

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR
SEMESTER END THEORY EXAMINATION, B.Tech. (D.T.) Degree Course 2017-18

Semester	: II (New Syllabus)	Academic Year	: 2017-2018
Course No.	: DE- 205	Course Title	: Thermodynamics
Credits	: 2+1=3	Total Marks	: 50
Day & Date	: Monday, 11.06.2018.	Time	: 11.00 to 13.00 Hrs.

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

SECTION – 'A'

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

- i) Second law of thermodynamics defines
 - a) Heat
 - b) Work
 - c) Entropy
 - d) Internal energy
- ii) Which of the following is an intensive property?
 - a) Volume
 - b) Temperature
 - c) Heat
 - d) energy
- iii) The ratio of specific heat at constant pressure (C_p) and specific heat at constant volume (C_v) is
 - a) Equal to one
 - b) Less than one
 - c) More than one
 - d) None of these.
- iv) Thermodynamic process during which system does not exchange any heat with its surrounding is known as
 - a) Isentropic
 - b) Adiabatic
 - c) Polytropic
 - d) Isochoric
- v) The latent heat of vaporization with the increase in the pressure.
 - a) Increases
 - b) Decreases
 - c) Remains constant
 - d) Increases first and then steadily falls

B) Do as directed. (05)

- i) State the name of thermodynamic cycle on which petrol engine works.
- ii) Define the term Specific heat.
- iii) State the Zeroth law of thermodynamics.
- iv) Give the SI unit of power.
- v) What is the molecular mass of Nitrogen (N_2)?

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

- i) Give the expression to determine draught pressure in chimney.
- ii) Give the equation for Boyle's law.
- iii) State the equation for total heat content/ enthalpy of wet steam.
- iv) Give the formula for dryness fraction.
- v) Give the formula for determination of higher calorific value of fuel.

- B) State whether True or False. If false, rewrite the statement after making (01) necessary corrections.
- In an isothermal process, internal energy first decreases and then increases.
 - A single acting steam engine produces double power than that of double acting steam engine.
 - The rate of water evaporation for water tube boiler is more than the fire tube boiler.
 - In four stroke engine the working cycle is completed in two revolutions of the crankshaft.
 - The point on temperature – total heat graph during steam formation where liquid and vapour phases merge is called as critical point.

SECTION – 'B'

- Q. 3 Enlist the various types of boiler and explain any one with neat and well labeled (06) diagram.
- Q. 4 Determine the quantity of heat required to produce 1 kg of steam at a pressure of 6 bar (06) at a temperature of 25°C , under the following conditions:
- When the steam is wet having a dryness fraction 0.9.
 - When the steam is dry saturated.
 - When it is superheated at a constant pressure at 250°C assuming the mean specific heat of superheated steam to be 2.3 kJ/kgK .
- Q. 5 Enlist the various boiler mountings and accessories. Explain any two boiler mountings (06) in detail.
- Q. 6
- Why, heat and work are path function. (02)
 - A Carnot engine working between 650°K and 310°K , produces 150 kJ of work. (02)
Find the thermal efficiency and heat added during the process.
 - Differentiate between four stroke cycle and two stroke cycle. (02)
- Q. 7
- Write short note on the various fuels used in dairy industry. (03)
 - Explain with neat sketch the working of single stage reciprocating air (03) compressor.
- Q. 8
- Differentiate between Fire tube boiler and Water tube boiler. (02)
 - State the general laws for expansion and compression of perfect gas. (02)
 - A gas occupies a volume of 0.1 m^3 at a temperature of 20°C and a pressure of 1.5 bar. Find the final temperature of the gas if it is compressed to a pressure of 7.5 bar and occupies volume of 0.04 m^3 . (02)
- Q. 9
- Define thermodynamic system. Explain the different types of thermodynamic (02) system.
 - State the differences between Otto and Diesel cycle. (04)
