

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR
SEMESTER END THEORY EXAMINATION, B. Tech. (D.T.)

Semester	: II (V Dean)	Academic Year	: 2021-2022
Course No.	: DE-206	Course Title	: Boilers and Steam Generation
Credits	: 1+1=2	Total Marks	: 50
Day & Date	: Friday, 04/11/2022	Time	: 02:30 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 latent heat of steam at atmospheric pressure is
 - a) 1535 kJ/kg
 - b) 1875 kJ/kg
 - c) 2257 kJ/kg
 - d) 2685 kJ/kg
- ii) The amount of heat required to evaporate 1 kg of water from its saturation temperature, without change of temperature is called
 - a) Sensible heat of water
 - b) Latent heat of evaporation
 - c) Enthalpy of steam
 - d) Entropy of steam
- iii) One kg of carbon requires a particular quantity of oxygen and produces 7/3 kg of carbon monoxide. This particular quantity is equal to
 - a) 4/3
 - b) 5/3
 - c) 7/3
 - d) 8/3
- iv) The diameter of internal flue tubes of a Lancashire boiler is about that of the shell.
 - a) One fourth
 - b) One third
 - c) Two fifth
 - d) One half
- v) The pressure of feed water has to be increased before its entry into the boiler. The pressure is raised by a device known as
 - a) Feed check valve
 - b) Feed pump
 - c) Injector
 - d) Pressure gauge

B) Define the following. (05)

- i) Boiler Draught
- ii) Dryness fraction
- iii) Critical temperature
- iv) Equivalent evaporation
- v) Calorific value

Q. 2 A) Give reasons for the following. (05)

- i) In forced draught, the fan is placed after the fire grate.
- ii) In chimney, for maximum discharge, temperature of flue gases should be slightly more than the atmospheric pressure.
- iii) The superheated steam contains more heat and hence its capacity to do work is also increased without increasing its pressure.
- iv) A throttling calorimeter is used to determine the dryness fraction of steam.
- v) When the dry saturated steam is further heated under a constant pressure then it is called wet steam.

P.T.O.

- B) State the functions of the following. (05)
- i) Compressor
 - ii) Water Level Indicator
 - iii) Blow down valve of boiler
 - iv) Expansion joint in steam pipe
 - v) Steam trap

SECTION –‘B’

- Q. 3 A) Derive the expression for determination of minimum quantity of air required for complete combustion of fuel. (05)
- B) Explain any water tube boiler with neat sketch. (05)
- Q. 4 A) Explain in brief: Calorific Value and its types. (05)
- B) Discuss any one type of renewable energy in detail. (05)
- Q. 5 A) What are Mollier charts? Explain. (03)
- B) Estimate the higher and lower calorific value of a fuel having the following composition by mass:
C=85%, H₂= 10%, S=2% and the rest is incombustible matter. (03)
- C) Derive an expression for the height of a chimney and the draught it produces in terms of atmospheric temperature and mean flue gas temperature. (04)
- Q. 6 A) Why in modern industrialized world, renewable energy has become indispensable? (03)
- B) How steam acquires different forms like wet, dry saturated and superheated? (03)
- C) Draw the diagram and explain the working of a single stage reciprocating compressor. (04)
- Q. 7 Write short notes on (Any two) (10)
- i) Boiler mountings
 - ii) Boiler accessories
 - iii) Layout of steam pipe line
