

BACHELOR OF VOCATION
Solar Technology
Subject: Thermodynamics
Subject Code: ME-604
Semester: Third
January 2021
Theory (External): 35 Marks
Time: 03 Hours

Instructions to the Students

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 1 mark.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

Roll Number											

SECTION –A (SHORT/OBJECTIVE TYPE QUESTIONS)
(10x1=10 Marks)

- A. Closed system is a system of
- Constant mass
 - Constant Energy
 - Constant mass and Constant Energy
 - None of the above
- B. State Postulate requires to define simple compressible system
- Two extensive properties
 - Two intensive properties
 - One extensive and one intensive properties
 - Three intensive properties
- C. First law of thermodynamics for a cycle is
- $dQ = du + pdv$
 - $\Sigma dQ = \Sigma dW$
 - $Q = W+U$
 - None of the above
- D. Internal Energy is sum of
- Sensible heat + latent heat
 - Sensible heat + Chemical energy
 - b + nuclear energy
 - None of the above
- E. What is Thermal Energy reservoir.
- Large body
 - Small Body
 - High temperature body
 - High thermal capacity body
- F. Kelvin Plank's statement is given for
- Refrigerator
 - Heat pump
 - Heat engines
 - None of the above

- G. At triple point of water
- Ice and water are in equilibrium.
 - Water and vapour are in equilibrium.
 - Water and vapour and ice are in equilibrium.
 - None of the above
- H. Enthalpy of superheated steam is
- Greater than saturated vapour
 - Less than saturated vapour
 - Both are equal
 - None of the above.
- I. Internal energy of Ideal gases.
- Is a function of pressure
 - Is a function of Temperature only
 - Is a function of pressure and volume
 - Is a function of volume
- J. For an Ideal gas slope of the constant volume process on T-S diagram is
- Greater than constant pressure line
 - Equal to constant pressure line
 - Not defined
 - None of the above



SECTION –B (ESSAY TYPE QUESTIONS)
(5x5=25 Marks)

1. Differentiate between Pdv work (displacement work) and Flow work.
2. A piston and cylinder machine containing a fluid system has a stirring device in the cylinder. The piston is frictionless and is held down against the fluid due to the atmosphere pressure of 101.324kPa. The stirring device is turned 5,000 revolutions with an average torque against the fluid 1.275Nm. Meanwhile the piston of 0.6m diameter moves out to 0.8m. Find the net - work transfer for the system.
3. Prove that $(COP)_{ref} = (COP)_{hp} + 1$
4. Air at 10⁰ C and 80kPa enters the diffuser of a jet engine steadily with a velocity of 200m/s. The inlet area of the diffuser is 0.4 m². The air leaves the diffuser with a velocity that is very small compared with the inlet velocity. Determine (a) the mass flow rate of the air and (b) the temperature of the air leaving the diffuser.
5. Prove that two statements of second law of thermodynamics are equivalent.
6. What is the significance of Clasius' Theorem? Differentiate between entropy transfer and entropy generation.
7. What is Gibbs theorem of gases mixture? Derive expression of gas constant for a gases mixture.
8. Two heat engines are having equal thermal efficiencies of 30% but their reversible thermal efficiencies are 50% and 70% respectively. Find the engine of higher second law efficiency.

===END OF PAPER===