ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END-SEMESTER EXAMINATION: JANUARY 2021** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech Mechanical Engineering	**Semester:**	III
Paper Title:	ENGG. THERMODYNAMICS	**Paper Code:**	EME42115
Maximum Marks:	40	**Time duration:**	03 HRS
Total No of questions:	08	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)			

Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a) What is the difference between a closed system and open system?**
b) Define Intensive property with examples.
c) What do you understand by macroscopic and microscopic approach?
d) Which property of a system increases when heat is transferred at i) Constant Volume ii) Constant Pressure
e) Why heat and work not completely interchangeable forms of energy?

GROUP –B

Answer *any three* of the following $3 \times 5 = 15$

2. Find the enthalpy, entropy and volume of steam at 1.4Mpa, 380° C

3. Establish the Inequality of Claussius.

4. A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C.What is the least rate of heat rejection per kW net output of the engine?

5. A stationary mass of gas is compressed without friction from an initial state of $0.3m^3$ and 0.105 MPa to a final state of $0.15m^3$ and 0.105MPa, the pressure remaining constant during the process. How much does the internal energy of the gas change?

GROUP –C

Answer *any two* of the following $2 \times 10 = 20$

6. i) What is the difference between standard symbols of E and U? [4]
ii) A piston and cylinder contain a fluid system which passes through a complete cycle of four processes. During a cycle, the sum of all heat transfers is -170 kJ. The system completes 100 cycles per minute. Complete the following table showing the method for each item, and compute the net rate of work output in kW.

Process	Q (kJ/min)	W (kJ/min)	ΔE (kJ/min)
a-b	0	2170	-
b-c	21000	0	-
c-d	-2100	-	-36600
d-a	-	-	-

[6]

7. i) Write down the Maxwell's equation. [5]
ii) Derive the *first* TdS equation. [5]

8. i) State the equivalence of Kelvin Planck and Claussius statement of thermodynamics
ii) Derive the maximum work obtainable from two finite bodies at temperatures T_1 and T_2.