MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

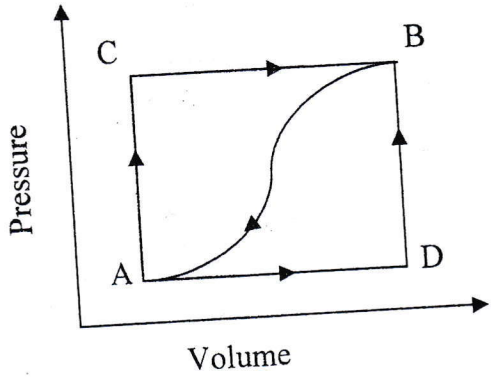
Semester	: **II (New)**	**Term**	: **II**	**Academic Year**	: **2015-16**
Course No.	: APE 121	**Title**	: **Thermodynamics**		
Credits	: 3 (2+1)				
Day & Date	: Wednesday, 27.04.2016	**Time**	: 09.00 to 12.00	**Total Marks**	: **80**

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 vessel of capacity 3 m^3 contains air at a pressure of 1.5 bar and a temperature of 25^0 C. Additional air is now pumped into the system until the pressure rises to 30 bar and temperature rises to 60^0C. Determine the mass of air pumped in and express the quantity as a volume at a pressure of 1.02 bar and a temperature of 20^0C. If the vessel is allowed to cool until the temperature is again 25^0 C, calculate the pressure in the vessel.(Take R=287J/kg.K)

Q.2 When a system is taken from the state A to state B as shown in Fig. along the path ACB 80KJ of heat flows into the system as the system does 30 kJ of work.



1. How much heat flows into the system along the path ADB, if the work done is 10 k
2. When the system is returned from the state B to state A along the curved path, the work done on the system is 20 kJ. Does the system absorb or liberate heat and how much heat is absorbed or liberated.
3. If the internal energy at A(U_A) = 0 and at D(U_D) = 40 kJ, find the heat absorbed in process AD and DB.

Q.3 Explain the Kelvin-Plank and Clausius statement for second law of thermodynamics.

Q.4 What is a thermodynamic system? Explain the different types of thermodynamic sys

Q.5 a) Find the internal energy of 1 kg of superheated steam at a pressure of 10 bar and 280^0C. If the steam be expanded to a pressure of 1.6 bar and 0.8 dry, determine th change in internal energy. Assume the specific heat of superheated steam as 2.1 kJ/kg.K.

b) Give the essentials of a good steam boiler.

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Q.6 Describe the working principle of (1) High steam low safety valve; (2) Spring loaded safety valve.

Q.7 a) Explain the working principle of simple vertical boiler.

b) Explain the various advantages of superheated steam.

Q.8 Write short notes on (Any two).

1) Application of steady flow energy to condenser

2) Importance of entropy

3) Temperature-total heat graph

Q.9 Derive an equation for P-V-T relationship of adiabatic process.

Q.10 An insulated vessel of capacity 0.056 m^3 is divided into two components A and B by a conducting diaphragm. Each component has a capacity of 0.028m^3. The component A contains air at a pressure of 1.5 bar and 25^{0}C and the component B contains air at a pressure of 4.2 bar and 175^{0}C. Find: (1) Final equilibrium temperature; (2) Final pressure on each side of the diaphragm, (3) Change of entropy of the system (R for air =287 J/kg K)

SECTION "B"

Q.11 Fill in the blanks.

1) In dead safety valve, the pressure of the steam exceeds the normal pressure, the valve as well as the case are lifted from its_____.

2) The change in _____ may be regarded as a measure of unavailable form of heat energy or irreversibility of the process.

3) When the pressure and saturation temperature increases, the latent heat of vaporization decreases, it becomes zero at a point where liquid and _____meet.

4) The field of science, which deals with the energies possessed by gases and vapours, is known as_____.

5) Sensible heat is also known as _____.

6) The processes occurring in open systems which permit the transfer of mass to and from the system are known as _____.

7) _____is the ratio of mass of actual dry steam, to the mass of same quantity of wet steam.

8) In the flow process, _____ enters the system as leaves after doing the work.

Q.12 Match the following pairs.

"A"	"B"
1) 1 kgf	a) m^2/s
2) $(C.O.P.)_P$	b) 32^{0}F
3) Kinematic viscosity	c) dEαdT
4) Freezing point of water	d) kg/mol
5) Transit energy	e) 9.81 N
6) Joule's law	f) Stored Energy =Internal Energy
7) Molecular mass	g) $> (C.O.P.)_R$
8) Non flow process	h) System crossing the boundaries
	i) 1 N

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