R07

Set No. 2

Time: 3 hours

Code No: 07A40802

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks ****

- 1. (a) Define entropy. Is it a path function?
 - (b) What is irreversibility?

[8+8]

- 2. It is proposed that solar energy be used to warm a large collector plate. This energy would, in turn, be transferred as heat to a fluid within a heat engine, and the engine would reject energy as heat to the atmosphere. Experiments indicate that about 1880 kJ/ m^2 hr of energy can be collected, when the plate is operating at 90^o C. Estimate the minimum collector area that would be required for a plant producing 1 kW of useful shaft power. The atmospheric temperature may be assumed to be 20^{0} C. [16]
- 3. (a) Mention a few common refrigerants.
 - (b) What are different methods for the liquefaction of gases? Discuss any one of them. |6+10|
- (a) What is a continuous system and how do we describe the state of such a 4. system?
 - (b) Compare and contrast the characteristics of control mass and control volume. [8+8]
- 5. The fundamental relation of a particular thermodynamic system is given by $S = (KUVN)^{1/3}$. Determine the relation among the intensive parameters for the above fundamental relation. [16]
- 6. Compute the degrees of freedom if,
 - (a) System is made up of liquid water in equilibrium with its vapour and helium.
 - (b) System consists of liquid water and liquid touene (immiscible) in equilibrium with its vapours.
 - (c) System is consisting of solid carbon, CO, CO_2 and O_2 in chemical equilibrium. [5+5+6]
- 7. (a) What is sub cooled or compressed liquid?
 - (b) State the law of corresponding states that can be deduced from the equation of state. [6+10]

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Set No. 2

8. The pressure of gas in a pipe line is measured with a mercury manometer having one limb open to the atmosphere. If the difference in the height of mercury in the two limbs is 540mm, calculate the gas pressure. The barometer reads 760mm Hg, the acceleration due to gravity is 9.79 m/ s^2 , and the density of mercury is 13,640kg/ m^3 . [16]

R07

Set No. 4

Time: 3 hours

Code No: 07A40802

Max Marks: 80

[5+5+6]

Answer any FIVE Questions All Questions carry equal marks ****

- 1. Compute the degrees of freedom if,
 - (a) System is made up of liquid water in equilibrium with its vapour and helium.
 - (b) System consists of liquid water and liquid touene (immiscible) in equilibrium with its vapours.
 - (c) System is consisting of solid carbon, CO, CO_2 and O_2 in chemical equilibrium.

2. The fundamental relation of a particular thermodynamic system is given by $S = (KUVN)^{1/3}$. Determine the relation among the intensive parameters for the above fundamental relation. 16

- 3. It is proposed that solar energy be used to warm a large collector plate. This energy would, in turn, be transferred as heat to a fluid within a heat engine, and the engine would reject energy as heat to the atmosphere. Experiments indicate that about 1880 kJ/ m^2 hr of energy can be collected, when the plate is operating at 90° C. Estimate the minimum collector area that would be required for a plant producing 1 kW of useful shaft power. The atmospheric temperature may be assumed to be 20^{0} C. [16]
- 4. (a) Define entropy. Is it a path function?
 - (b) What is irreversibility? |8+8|
- (a) What is sub cooled or compressed liquid? 5.
 - (b) State the law of corresponding states that can be deduced from the equation of state. [6+10]
- 6. (a) Mention a few common refrigerants.
 - (b) What are different methods for the liquefaction of gases? Discuss any one of them. [6+10]
- 7. (a) What is a continuous system and how do we describe the state of such a system?
 - (b) Compare and contrast the characteristics of control mass and control volume. [8+8]

Code No: 07A40802

 $\mathbf{R07}$

Set No. 4

8. The pressure of gas in a pipe line is measured with a mercury manometer having one limb open to the atmosphere. If the difference in the height of mercury in the two limbs is 540mm, calculate the gas pressure. The barometer reads 760mm Hg, the acceleration due to gravity is 9.79 m/s², and the density of mercury is $13,640 \text{kg}/m^3$. [16]

FIRST

R07

Set No. 1

Time: 3 hours

Code No: 07A40802

Max Marks: 80

[8+8]

Answer any FIVE Questions All Questions carry equal marks ****

- 1. (a) What is sub cooled or compressed liquid?
 - (b) State the law of corresponding states that can be deduced from the equation of state. [6+10]
- (a) What is a continuous system and how do we describe the state of such a 2. system?
 - (b) Compare and contrast the characteristics of control mass and control volume.

- (a) Mention a few common refrigerants. 3.
 - (b) What are different methods for the liquefaction of gases? Discuss any one of them. [6+10]
- 4. Compute the degrees of freedom if
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 - (b) System consists of liquid water and liquid touene (immiscible) in equilibrium with its vapours.
 - (c) System is consisting of solid carbon, CO, CO_2 and O_2 in chemical equilibrium. [5+5+6]
- 5. The pressure of gas in a pipe line is measured with a mercury manometer having one limb open to the atmosphere. If the difference in the height of mercury in the two limbs is 540mm, calculate the gas pressure. The barometer reads 760mm Hg, the acceleration due to gravity is 9.79 m/ s^2 , and the density of mercury is $13,640 \text{kg}/m^3$. [16]
- 6. The fundamental relation of a particular thermodynamic system is given by $S = (KUVN)^{1/3}$. Determine the relation among the intensive parameters for the above fundamental relation. [16]
- 7. It is proposed that solar energy be used to warm a large collector plate. This energy would, in turn, be transferred as heat to a fluid within a heat engine, and the engine would reject energy as heat to the atmosphere. Experiments indicate that about 1880 kJ/ m^2 hr of energy can be collected, when the plate is operating at 90⁰ C. Estimate the minimum collector area that would be required for a plant producing 1 kW of useful shaft power. The atmospheric temperature may be assumed to be 20^{0} C. [16]

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R07



- 8. (a) Define entropy. Is it a path function?
 - (b) What is irreversibility?

[8+8]



R07

Set No. 3

Time: 3 hours

Code No: 07A40802

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks ****

- 1. The fundamental relation of a particular thermodynamic system is given by $S = (KUVN)^{1/3}$. Determine the relation among the intensive parameters for the above fundamental relation. [16]
- 2. The pressure of gas in a pipe line is measured with a mercury manometer having one limb open to the atmosphere. If the difference in the height of mercury in the two limbs is 540mm, calculate the gas pressure. The barometer reads 760mm Hg, the acceleration due to gravity is 9.79 m/ s^2 , and the density of mercury is $13,640 \text{kg}/m^3$. [16]
- 3. It is proposed that solar energy be used to warm a large collector plate. This energy would, in turn, be transferred as heat to a fluid within a heat engine, and the engine would reject energy as heat to the atmosphere. Experiments indicate that about 1880 kJ/ m^2 hr of energy can be collected, when the plate is operating at 90⁰ C. Estimate the minimum collector area that would be required for a plant producing 1 kW of useful shaft power. The atmospheric temperature may be assumed to be 20^{0} C. [16]
- 4. (a) Define entropy. Is it a path function?
 - (b) What is irreversibility? [8+8]
- 5. (a) What is a continuous system and how do we describe the state of such a system?
 - (b) Compare and contrast the characteristics of control mass and control volume.

[8+8]

- 6. (a) Mention a few common refrigerants.
 - (b) What are different methods for the liquefaction of gases? Discuss any one of them. [6+10]
- 7. (a) What is sub cooled or compressed liquid?
 - (b) State the law of corresponding states that can be deduced from the equation of state. [6+10]
- 8. Compute the degrees of freedom if,
 - (a) System is made up of liquid water in equilibrium with its vapour and helium.
 - (b) System consists of liquid water and liquid touene (immiscible) in equilibrium with its vapours.

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(c) System is consisting of solid carbon, CO, CO₂ and O₂ in chemical equilibrium. [5+5+6]

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