Printed Pages : 4 EME-303

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0430 Roll No. | | | | | | | | | | |

B. Tech.

(Semester III) Theory Examination, 2011-12

THERMODYNAMICS

Time : 2 Hours] *[Total Marks : 50*

Note : Attempt questions from each Section as per directions.

Section-A

1. Answer *all* questions : 2×5=10

   (a) What do you understand by flow work? Is it different from displacement work?

   (b) Explain Amagat's Law.

   (c) What is the concept of continuum?

   (d) Why the second law is called the law of degradation energy?

   (e) Define Helmholtz and Gibb's function.

Section-B

2. Answer any *three* questions : 5×3=15

(a) Explain different types of temperature scales.

(b) Make Steady Flow Energy analysis on turbine.

(c) The gas leaving the turbine jet engine flows steadily into the jet pipe with an enthalpy 960 kJ/kg and with a velocity of 250 m/sec. The exit from the pipe is at enthalpy 869 kJ/kg and exhaust is in line with intake. Neglect heat loss from the system determines the velocity of gas leaving the pipe.

(d) Explain the concept of Clausius inequality.

(e) Show the graphical representation of P-V-T diagram for pure substance and explain.

Section-C

Answer *all* questions : 5×5=25

3. With the help of a neat sketch explain Joule's experiment.

Or

A gas expands according to the equation PV=100, where 'P' is the pressure in kPa and 'V' is the specific volume. The initial pressure of the gas is 1000 kPa and the final pressure is 500 kPa. The gas is then heated at constant volume back to its original pressure of 1000 kPa. Determine the work of combined process. Also sketch the process on P-V coordinates.

4. Explain Kelvin Plank, Clausius statements of second law of thermodynamics.

Or

A reversible heat engine operating between the thermal reservoirs at 900 K and 300 K is used to drive a reversible refrigerator for which the temperature limits are 300 K and 250 K. The engine absorbs 1800 kJ of energy as heat from the reservoir at 900 K and the net output from the engine refrigerator system is 360 kJ. Make calculations for the heat extracted from the refrigerator cabinet and the net heat rejected to the reservoir at 300 K.

5. Define Heat engine, Heat pump, Refrigerator and derive COP for Heat pump.

Or

Determine the power required to run a refrigerator that transfers 2000 kJ/min of heat from a cooled space at 0°C to the surrounding atmosphere at 27°C. The refrigerator operates on reversed Carnot cycle.

6. Explain the concepts of availability, irreversibility, available energy and unavailable energy.

Or

Using Maxwell's relations deduce the two Tds equations.

7. Explain Heat balance sheet for IC engine and draw the table.

Or

Find the internal energy and enthalpy of unit mass of steam of a pressure of 7 bar when :

(i) its quality is 0.8

(ii) it is dry saturated

(iii) superheated the degree of superheat being 65°C.