BITS F111 - Assignment - 06-04-2016

Name: **Id No:**

1. Five kg of liquid water at 50 ^{o}C and 50 kPa. Is contained in a piston/cylinder assembly. It is heated to reach a pressure of 1500 kPa with a volume of 0.11 m^3. Find the final temperature and the heat transfer in the process.

2. A piston/cylinder contains water at -10 ^{o}C experiences only the impact of atmospheric pressure through the piston. The water is now heated to saturated vapor, at this state the piston floats at a pressure of 500 kPa. Find the final temperature and specific work and heat transfer for the process.

3. A constant pressure piston/cylinder system initially contains a saturated mixture of water with x = 0.825. The initial volume of 0.25 m^3. The system is now heated to final state of temperature and pressure 400 °C and 500 kPa respectively. Determine the work, rise in temperature and the heat transfer in the process.

4. Ammonia kept in cylinder has a volume of 50 L and 1005 kPa, 25 °C and placed inside a laboratory of dimension 5x10x20 m. The lab room is well insulated and initially evacuated. The ammonia in the cylinder leaked due to the valve failure and filled the whole room, isothermally. What would be the final phase, pressure and internal energy of ammonia inside the lab?

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Name: **Id No:**

1. Ten kg of R-134a at 350 kPa with a quality of 25% is heated to 50 ^{o}C in a constant pressure process. What are the heat transfer, ΔT and work in the process?

2. Ten kg sat. vapor of nitrogen at 100 K, is heated in a constant pressure process to 500 K in a piston/cylinder arrangement. Find the initial and final volumes and the total heat transfer required.

3. Ten kg of R-410a 200 °C, 800 kPa is cooled in a piston/cylinder arrangement at constant pressure to a final state of quality 50%. Find the heat transfer and the necessary work.

4. A rigid tank is divided into two rooms by a membrane, both containing ammonia as shown in fig. Room A is at 1000 kPa, v = 0.1 m^3/kg, V_A = 1 m^3, and room B contains 5 kg at 500 kPa, 100°C. The membrane now ruptures and heat transfer takes place so the ammonia comes to a uniform state at 20°C. Find the heat transfer during the process.