

1. For a thermodynamic system to be in thermodynamic equilibrium, which of the following can be non uniform through out the system
  - (a) temperature
  - (b) pressure
  - (c) chemical composition
  - (d) none of these
  
2. A piston cylinder device with a set of stops initially contains 0.3 kg of water vapour at 1 MPa and 400°C. The location of the stops corresponds to 60% of the initial volume. Now as the water vapour is cooled keeping the pressure constant. The compression work required will be \_\_\_\_\_ kJ [Take R for water vapour as 0.4615 kJ/kgK] [Consider water vapour as an ideal gas]
  
3. A spherical balloon of 1 m diameter contains a gas at 150 kPa, the gas inside the balloon is heated. Until pressure reaches 450 kPa. During the process of heating, the pressure inside the balloon is directly proportional to the diameter of the balloon. The work done for the process is \_\_\_\_\_ kJ
  
4. A piston cylinder device contains a gas. Heat is added to the gas until the volume becomes double. In case-I Piston is free to move and in case-2 a linear spring is just touching the piston before heat addition. After the a heat addition the p-v curve of the
 

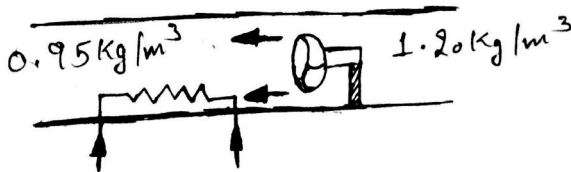
a) Expansion process

b) Expansion process

c) Compression process

d) Compression process
  
5. During an expansion process, the pressure of gas changes from 100 to 700 kPa according to the relation  $[P = aV + b]$ , where  $a = 1220 [kPa / m^3]$  and b is a constant. If the initial volume of gas is 0.2 m<sup>3</sup>, The work done during the process will be \_\_\_\_\_ kJ
  
6. A mixture of gases expands at constant pressure from 1 MPa, 0.03 m<sup>3</sup> to 0.06m<sup>3</sup> with 84 kJ positive heat transfer. There is no work other than done on the pis

- |  |   |
|--|---|
| <p>ton. Change in energy for gaseous mixture is<br/>(a) 54 kJ                      (b) 30 kJ<br/>(c) 119 kJ                    (d) 89kJ</p> <p>7. A hair dryer of constant diameter and fitted with an electric resistor is used to heat (expand) the air and to accelerate it as air is pushed in with help of a fan. If density of air is <math>1.20 \text{ kg/m}^3</math> at the inlet and <math>0.95 \text{ kg/m}^3</math> at the exit, the percentage in crease in velocity of air as it flows through the dryer is _____</p> | <p>10. For a free flow process which of the following is correct</p> <p>1 Temperature throughout the process remains constant</p> <p>2 Internal energy of the process is conserved after the process</p> <p>3 P-V curve of free expansion process can be shown by a continuous solid line</p> <p>4 P-V curve of free expansion process can be shown by a dotted line</p> <p>(a) 1,2 and 4                      (b) 2 and 4<br/>(c) 2 and 3                        (d) 1 and 4</p> |
|--|---|



8. Air enters an adiabatic nozzle steadily at 300 kPa,  $200^\circ\text{C}$  and 45 m/s and leaves at 100 kPa and 180 m/s. The exit temperature of air is \_\_\_\_\_ K.
9. In a room 2 fans consuming 0.18 kW and three 100 w bulbs are used at time. Air at a rate of 80 kg/hr enters the room with an enthalpy of 84 kJ/kg and leaves with an enthalpy of 59 kJ/kg. The rate at which heat is to be removed by the room cooler, so as to maintain steady state is \_\_\_\_\_ kW