

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR

SEMESTER END THEORY EXAMINATION, *B. TECH. (D.T.)*

Semester	: II (V Dean)	Academic Year	: 2023-2024
Course No.	: DE- 206	Course Title	: Boilers and Steam Generation
Credits	: (1+1=2)	Total Marks	: 50
Day & Date	: Friday; 09/08/2024	Time	: 2.00 Hrs.

- Note :**
- 1) All questions from **Section 'A'** are compulsory.
 - 2) Solve **Any Three** questions from **Section 'B'**.
 - 3) Draw neat and well labelled diagram wherever necessary.

SECTION –‘A’

Q. 1 A) Choose the most appropriate answer from the options given below. (05)

- i) The amount of water evaporated in per kg of fuel burnt is called
 - a) Equivalent evaporation in “ from and at 100 °C”
 - b) Evaporative capacity of boiler
 - c) Boiler efficiency
 - d) None of above.
- ii) The net calorific value is always gross calorific value.
 - a) Equal to
 - b) Less than
 - c) More than
 - d) Twice the
- iii) Among the following has minimum molecular mass.
 - a) Oxygen
 - b) Nitrogen
 - c) Hydrogen
 - d) Water
- iv) The chimney draught varies with
 - a) Climatic conditions
 - b) Temperature of furnace
 - c) Height of chimney
 - d) All of the above
- v) The volume of air delivered by the compressor is called as
 - a) Free air delivery
 - b) Comprssor capacity
 - c) Swept volume
 - d) None of the above

B) Answer in one line. (05)

- i) What is boiler mountings?
- ii) Give the names of any two gaseous fuel.
- iii) Which calorimeter is used for determination of higher calorific value?
- iv) State the function of pressure gauge in boiler.
- v) State latent heat of steam at atmospheric pressure.

Q. 2 A) Define the following terms. (05)

- i) Calorific value of fuel
- ii) Dryness fraction
- iii) Volumetric efficiency
- iv) Boiler draught
- v) Molecular mass

(P.T.O.)

- B) State whether the following statements are True or False. If false, rewrite the statement after making necessary corrections. (05)
- i) Hard water is used for boilers.
 - ii) The dryness fraction of dry saturated steam is one
 - iii) Lancashire boiler is a stationary water tube boiler.
 - iv) The function of steam stop valve is to regulate the flow of water.
 - v) The boiler biggest heat loss is due to dry flue gases.

SECTION – 'B'

- Q. 3 a) What are the requirements of good fuel? State the merits and demerits of liquid fuels over solid fuel. (05)
- b) Define the term renewable energy. Give the classification and types of renewable energy and explain any in brief. (05)
- Q. 4 a) Give the classification of steam generators. Differentiate between fire tube and water tube boiler. (05)
- b) Enumerate the different boiler mountings and accessories and explain any one in detail. (05)
- Q. 5 a) Explain in short about Indian Boiler Regulation Act. (03)
- b) State the types of boiler draught. Give the comparison between forced draught and induced draught. (03)
- c) A boiler uses 18 kg of air per kg of fuel. Determine the minimum height of chimney required to produce a draught of 25 mm of water. The mean temperature of chimney gases is 315°C and that of outside air is 27°C. (04)
- Q. 6 a) Define air compressor and give its classification. (03)
- b) Draw P-V and T-S diagram for a single stage reciprocating air compressor without clearance volume. (03)
- c) Explain with neat sketch the working of single stage reciprocating compressor. (04)
- Q.7 Determine the quantity of heat required to produce 1 kg of steam at pressure of 6 bar at a temperature of 25°C under following conditions: (10)
- a) When the steam is wet having dryness fraction 0.9.
 - b) When the steam is dry saturated, and
 - c) When it is superheated at constant pressure at 250°C assuming the mean specific heat of superheated steam to be 2.3 kJ/kgK.
