



M.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

ENERGY ENGINEERING

P14EETE12: Boiler Technology

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): Dulong's formula is used to calculate the CV of fuels [K₃]
Reason (R): It is used to estimate the C content of the fuels
- a) Both (A) and (R) are individually true and (R) is the correct explanation of (A) b) Both (A) and (R) are individually true and (R) is not the correct explanation of (A)
- c) (A) is true but (R) is false d) (A) is false but (R) is true
2. The boiler popularly used in modern sugar mills are: [K₁]
- a) FBC with under feeding system b) Pulverized fuel boiler
- c) FBC with over feeding d) PFBC boilers
3. When a conical sample of ash fused down to a spherical lump whose height is equal to its width... [K₂]
- a) Softening Temperature b) Fluid temperature
- c) Hemispherical Temperature d) Initial Deformation Temperature
4. Match the following: [K₂]

List I	List II
A. Grindability	i. Seam
B. Coal fineness	ii. mg
C. Moisture	iii.HGI
D. Abrasion	iv. Sieve

	A	B	C	D
a)	iii	iv	i	ii
b)	iii	i	ii	iv
c)	i	iv	iii	ii
d)	iii	i	iv	ii

5. Assertion (A): The conditioned atomizing angle is greater than the exit atomizing angle. [K₃]

Reason (R): It is the angle between the two tangents of the spray edge.

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|---|---|
| a) Both (A) and (R) are individually true and (R) is not the correct explanation of (A) | b) Both (A) and (R) are individually true and (R) is the correct explanation of (A) |
| c) (A) is true but (R) is false | d) (A) is false but (R) is true |

6. Tilting burner is used for..... [K₁]

- | | |
|------------------------|--------------------------------|
| a) Gas control | b) Economizer startup |
| c) Temperature control | d) Non uniform heat absorption |

7. In india the commonly used boiler is are: [K₂]

- | | |
|-----------------|----------------------------------|
| (A) PFBC boiler | (B) Pulverized coal fired boiler |
| (C) AFBC boiler | (D) Stocker fired boiler |
| a) (A) and (B) | b) (B) and (C) |
| c) (A) and (C) | d) (A) and (D) |

8. Assertion (A):The gas velocity through the economizer ranges from 7 – 13m/s. [K₃]

Reason (R): Low gas velocity lead to poor heat transfer and series ash deposit on the tubes.

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|---|---|
| a) (A) is true but (R) is false | b) (A) is false but (R) is true |
| c) Both (A) and (R) are individually true and (R) is not the correct explanation of (A) | d) Both (A) and (R) are individually true and (R) is the correct explanation of (A) |

9. The term back pass is called as..... [K₁]

- | | |
|----------------------|-----------------------|
| a) Condenser section | b) Convective section |
| c) Reheater section | d) radiant section |

10. In FBC boiler the combustion is carried out at a temperature [K₁]
- a) Closer to steam temperature b) At adiabatic combustion temperature
- c) Above ash fusion temperature d) Below ash fusion temperature of fuel used

PART B (10 x 2 = 20 Marks)

11. List the various classifications of boilers. [K₂]
12. Write the enthalpy equation of air and flue gas for combustion of 1kg of fuels. [K₂]
13. Describe the relationship between the feed size and boiler performance. [K₂]
14. Mention the factors influencing the capacity of the pulverizers. [K₃]
15. Define oil flux density. [K₂]
16. Define furnace volume heat release rate. [K₂]
17. Define the terms: (a) Angular coefficient and (b) Fouling factor. [K₂]
18. Define flame emissivity. [K₂]
19. State the effects of flue gas velocity and ash deposit on performance of economizer. [K₃]
20. State the application of recuperative air heater. [K₂]

PART C (6 x 5 = 30 Marks)

21. Explain briefly about the control of SO₂ and NO_x during the combustion of coal. [K₃]
22. Explain with suitable sketch the Ball tube mill pulverizers. [K₃]
23. Sketch and explain about the swirl type air register. [K₃]
24. Explain about general design principles of furnace. [K₄]
25. Discuss about heat load distribution on the furnace. [K₃]
26. Discuss about the temperature control in reheater. [K₃]

PART D (4 x 10 = 40 Marks)

27. Draw the schematic representation of heat balance of a boiler and explain the sources of heat input and losses. [K₃]
28. Explain the various steps involved in design of coal preparation system for pulverized coal boiler with suitable example. [K₄]

- 29 Explain any three types of oil atomizers used in oil fired boiler with suitable sketch. [K₃]
- 30 Explain in detail the design configuration of super heater. [K₄]
