

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

**Subject Name: Thermodynamics**

**Subject Code: 4TE04TDY1**

**Branch: B.Tech (Auto)**

**Semester: 4**

**Date: 24/11/2015 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.
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**Q-1**

**Attempt the following questions:**

**(14)**

- a) Define Extensive properties
- b) Write the statement of zeroth law of thermo dynamics.
- c) The first law of thermodynamics is expressed by the equation  
(1).  $Q=W$       (2)  $Q=U$       (3)  $Q=H$       (4)  $Q=pv$
- d) Write the steady flow energy equation for thermally insulated nozzle.
- e) The process of car not cycle are  
(1). Two adiabatic and two constant pressure.  
(2). Two adiabatic and two constant volume.  
(3). Two isotropic and two isothermal.  
(4). Two polytrophic and two isothermal.
- f) The entropy of universe is.  
(1) Always zero    (2) Always unity    (3) Always increase    (3) Always decrease.
- g) List the various component of steam power plant?
- h) What is an air standard Efficiency?
- i) What is air- fuel ratio?
- j) Define excess air.
- k) Write the statement of Gibbs-Daltons law of partial pressure.
- l) What is universal gas constant?
- m) What is Ideal Gas equation?
- n) List the high grade energy.



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

<b>Q-2</b>	<b>Attempt all questions</b>	<b>(14)</b>
<b>A</b>	Explain throttling process and derive its SFEE.	<b>4</b>
<b>B</b>	Explain the first law of TD with Joules experiment.	<b>5</b>
<b>C</b>	Steam enters in a nozzle at pressure of 7 bar and 20C and leaves at pressure of 1.5 bar. The initial velocity of steam at the entrance is 40 m/s and the exit velocity is 700 m/s. the mass flow rate through nozzle is 1400 kg/h. the heat loss from the nozzle is 11705 kj/h. determine the final area	<b>5</b>
<b>Q-3</b>	<b>Attempt all questions</b>	<b>(14)</b>
<b>A</b>	Write the limitation of the first law of thermodynamics with example.	<b>7</b>
<b>B</b>	State and prove the clausius theorem.	<b>7</b>
<b>Q-4</b>	<b>Attempt all questions</b>	<b>(14)</b>
<b>A</b>	State the four process of the diesel cycle.	<b>4</b>
<b>B</b>	Write comparison of Otto, Diesel and dual cycle.	<b>5</b>
<b>C</b>	The thermal power plant uses steam as a working fluid and operates on Rankin cycle. The temperature & pressure of steam entering the turbine are 3318C and 110 bar respectively. The steam expands in turbine up to 0.05bar. determine 1. Cycle efficiency. 2. Work ratio 3. Steam rate per kWh.	<b>5</b>
<b>Q-5</b>	<b>Attempt all questions</b>	<b>(14)</b>
<b>A</b>	Derive an expression for the mean effective pressure of Otto Cycle.	<b>7</b>
<b>B</b>	Explain Carnot cycle with P-V and T-S diagram.	<b>7</b>
<b>Q-6</b>	<b>Attempt all questions</b>	<b>(14)</b>
<b>A</b>	Explain Construction and working of Bomb calorimeter with neat sketch.	<b>7</b>
<b>B</b>	Determine of min air required per Kg of Solid or Liquid for complete combustion.	<b>7</b>
<b>Q-7</b>	<b>Attempt all questions</b>	<b>(14)</b>
<b>A</b>	State the different form of fuels	<b>4</b>
<b>B</b>	Explain in detail about Combustion of Hydrogen	<b>5</b>
<b>C</b>	What is van der Wall's equation of state? What are the limitation?	<b>5</b>
<b>Q-8</b>	<b>Attempt all questions</b>	<b>(14)</b>
<b>A</b>	Write a short note on Van der Waal's equation.	<b>7</b>
<b>B</b>	Explain Gas and vapour mixture with the help of neat sketch.	<b>7</b>

