Code No: 07A40802 **R07** **Set No. 2**

II B.Tech II Semester Examinations,April/May 2012
CHEMICAL ENGINEERING THERMODYNAMICS - I
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Define COP of Carnot refrigerator. What are the two alternatives to increase the COP of Carnot refrigerator? Which of the two alternatives in more effective. [16]

2. Consider the filling of an evacuated tank with a gas from a constant pressure line. What is the relation between the enthalpy of the gas in the entrance line and the internal energy of the gas in the tank? Neglect heat transfer between the gas and the tank. If the gas is ideal and has constant heat capacities, how is the temperature of gas in the tank related to the temperature in the entrance line? [16]

3. If one kmol of methane is stored in 0.3 m^3 tank at 300 K, estimate the pressure of the gas using Redlich-Kwong equation of state. The critical constants of methane are P_C = 4.60MPa and T_C = 190.6 K. [16]

4. (a) Discuss in brief heat and work.
   (b) A car of 1000 kg mass is moving with a speed of 90 km/h on a road, which is 100 m above the sea level. Calculate the kinetic energy and potential energy of the car. [6+10]

5. (a) State the Clausius inequality.
   (b) Give two statements of second law of thermodynamics. Explain interms of enpressions. [8+8]

6. Tank A of volume 1m^3 containing 5-k mol of a gas at 600K is brought into contact through a dia-thermal wall with a tank B of volume 1m^3 containing 3k-mol of the same gas at 400K. Determine the equilibrium temperature of the gas and the internal energy of gas in tank A and B, if the gas obeys the equation of state $1/T = \frac{3NR}{2U}$. [16]

7. One kg of water at 273 K is brought into contact with a heat reservoir at 373 K. When the water has reached 373 K, find the entropy change of the water, of the reservoir, and of the universe. Specific heat of water is 4.187 kJ $kg^{-1}K^{-1}$. [16]

8. (a) What is the necessity of classifying point and path functions?
   (b) What is heat? Is it a path function? Explain. [8+8]

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Code No: 07A40802 **R07** **Set No. 4**

II B.Tech II Semester Examinations,April/May 2012
CHEMICAL ENGINEERING THERMODYNAMICS - I
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Tank A of volume 1m^3 containing 5-k mol of a gas at 600K is brought into contact through a dia-thermal wall with a tank B of volume 1m^3 containing 3k-mol of the same gas at 400K. Determine the equilibrium temperature of the gas and the internal energy of gas in tank A and B, if the gas obeys the equation of state $1/T = \frac{3NR}{2U}$. [16]

2. (a) What is the necessity of classifying point and path functions?
   (b) What is heat? Is it a path function? Explain. [8+8]

3. One kg of water at 273 K is brought into contact with a heat reservoir at 373 K. When the water has reached 373 K, find the entropy change of the water, of the reservoir, and of the universe. Specific heat of water is 4.187 kJ kg^{-1}K^{-1}. [16]

4. (a) State the Clausius inequality.
   (b) Give two statements of second law of thermodynamics. Explain interms of enpressions. [8+8]

5. If one kmol of methane is stored in 0.3 m^3 tank at 300 K, estimate the pressure of the gas using Redlich-Kwong equation of state. The critical constants of methane are P_C = 4.60MPa and T_C = 190.6 K. [16]

6. (a) Discuss in brief heat and work.
   (b) A car of 1000 kg mass is moving with a speed of 90 km/h on a road, which is 100 m above the sea level. Calculate the kinetic energy and potential energy of the car. [6+10]

7. Define COP of Carnot refrigerator. What are the two alternatives to increase the COP of Carnot refrigerator? Which of the two alternatives in more effective. [16]

8. Consider the filling of an evacuated tank with a gas from a constant pressure line. What is the relation between the enthalpy of the gas in the entrance line and the internal energy of the gas in the tank? Neglect heat transfer between the gas and the tank. If the gas is ideal and has constant heat capacities, how is the temperature of gas in the tank related to the temperature in the entrance line? [16]

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Code No: 07A40802 **R07** **Set No. 1**

II B.Tech II Semester Examinations,April/May 2012
CHEMICAL ENGINEERING THERMODYNAMICS - I
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Define COP of Carnot refrigerator. What are the two alternatives to increase the COP of Carnot refrigerator? Which of the two alternatives in more effective. [16]

2. (a) Discuss in brief heat and work.
   (b) A car of 1000 kg mass is moving with a speed of 90 km/h on a road, which is 100 m above the sea level. Calculate the kinetic energy and potential energy of the car. [6+10]

3. (a) What is the necessity of classifying point and path functions?
   (b) What is heat? Is it a path function? Explain. [8+8]

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7. One kg of water at 273 K is brought into contact with a heat reservoir at 373 K. When the water has reached 373 K, find the entropy change of the water, of the reservoir, and of the universe. Specific heat of water is 4.187 kJ $kg^{-1}K^{-1}$. [16]

8. Tank A of volume $1m^3$ containing 5-k mol of a gas at 600K is brought into contact through a dia-thermal wall with a tank B of volume $1m^3$ containing 3k-mol of the same gas at 400K. Determine the equilibrium temperature of the gas and the internal energy of gas in tank A and B, if the gas obeys the equation of state $1/T = \frac{3NR}{2U}$. [16]

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Code No: 07A40802 **R07** **Set No. 3**

II B.Tech II Semester Examinations,April/May 2012
CHEMICAL ENGINEERING THERMODYNAMICS - I
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Define COP of Carnot refrigerator. What are the two alternatives to increase the COP of Carnot refrigerator? Which of the two alternatives in more effective. [16]

2. Tank A of volume 1m^3 containing 5-k mol of a gas at 600K is brought into contact through a dia-thermal wall with a tank B of volume 1m^3 containing 3k-mol of the same gas at 400K. Determine the equilibrium temperature of the gas and the internal energy of gas in tank A and B, if the gas obeys the equation of state $1/T = \frac{3NR}{2U}$. [16]

3. Consider the filling of an evacuated tank with a gas from a constant pressure line. What is the relation between the enthalpy of the gas in the entrance line and the internal energy of the gas in the tank? Neglect heat transfer between the gas and the tank. If the gas is ideal and has constant heat capacities, how is the temperature of gas in the tank related to the temperature in the entrance line? [16]

4. (a) State the Clausius inequality.
   (b) Give two statements of second law of thermodynamics. Explain interms of enpressions. [8+8]

5. One kg of water at 273 K is brought into contact with a heat reservoir at 373 K. When the water has reached 373 K, find the entropy change of the water, of the reservoir, and of the universe. Specific heat of water is 4.187 kJ kg^{-1}K^{-1}. [16]

6. (a) Discuss in brief heat and work.
   (b) A car of 1000 kg mass is moving with a speed of 90 km/h on a road, which is 100 m above the sea level. Calculate the kinetic energy and potential energy of the car. [6+10]

7. If one kmol of methane is stored in 0.3 m^3 tank at 300 K, estimate the pressure of the gas using Redlich-Kwong equation of state. The critical constants of methane are P_C = 4.60MPa and T_C = 190.6 K. [16]

8. (a) What is the necessity of classifying point and path functions?
   (b) What is heat? Is it a path function? Explain. [8+8]

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