Code No: RR410305 **RR** **Set No. 2**

IV B.Tech I Semester Examinations,November 2010
REFRIGERATION AND AIRCONDITIONING
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the layout for a central air conditioning system that you would suggest for your institution for cooling in summer. [8]
   (b) Explain the working of a window air conditioner by drawing a neat sketch. [8]

2. A refrigerant plant working on simple vapour compression cycle using F-12 as refrigerant is used for producing 10 tons of ice at -5^0C per day with water at 35^0C. It is required to maintain 10^0C of temperature difference for better heat transfer at condenser and evaporator. Calculate the dimension of compressor cylinder: if it runs at 1400 RPM. Also find the COP and relative COP With respect to Carnot cycle. Take L/D ratio and volumetric efficiency of the compressor as 1.1 and 0.9 respectively. [16]

3. (a) Name the applications of steam jet refrigeration system. [4]
   (b) What are the limitations of thermoelectric Refrigerator over conventional absorption system? Explain how thermoelectric refrigerator works. [12]

4. (a) What are the merits and demerits of water cooled condensers over air cooled condensers? [6]
   (b) Name and explain the working of any two types of water cooled condensers. [10]

5. (a) Explain the working of a rotary screw compressor. [10]
   (b) How the capacity control is achieved in refrigerant compressor? [6]

6. (a) What are the advantages and disadvantages of air refrigeration system? [6]
   (b) A dense air refrigeration machine operates on a reversed Brayton cycle and is reversed for 20 tonnes refrigeration capacity. The cooler pressure is 4.9 bar and the refrigerator pressure is 1.4 bar. The air is cooled to a temperature of 45^0C. and the temperature of air at the inlet to the compressor is -20^0C. Assuming the cycle is ideal determine:
      i. The COP of the system.
      ii. Mass of air circulated /min
      iii. Net power per ton of refrigeration. [10]

7. (a) Represent the following process in a skeleton psychrometric chart.
      i. Sensible cooling
      ii. Cooling and humidification

iii. Adiabatic mixing of air streams. [6]

(b) Ten grams of moisture per kg of dry air is removed from atmospheric air when it is passed through an air conditioning system and its temperature becomes 20°C. The atmospheric conditions are 40°C DBT and 60% RH. Find the following for the conditioned air

i. Relative humidity
ii. Wet-bulb temperature
iii. Dew point temperature
iv. Enthalpy change for the air. [10]

Assume standard atmospheric pressure.

8. (a) Describe with neat sketch working of lithium Bromide - water absorption system. [10]

(b) What are the different refrigerent - absorbent working pairs and what is the Effect of evaporator temperature on performance of absorption systems. [6]

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Code No: RR410305 **RR** **Set No. 4**

IV B.Tech I Semester Examinations,November 2010
REFRIGERATION AND AIRCONDITIONING
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the working of a rotary screw compressor. [10]
   (b) How the capacity control is achieved in refrigerant compressor? [6]
2. (a) Name the applications of steam jet refrigeration system. [4]
   (b) What are the limitations of thermoelectric Refrigerator over conventional absorption system? Explain how thermoelectric refrigerator works. [12]
3. (a) Draw the layout for a central air conditioning system that you would suggest for your institution for cooling in summer. [8]
   (b) Explain the working of a window air conditioner by drawing a neat sketch.[8]
4. A refrigerant plant working on simple vapour compression cycle using F-12 as refrigerant is used for producing 10 tons of ice at -5^0C per day with water at 35^0 C. It is required to maintain 10^0C of temperature difference for better heat transfer at condenser and evaporator. Calculate the dimension of compressor cylinder: if it runs at 1400 RPM. Also find the COP and relative COP With respect to Carnot cycle. Take L/D ratio and volumetric efficiency of the compressor as 1.1 and 0.9 respectively. [16]
5. (a) Describe with neat sketch working of lithium Bromide - water absorption system. [10]
   (b) What are the different refrigerent - absorbent working pairs and what is the Effect of evaporator temperature on performance of absorption systems. [6]
6. (a) What are the advantages and disadvantages of air refrigeration system? [6]
   (b) A dense air refrigeration machine operates on a reversed Brayton cycle and is reversed for 20 tonnes refrigeration capacity. The cooler pressure is 4.9 bar and the refrigerator pressure is 1.4 bar. The air is cooled to a temperature of 45^0C. and the temperature of air at the inlet to the compressor is -20^0C. Assuming the cycle is ideal determine:
      i. The COP of the system.
      ii. Mass of air circulated /min
      iii. Net power per ton of refrigeration. [10]
7. (a) Represent the following process in a skeleton psychrometric chart.
      i. Sensible cooling
      ii. Cooling and humidification

iii. Adiabatic mixing of air streams. [6]

(b) Ten grams of moisture per kg of dry air is removed from atmospheric air when it is passed through an air conditioning system and its temperature becomes 20°C. The atmospheric conditions are 40°C DBT and 60% RH. Find the following for the conditioned air

i. Relative humidity
ii. Wet-bulb temperature
iii. Dew point temperature
iv. Enthalpy change for the air. [10]

Assume standard atmospheric pressure.

8. (a) What are the merits and demerits of water cooled condensers over air cooled condensers? [6]

(b) Name and explain the working of any two types of water cooled condensers. [10]

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Code No: RR410305 **RR** **Set No. 1**

IV B.Tech I Semester Examinations,November 2010
REFRIGERATION AND AIRCONDITIONING
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the advantages and disadvantages of air refrigeration system? [6]
   (b) A dense air refrigeration machine operates on a reversed Brayton cycle and is reversed for 20 tonnes refrigeration capacity. The cooler pressure is 4.9 bar and the refrigerator pressure is 1.4 bar. The air is cooled to a temperature of 45^0C. and the temperature of air at the inlet to the compressor is -20^0C. Assuming the cycle is ideal determine:
      i. The COP of the system.
      ii. Mass of air circulated /min
      iii. Net power per ton of refrigeration. [10]
2. (a) Draw the layout for a central air conditioning system that you would suggest for your institution for cooling in summer. [8]
   (b) Explain the working of a window air conditioner by drawing a neat sketch.[8]
3. (a) Name the applications of steam jet refrigeration system. [4]
   (b) What are the limitations of thermoelectric Refrigerator over conventional absorption system? Explain how thermoelectric refrigerator works. [12]
4. (a) Explain the working of a rotary screw compressor. [10]
   (b) How the capacity control is achieved in refrigerant compressor? [6]
5. A refrigerant plant working on simple vapour compression cycle using F-12 as refrigerant is used for producing 10 tons of ice at -5^0 C per day with water at 35^0C. It is required to maintain 10^0C of temperature difference for better heat transfer at condenser and evaporator. Calculate the dimension of compressor cylinder: if it runs at 1400 RPM. Also find the COP and relative COP With respect to Carnot cycle. Take L/D ratio and volumetric efficiency of the compressor as 1.1 and 0.9 respectively. [16]
6. (a) What are the merits and demerits of water cooled condensers over air cooled condensers? [6]
   (b) Name and explain the working of any two types of water cooled condensers. [10]
7. (a) Describe with neat sketch working of lithium Bromide - water absorption system. [10]

(b) What are the different refrigerent - absorbent working pairs and what is the Effect of evaporator temperature on performance of absorption systems. [6]

8. (a) Represent the following process in a skeleton psychrometric chart.
   i. Sensible cooling
   ii. Cooling and humidification
   iii. Adiabatic mixing of air streams. [6]

   (b) Ten grams of moisture per kg of dry air is removed from atmospheric air when it is passed through an air conditioning system and its temperature becomes 20°C. The atmospheric conditions are 40°C DBT and 60% RH. Find the following for the conditioned air
   i. Relative humidity
   ii. Wet-bulb temperature
   iii. Dew point temperature
   iv. Enthalpy change for the air. [10]

Assume standard atmospheric pressure.

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Code No: RR410305 **RR** **Set No. 3**

IV B.Tech I Semester Examinations,November 2010
REFRIGERATION AND AIRCONDITIONING
Mechanical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Name the applications of steam jet refrigeration system. [4]
   (b) What are the limitations of thermoelectric Refrigerator over conventional absorption system? Explain how thermoelectric refrigerator works. [12]

2. (a) Represent the following process in a skeleton psychrometric chart.
      i. Sensible cooling
      ii. Cooling and humidification
      iii. Adiabatic mixing of air streams. [6]
   (b) Ten grams of moisture per kg of dry air is removed from atmospheric air when it is passed through an air conditioning system and its temperature becomes 20^{o}C. The atmospheric conditions are 40^{o}C DBT and 60% RH. Find the following for the conditioned air
      i. Relative humidity
      ii. Wet-bulb temperature
      iii. Dew point temperature
      iv. Enthalpy change for the air. [10]

   Assume standard atmospheric pressure.

3. (a) What are the advantages and disadvantages of air refrigeration system? [6]
   (b) A dense air refrigeration machine operates on a reversed Brayton cycle and is reversed for 20 tonnes refrigeration capacity. The cooler pressure is 4.9 bar and the refrigerator pressure is 1.4 bar. The air is cooled to a temperature of 45^{0}C. and the temperature of air at the inlet to the compressor is -20^{0}C. Assuming the cycle is ideal determine:
      i. The COP of the system.
      ii. Mass of air circulated /min
      iii. Net power per ton of refrigeration. [10]

4. (a) Describe with neat sketch working of lithium Bromide - water absorption system. [10]
   (b) What are the different refrigerent - absorbent working pairs and what is the Effect of evaporator temperature on performance of absorption systems. [6]

5. (a) What are the merits and demerits of water cooled condensers over air cooled condensers? [6]

(b) Name and explain the working of any two types of water cooled condensers. [10]

6. A refrigerant plant working on simple vapour compression cycle using F-12 as refrigerant is used for producing 10 tons of ice at -5^0C per day with water at 35^0C. It is required to maintain 10^0C of temperature difference for better heat transfer at condenser and evaporator. Calculate the dimension of compressor cylinder: if it runs at 1400 RPM. Also find the COP and relative COP With respect to Carnot cycle. Take L/D ratio and volumetric efficiency of the compressor as 1.1 and 0.9 respectively. [16]

7. (a) Explain the working of a rotary screw compressor. [10]
   (b) How the capacity control is achieved in refrigerant compressor? [6]

8. (a) Draw the layout for a central air conditioning system that you would suggest for your institution for cooling in summer. [8]
   (b) Explain the working of a window air conditioner by drawing a neat sketch. [8]

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