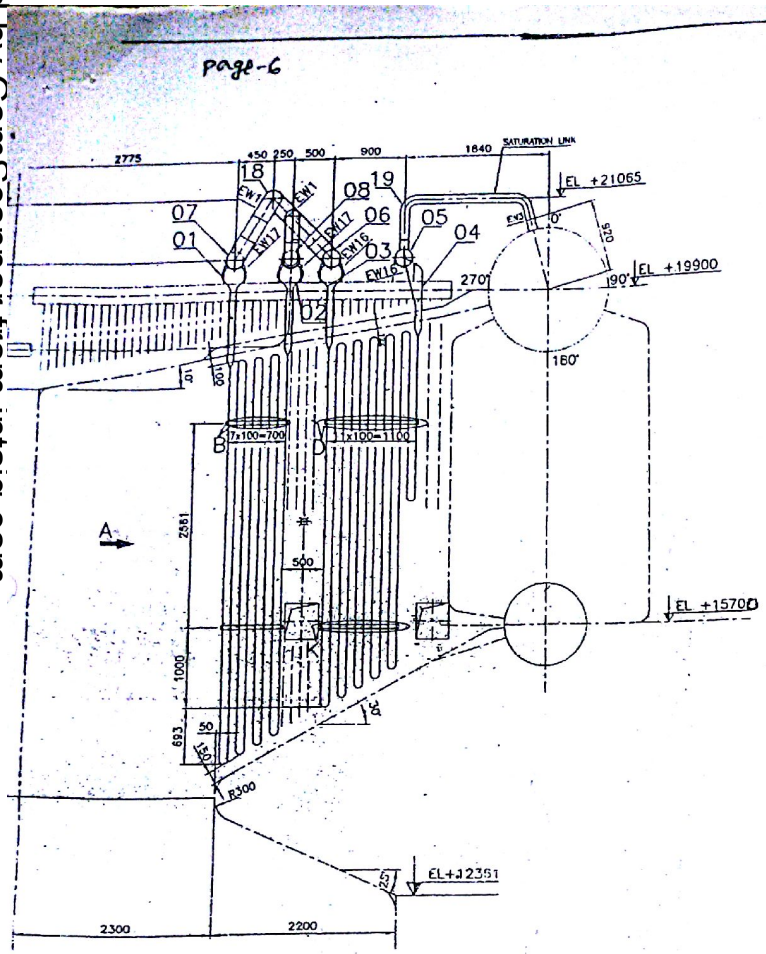
FEED CHECKVALVE

III. Name the parts of the pilot operated safety relief valve shown in the next page 10

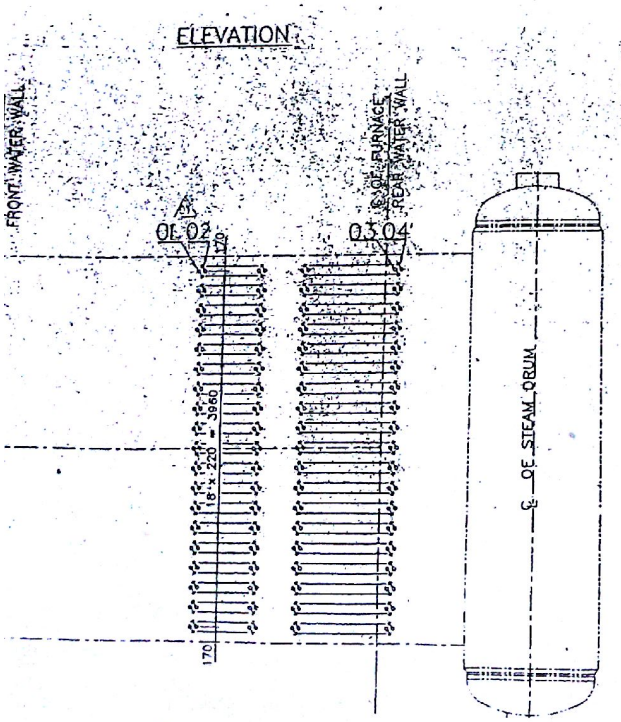
P.T.O.



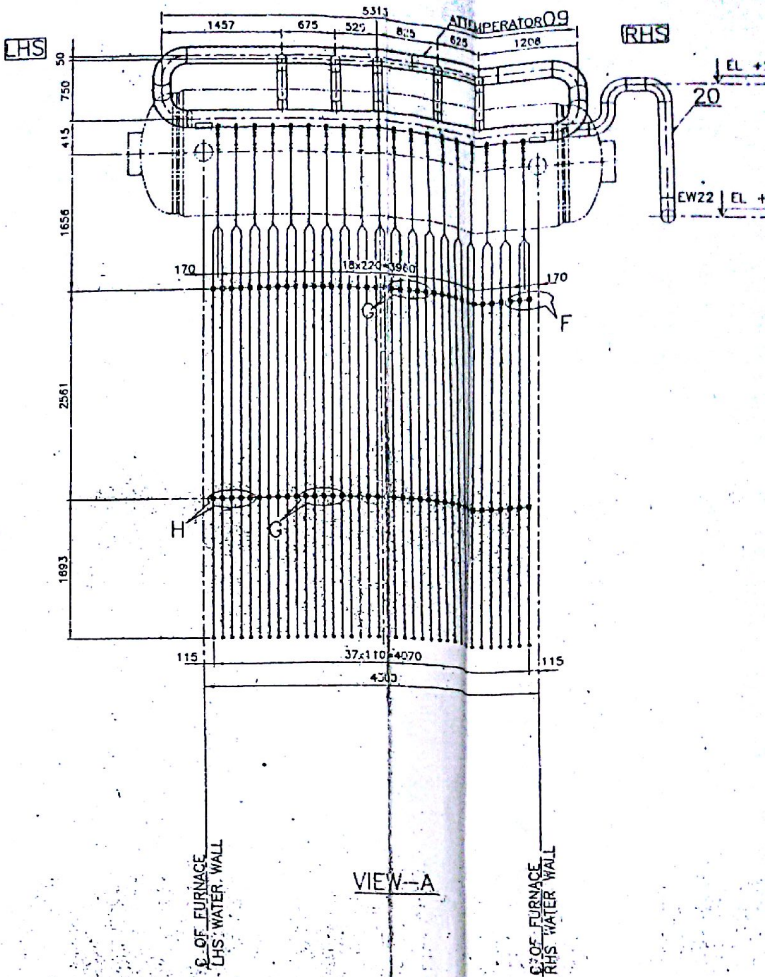
page-6



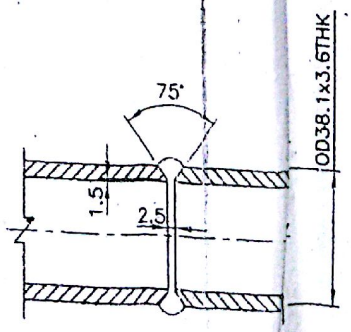
ELEVATION



SECTION PLAN



VIEW-A



TYPICAL TUBE TO TUBE WELDING DETAIL