Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name: Thermodynamics

Subject Code: 4TE04TDY1 Branch: B.Tech (Auto)

Semester: 4 Date: 20/5/2016 Time: 2:30 To 5:30 Marks: 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Which of the following is an intensive property of a thermodynamic system?
(a) Volume (b) Temperature
(c) Mass (d) Energy

b) Absolute zero temperature is taken as
(a) – 273°C (b) 273°C
(c) 237°C (d) – 373°C.

c) The latent heat of vaporization at critical point is
(a) less than zero (b) greater than zero
(c) equal to zero (d) none of the above.

d) The gas constant (R) is equal to the
(a) sum of two specific heats (b) difference of two specific heats
(c) product of two specific heats (d) ratio of two specific heats.

e) The processes or systems that do not involve heat are called
(a) isothermal processes (b) steady processes
(c) adiabatic processes. (d) equilibrium processes

f) The main cause for the irreversibility is
(a) mechanical and fluid friction (b) unrestricted expansion
(c) heat transfer with a finite temp. difference (d) all of the above.

g) Kelvin-Planck's law deals with
(a) conservation of energy (b) conservation of heat
(c) conversion of heat into work (d) conversion of work into heat.

h) The value of the universal gas constant is
(a) 8.314 J/kg K (b) 83.14 kJ/kg K
(c) 848 kJ/kg K (d) 8.314 kJ/kg K

i) Bomb calorimeter is used to find the calorific value of ..... fuels.
(a) solid (b) gaseous
(c) solid and gaseous (d) all of above

j) Stoichiometric air-fuel ratio by mass for combustion of petrol is

(a) 5 (b) 10

(c) 12 (d) 15.05

k) In diesel cycle, heat is added at

(a) Constant temperature b) Constant volume

(c) Constant pressure (d) Constant enthalpy

l) Brayton cycle is also called

(a) Joule cycle (b) constant pressure cycle

(c) all of above (d) none of above

m) "Equal volumes of all perfect gases at the same pressure and temperature contain the same number of molecules". It is the statement of

(a) Boyle's law (b) Avogadro's law

(c) Charle's law (d) Combined gas law

n) One kg mol of a gas occupies a volume of ____ at normal temperature and pressure

(a) 22.4 m^3 (b) 21.8 m^3

(c) 20.4 m^3 (d) 23.8 m^3

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions**

(a) Distinguish between Microscopic and Macroscopic point of view. **(04)**

(b) Explain Thermodynamic equilibrium. **(05)**

(c) Explain with simple sketch open, closed and isolated system. **(05)**

Q-3 **Attempt all questions**

(a) Derive general steady flow energy equation (SFEE). **(07)**

(b) A vessel of 6 m^3 capacity contains two gases A and B in proportion of 45 per cent and 55 per cent respectively at 30°C. If the value of R for the gases is 0.288 kJ/kg K and 0.295 kJ/kg K and if the total weight of the mixture is 2 kg, calculate : (i) The partial pressure ;(ii) The total pressure ; (iii) The mean value of R for the mixture **(07)**

Q-4 **Attempt all questions**

(a) Explain reversible and irreversible process with suitable example. **(04)**

(b) Prove that entropy is a property of a system. **(05)**

(c) 300 kJ/s of heat is supplied at a constant fixed temperature of 290°C to a heat engine. The heat rejection takes place at 8.5°C. The following results were obtained: **(05)**

(i) 215 kJ/s are rejected.

(ii) 150 kJ/s are rejected.

(iii) 75 kJ/s are rejected.

Classify which of the result report a reversible cycle or irreversible cycle or impossible results.

Q-5 **Attempt all questions**

(a)	Derive the equation for availability in steady flow process	**(06)**
(b)	State and prove the clausius theorem.	**(04)**
(c)	State the four processes of the diesel cycle.	**(04)**

Q-6 **Attempt all questions**

(a)	Explain Rankine cycle with P-V ans T-S Diagram.	**(07)**
(b)	A Carnot engine working between 400°C and 40°C produces 130 kJ of work. Determine : (i) The engine thermal efficiency. (ii) The heat added. (iii) The entropy changes during heat rejection process.	**(07)**

Q-7 **Attempt all questions**

(a)	Explain pure substance.	**(04)**
(b)	Write a short note on Vander Waal's equation.	**(05)**
(c)	Explain triple point with diagram	**(05)**

Q-8 **Attempt all questions**

(a)	State and explain Dalton's law of Partial pressures.	**(04)**
(b)	Write a short note on "Adiabatic flame temperature".	**(04)**
(c)	Explain adiabatic mixing of perfect gas.	**(06)**