MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: II (New)	Term	: II	Academic Year	:	2016-17
Course No.	: APE 121					
Credits	: 3 (2+1)	Title	: Thermodynamics			
Day & Date	: Tuesday, 02.05.2017	Time	: 09.00 to 12.00	Total Marks	:	80

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A"**.
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) A gauge fitted to steam condenser indicates 700 mm of mercury when the barometer records 760 mm of mercury. Calculate the absolute pressure in the condenser in N/m^2, bar and kPa.

b) Define thermodynamic system. Give its classification and explain any one.

Q.2 Differentiate between the following.

1) Extensive Properties and Intensive properties.

2) Water tube boiler and fire tube boiler.

Q.3 a) What is the first law of thermodynamics? Give the limitations of first law of thermodynamics.

b) Write in brief about Boyle's law and Charles' law.

Q.4 Explain in brief about Kelvin Planck and Clausius statement.

Q.5 3 kg of an ideal gas is expanded from a pressure 7 bar and volume 1.5 m^3 to a pressure 1.4 bar and volume 4.5 m^3. The change in internal energy is 525 kJ. The specific heat at constant volume for the gas is 1.047 kJ/kg^0K.
Calculate:

1) Gas constant   2) Change in enthalpy   3) Initial and final temperatures.

Q.6 a) A gas occupies a volume of 0.1 m^3 at a temperature of 20^0C 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 a volume of 0.04 m^3.

b) What is specific heat of gases? Explain in brief about Specific heat of gas at constant volume (Cv).

Q.7 a) Give the classification of thermodynamic process. Derive expression for work done during non flow polytropic process ($pv^n = C$)

b) One liter of hydrogen at 0^0C is suddenly compressed to one half of its volume. Find the change in temperature of the gas, if the ratio of two specific heats for hydrogen is 1.4.

Q.8 Derive the expression for pressure, work done, change in internal energy and change in enthalpy of a isothermal process.

(P.T.O.)

Q.9   a) Enlist the different boiler mountings. Explain in brief construction of water level indicator.

b) Enlist the important requirements of a good steam boiler.

Q.10   a) A quantity of air has a volume of 0.4 m^3 at a pressure of 5 bar and a temperature of 80^0C. It is expanded in a cylinder at a constant temperature to 1 bar pressure. Determine the amount of work done by the air during expansion.

b) State and explain general gas laws for expansion and compression.

SECTION "B"

Q.11   State True or False.

1) With increase in pressure, boiling point of water increases and enthalpy of evaporation decreases.

2) In International System of Units (i.e. S.I. Units), mass is taken in kg and weight in Newton.

3) Specific heat of air at constant pressure is $3 \text{ kJ/kg}^0\text{K}$.

4) The value of gas constant (R) is $287 \text{ J/kg}^0\text{K}$.

5) The specific volume of water when heated from 0^0C, first decreases and then increases.

6) The isentropic process, on the Mollier diagram is represented by a horizontal line.

7) Zeroth law of thermodynamics states that the energy can neither be created nor destroyed.

8) The work done for a non flow isochoric process is zero.

Q.12   Fill in the blanks.

1) The specific heat at constant pressure is _____ than that of specific heat at constant volume.

2) The general law for expansion and compression of gases is $pv^n = c$, the process is said to be hyperbolic if n is equal to _____.

3) _____ is the ratio of mass of actual dry steam to the mass of same quantity of wet steam.

4) The property of a working substance which increases or decreases as the heat is supplied or removed in a reversible manner, is known as _____.

5) The enthalpy of dry saturated steam _____ with the increase in pressure.

6) A device used to put off fire in the furnace of the boiler when the level of water in the boiler falls to an unsafe limit is called _____.

7) _____ boiler is a multi tubular, horizontal, internally fired and mobile boiler.

8) The change in internal energy for non flow isothermal process is _____.

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