**Assignment-3**

**Due date for this assignment:**2018-02-28, 23:59 IST.

***1 point***

An insulated piston-cylinder device contains 5 L of saturated liquid water at a constant pressure of 175 kPa. Water is stirred by a paddle wheel while a current of 8 A flows for 45 min through a resistor placed in the water. If one-half of the liquid is evaporated during this constant-pressure process and the paddle-wheel work amounts to 400 kJ, determine the voltage of the source.

 250 V

 280 V

 224 V

 328 V

***1 point***

A balloon behaves such that the pressure inside is proportional to the diameter squared. It contains 2 kg of ammonia at 429.3 kPa, 0°C and 60% quality. The balloon and ammonia are now heated so that a final pressure of 600 kPa is reached. Considering the ammonia as a control mass, find the amount of work done in the process. The specific volumes of liquid and gas phase ammonia are 0.001566 and 0.289396 m3/kg, respectively at 0°C.

 217.5 kJ

 110.5 kJ

 117.5 kJ

 125 kJ

***1 point***

A mass of 5 kg of saturated water vapor at 300 kPa is heated at constant pressure until the temperature reaches 200°C. Calculate the work done by the steam during this process.

 166 kJ

 156 kJ

 120 kJ

 256 kJ

***1 point***

Carbon dioxide contained in a piston-cylinder device is compressed from 0.3 to 0.1 m3. During the process, the pressure and volume are related by P = av-2***,***where a= 8 kPa-m6. Calculate the work done on the carbon dioxide during this process.

 85.5 kJ

 100 kJ

 53.3 kJ

 120.5 kJ

***1 point***

A rigid 10-L vessel initially contains a mixture of liquid water and vapor at 100°C with 12.3 % quality. The mixture is then heated until its temperature is 150°C. Calculate the heat transfer required for this process.

 20 kJ

 47 kJ

 63 kJ

 40 kJ

***1 point***

A piston-cylinder device containing argon gas as the system undergoes an isothermal process from 200 kPa and 100°C to 50 kPa. During the process, 1500 kJ of heat is transferred to the system. Determine the mass of this system.

 25 kg

 44 kg

 14 kg

 10 kg

***1 point***

Argon is compressed in a polytropic process with n= 1.2 from 120 kPa and 10°C to 800 kPa in a piston-cylinder device. Determine the heat transferred during this compression process, in kJ/kg.

 125

 50.6

 76.6

 96.4

***1 point***

Air is contained in a variable-load piston-cylinder device equipped with a paddle wheel. Initially, air is at 500 kPa and 27°C. The paddle wheel is now turned by an external electric motor until 50 kJ/kg of work has been transferred to air. During this process, heat is transferred to maintain a constant air temperature while allowing the gas volume to triple. Calculate the required amount of heat transfer.

 44.6 kJ/kg

 50.5 kJ/kg

 25.6 kJ/kg

 20.5 kJ/kg

***1 point***

Air goes through a polytropic process from 125 kPa, 325 K to 300 kPa and 500 K. Find the specific work in the process.

 51.8 kJ/kg

 -51.8 kJ/kg

 65.5 kJ/kg

 -65.5 kJ/kg

***1 point***

Steam at 75 kPa and 8 percent quality is contained in a spring-loaded piston-cylinder device, as shown in figure, with an initial volume of 2 m3. Steam is now heated until its volume is 10 m3 and its pressure is 300 kPa. Determine the heat transferred into the system during this process.


 13337.5 kJ

 21475.0 kJ

 11007.5 kJ

 27196.5 kJ

You may submit any number of times before the due date. The final submission will be considered for grading.