

10. a) What is refractory coated water wall and when is it used? 4
- b) Why is it necessary to control the steam temperature at superheater outlet? State the effects of the variation in the following steam generator operating variables on the superheater outlet steam temperature : (i) Load, (ii) feed water inlet temperature. 4+4
- c) How does the attemperator control the superheated steam temperature? 4
11. a) What are the advantages of preheating air in a steam generator? What are the advantages and limitations of regenerative air preheater over the recuperative type? 2+4
- b) What do you mean by cold end corrosion? How can it be avoided in a steam generator? 4
- c) What are the major losses that occur in a steam generator? How does the boiler loss depend on the supply of air to the boiler? 2+4

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BACHELOR OF POWER ENGG. EXAMINATION, 2011

(3rd Year, 2nd Semester, Supplementary)

Steam Generator

Time : Three hours

Full Marks : 100

Use separate Answer-Script for each part.

PART – I

(50 marks)

Answer any **three** questions

Two marks for neatness.

1. a) What is fine tube boiler? 3
- b) Describe features of a five tube boiler. 8
- c) What are the limitations of a fire tube boiler? 5
2. a) What are boiler mountings? Why are they provided? 6
- b) Describe four major mountings of a modern boiler. 10
3. a) What is fluidigastion? 4
- b) State imfortant properties of a fluidized led. 4
- c) Describe imfortant features of a bubbling led boiler. 8
4. a) Why is draft system provided for boiler? 2
- b) What are different draft systems? 6
- c) Describe functions of climney. 4

[Turn Over]

(2)

- d) Explain how chimney height is established. 4
5. Write few lines on : 4x4
- a) Function of ignitor.
- b) Straight flow coal burner.
- c) Dumping grate stokes.
- d) Direct coal fining system of boiler.

PART – II

(50 marks)

Answer any **three** questions

Two marks for neatness and to the answer.

6. a) How does a tower type boiler layout from a **p**-type layout? In which type of boilers the former layout is preferred? 3+1
- b) In a **p**-type steam generator layout of a utility power station show the different tube arrangements and mark the working fluid flow path. 10
- c) How do you classify a steam generator based on (i) tube content and (ii) draft? 2
7. a) In a finned economizer, on which side of the tube wall would you recommend to put the fin and why? Discuss

(3)

- with sketch the most suitable fin arrangement on the wall of an economizer tube bank. 4+4
- b) Feedwater enters the economizer of a power station steam generator at 180 bar 250°C and with a flow rate of 1500 T/h. The flue gas flow rate is 2200 T/h and the temperatures of the flue gas entering and leaving the economizer coil are 530°C and 360°C, respectively. The overall heat transfer coefficient based on the inside area of the economizer tube is 70 W/m² K. If the velocity of water entering the economizer is 1 m/s and the internal diameter of the tube is 50 mm, find out the number of coils in the economizer and the length of one coil. Take specific heat of flue gas as 1.1 kJ/kg°C. 8
8. Differentiate between : 4x4
- i) Nucleate boiling and film boiling in pool boiling
- ii) Annular flow and mist flow in forced flow boiling
- iii) Dry out and burn out of evaporator tube.
- iv) Void fraction and volumetric quality in two phase flow.
9. a) Define circulation ratio. How is it related to the dryness fraction at the riser exit? 2+1
- b) How does circulation take place in a natural circulation boiler? What do you mean by assisted circulation? 3+2
- c) Discuss with a neat sketch the internal arrangements of a steam drum in a power station steam generator. 8

[Turn Over]