

QUESTION BANK

1. Match **List-I** (Type of boiler) and **List-II** (Classification of boiler) and select the correct answer using the codes given below the lists:

List-I

List-II

- | | |
|-----------------------|-----------------------|
| A. Babcock and Wilcox | 1. Forced circulation |
| B. Lancashire | 2. Fire tube |
| C. La-mont | 3. Water tube |
| D. Cochran | 4. Vertical |

Codes:

- | A | B | C | D |
|-------|---|---|---|
| (a) 1 | 2 | 3 | 4 |
| (b) 2 | 3 | 4 | 1 |
| (c) 3 | 2 | 1 | 4 |
| (d) 2 | 4 | 1 | 3 |

2. In forced circulation boilers, about 90% of water is recirculated without evaporation. The circulation ratio is

- | | |
|---------|---------|
| (a) 0.1 | (b) 0.9 |
| (c) 9 | (d) 10 |

3. Consider the following

1. Increasing evaporation rate using convection heat transfer from hot gases.
2. Increasing evaporation rate using radiation.
3. Protecting the refractory walls of the furnace.
4. Increasing water circulation rate.

The main reasons for providing water wall enclosure in high pressure boiler furnaces would include

- | | |
|----------------|-------------|
| (a) 2 and 3 | (b) 1 and 3 |
| (c) 1, 2 and 4 | (d) 2 and 3 |

4. Consider the following components:

1. Radiation evaporator.
2. Economizers.

3. Radiation superheater.
4. Convection superheater.

In the case of Benson boiler, the correct sequence of the entry of water through these components is:

- | | |
|----------------|----------------|
| (a) 1, 2, 3, 4 | (b) 1, 2, 4, 3 |
| (c) 2, 1, 3, 4 | (d) 2, 1, 4, 3 |

5. Coal fired power plant boilers manufactured in India generally use:

- (a) pulverized fuel combustion
- (b) fluidized bed combustion
- (c) circulating fluidized bed combustion
- (d) moving stoker firing system

6. Once-through boilers will not have

- (a) Drums, headers and pumps
- (b) Drums, steam separators and pumps
- (c) Drums, headers and steam separators
- (d) Drums, headers and pumps

7. Match **List-I** (Name of boiler) with **List-II** (Special features) and select the correct answer using the codes given below the lists:

List-I

List-II

- | | |
|---------------|-------------------------------------|
| A. Lancashire | 1. High pressure water tube |
| B. Cornish | 2. Horizontal double fire tube |
| C. La-Mont | 3. Vertical multiple fire tube |
| D. Cochran | 4. Low pressure inclined water tube |
| | 5. Horizontal single fire tube |

Codes:

- | A | B | C | D |
|-------|---|---|---|
| (a) 2 | 5 | 1 | 3 |
| (b) 2 | 4 | 3 | 1 |
| (c) 1 | 5 | 2 | 3 |
| (d) 5 | 4 | 1 | 3 |

8. Benson boiler is one of the high pressure boilers having
- One drum
 - One water drum and one steam drum
 - Three drums
 - No drum
9. Consider the following statements:
- Forced circulation is always used in high pressure power boilers.
 - Soot blowers are used for cleaning tube surfaces at regular intervals.
 - Electrostatic precipitator is used to remove fly and form flue gases.
- Which of these statements are correct?
- 1, 2 and 3
 - 2 and 3
 - 1 and 3
 - 1 and 2
10. Boilers operate at
- subcritical pressure
 - supercritical pressure
 - subcritical as well supercritical pressures
 - critical pressure only
11. In a boiler, feed water supplied per hour is 205 kg while coal fired per hour is 23 kg. Net enthalpy rise per kg of water is 145 kJ for conversion to steam. If the calorific value of coal is 2050 kJ/kg then the boiler efficiency will be
- 78%
 - 74%
 - 62%
 - 59%
12. In steam generators, a stoker acts as one of the following devices. What is this device?
- Air preheating device
 - Steam superheating device
 - Air superheating device
 - Fuel feeding device
13. Scale deposits in Benson Boiler are prevented because
- boiler is flushed out after every 4000 working hour
 - forced circulation is used
 - bore of tubing is small.
 - steam and water have same density
14. In a boiler 25kg of fuel is burnt per hour 150kJ of enthalpy rise is required for conversion of 1kg steam from water. The feed water supplied per hour's 220kg. Calculate the boiler efficiency if calorific values of fuel is 5150 kJ /kg.
- 61%
 - 62%
 - 63%
 - 65%
15. Match List I with List II and select the correct answer
- List I**
- Lancashier Boiler
 - La-mont Boiler
 - Babcock & Wilcox Boiler
 - Cochran Boiler
- List II**
- Forced circulation
 - Fire tube
 - Water tube
 - Vertical
- Codes:**
- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 3 | 1 | 4 |
| (b) | 1 | 2 | 3 | 4 |
| (c) | 2 | 1 | 3 | 4 |
| (d) | 4 | 1 | 3 | 2 |
16. Which of the following is a water tube boiler?
- Locomotive boiler
 - Cochran boiler
 - Babcock & Wilcox
 - Lancaster boiler
17. The water tubes in Babcock & Wilcox boiler are inclined to
- improve convective heat transfer
 - improve radiative heat transfer
 - shorter the size of the boiler
 - promote natural circulation of water

18. Which of the following is a forced circulation boiler ?
- (a) Babcock and Wilcox
 - (b) Locomotive Boiler
 - (c) Simon Carres Boiler
 - (d) Benson Boiler
19. Feed water is heated by superheated steam in
- (a) Benson Boiler
 - (b) Velox Boiler
 - (c) Leoffler Boiler
 - (d) Babcock and Wilox Boiler
20. Steam from a high pressure boiler
- (a) is first superheated and then throttled
 - (b) is first throttled and then superheated
 - (c) is first superheated and cooled
 - (d) is fed into turbine without throttling
21. In water tube boilers parallel sets of tubing are used
- (a) to reduce the friction loss in flow
 - (b) to reduce the length of tubing
 - (c) to increase the exposed surface area
 - (d) to improve heat transfer
22. With the use of condensate instead of using the feed water, the deposition of salt in the boiler is
- (a) increased
 - (b) prevented
 - (c) dependent of other factors
 - (d) None of the above
23. A good condensing plant should have
- (a) maximum cooling surface per kW capacity
 - (b) minimum cooling surface area per kW capacity
 - (c) average cooling surface area per kW capacity
 - (d) None of the above

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ENGINEERS ACADEMY

ANSWERS AND EXPLANATIONS

1. **Ans. (c)**

Fire tube boilers:

- (i) Locomotive boiler (Horizontal boiler)
- (ii) Lancashire boiler
- (iii) Scotch marine boiler
- (iv) Cochran boiler (vertical boiler)

Water tube boilers:

- (i) Babcox-wilcox boiler
- (ii) Lamont boiler (high pressure boiler)
- (iii) Benson boiler (High pressure boiler)

2. **Ans. (d)**

3. **Ans. (a)**

Heat transfer to water wall is predominately by radiation.

$$E = \epsilon \sigma AT^4$$

4. **Ans. (d)**

5. **Ans. (a)**

Coal fired power plant boilers manufactured in India generally use pulverized fuel combustion.

6. **Ans. (c)**

7. **Ans. (a)**

8. **Ans. (d)**

Benson Boiler is a typical high pressure, water tube, forced circulated once through boiler. This boiler does not have any drum.

9. **Ans. (a)**

Forced circulation is required because at high pressure the density difference between steam and water is very less.

10. **Ans. (c)**

NTPC-Talcher (Orissa) plant has sub-critical once-through boiler.

11. **Ans. (c)**

Mass of feed water = 205 kg/hr

Mass of coal = 23 kg/hr

Calorific value of coal = 2050 kJ/kg

Net enthalpy rise = 145 kJ/kg of water

Total enthalpy rise = 145×205

Net heat supplied by the coal = 23×2050

$$\text{Boiler efficiency} = \frac{145 \times 205}{23 \times 2050} = 60\%$$

12. **Ans. (d)**

13. **Ans. (a)**

14. **Ans. (a)**

Heat utilized = $220 \times 150 = 33000 \text{ kJ/hr}$.

Heat supplied by fuel

$$= 25 \times 2150 = 53750 \text{ kJ/hr.}$$

Boiler efficiency

$$= \frac{\text{heat utilized}}{\text{heat supplied by fuel}} = \frac{33000}{53750} = 0.61$$

$$= 61\%$$

15. **Ans. (c)**

16. **Ans. (c)**

17. **Ans. (d)**

18. **Ans. (d)**

19. **Ans. (c)**

20. **Ans. (c)**

21. **Ans. (a)**

22. **Ans. (b)**

23. **Ans. (b)**

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