

**Thermodynamics (MEL2020)**  
**Indian Institute of Technology Jodhpur**

**Assignment-10**

Date: 31<sup>st</sup> March 2022

**Maximum points: 1**

**Instructions:**

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- *Answer all the questions*
  - *Please write your solutions/explanations on a paper with your handwriting*
  - *Scan all pages as a single pdf file and upload in google classroom before 03-04-22*
  - *This will give you **1 point** towards your total evaluation,*
  - ***Late submission lead to Zero Marks.***
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1. A completely reversible heat pump produces heat at a rate of 300 kW to warm a house maintained at 24 °C. The exterior air, which is at 7 °C, serves as the source. Calculate the rate of entropy change (kW/K) of the two reservoirs.
  
2. Two Carnot heat engines are operating in series such that the heat sink of the first engine serves as the heat source of the second one. If the source temperature of the first engine is 1300 K and the sink temperature of the second engine is 300 K and the thermal efficiencies of both engines are the same, the temperature of the intermediate reservoir is:
  
3. Derive the expression for entropy, temperature using Boltzmann's statistics