

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter2019 – 20 Examinations

Semester: 3**Date: 11/12/2019****Subject Code: 20103207****Time: 10:30 am to 12:30 pm****Subject Name: Thermodynamics, Refrigeration & Air Conditioning****Total Marks: 50****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 (A) Fill in the Blanks (05)

- 1 System, in which energy transfer takes place but mass remains constant, is known as _____ system.
- 2 During steady flow process mass and energy of system both are constant. TRUE or FALSE?
- 3 In the polytropic process equation $pV^n = \text{constant}$, if $n=0$, the process is termed as _____ process.
- 4 The difference between specific heat at constant pressure (C_p) & specific heat at constant volume (C_v) is _____
- 5 The unit of energy in S.I units _____
- 6 Degree of randomness in the system is called as enthalpy. True or False?
- 7 Work done in constant volume process is _____. (zero, one, less than one)
- 8 A refrigerant should have high boiling point True or False?
- 9 1 bar =N/m²
- 10 When heat supplied to the system work done is negative. True or False?

Q.1 (B) Multiple Choice Questions. (10)

- 1 A definite area or a space where some thermodynamic process takes place is known as
(a) Thermodynamic system (b) Thermodynamic cycle
(c) Thermodynamic process (d) Thermodynamic law
- 2 First law of thermodynamics refers to conservation of
(a) Mass (b) Momentum (c) Energy (d) Force
- 3 Zeroth law of thermodynamics forms the basis.....measurement
(a) Pressure (b) Temperature (c) Heat exchange (d) Work.
- 4 From the following is example of path function.
(a) Pressure (b) internal energy (c) energy (d) heat
- 5 When a gas is heated at constant pressure
(a) Its temperature will increase
(b) Its volume will increase
(c) both temperature and volume will increase
(d) neither temperature and volume will increase
- 6 The boiling point of ammonia is
(a) -100°C (b) -50°C (c) - 33.3°C (d) 0°C

- 7 The moisture in a refrigerant is removed by
 (a) evaporator (b) safety relief valve
 (c) dehumidifier (d) driers
- 8 Aqua ammonia is used as refrigerant in the following type of refrigeration system
 (a) compression (b) direct (c) indirect (d) absorption
- 9 Which of the following is extensive property of thermodynamics system
 (a) pressure (b) volume (c) Temperature (d) Density
- 10 One ton of refrigeration (1TR) means that the heat removing capacity is
 (a) 210 kJ/min (b) 200 kW (c) 100 kJ/min (d) 500 kW
- 11 Mathematical form of isothermal process is
 (a) $p v^n = C$ (b) $p v^2 = C$ (c) $P v = C$ (d) None
- 12 When a gas is heated at constant pressure
 (a) Its temperature will increase (b) Its volume will increase
 (c) both temperature and volume will increase (d) neither temperature and volume will increase
- 13 What is the example of intensive property?
 (a) Total volume (b) total mass (c) total energy (d) temperature
- 14 Thermodynamics is the study of
 (a) energy (b) equilibrium (c) entropy (d) all of the above
- 15 From following what is the example of non-flow process
 (a) Isothermal process (b) isobaric process (c) polytropic process (d) all of above
- 16 During a refrigeration process or cycle, heat is rejected by the refrigerant In a

 (a) Compressor (b) Condensor (c) evaporator (d) expansion device
- 17 In vapour compression refrigeration, the condition of refrigerant after compression .
 (a) high pressure, high temperature vapour refrigerant .
 (b) high pressure, low temperature liquid refrigerant.
 (c) low pressure, low temperature liquid refrigerant.
 (d) low pressure, low temperature vapour refrigerant.
- 18 Vapour form of water is known as
 (a) ice (b) steam (c) aqua (d) all of the above
- 19 From the following which is the constant enthalpy process.
 (a) adiabatic (b) polytropic (c) hyperbolic (d) throttling
- 20 Air conditioning means.....
 (a) cooling (b) heating (c) dehumidifying (d) all of them

Q.2 (A) Define the following (Any Five)

(05)

1. Energy reservoir
2. Intensive property
3. Thermal equilibrium
4. Refrigerant
5. Entropy
6. Point function

Q.2 (B) Answer the following (Any five out of seven questions)

(05)

- 1) Explain Entropy Principle
- 2) Explain about Enthalpy.
- 3) Application of Refrigeration in Agriculture.
- 4) Explain path function.
- 5) What is tone of Refrigeration
- 6) Define C.O.P
- 7) Components used in VAR refrigeration system.

Q.3 Write Short notes (Any five out of six questions)

(10)

1. Explain thermodynamics system and its types in detail.
2. Explain Carnot theorem in detail.
3. What is non-flow process? Types of non-flow process.
4. Derive equation of efficiency for Otto cycle.
5. Explain Kelvin-plank's Statement of 2nd law of thermodynamics.
6. Derive the equation for change in entropy by general method.

Q.4 Long Questions (Any three out of four questions)

(15)

- (1) Derive steady flow energy equation (SFEE).
- (2) Ten gram of water at 20°C is converted into ice at -10°C at constant atmospheric pressure. Assuming the specific heat of liquid water to remain constant at 4.2 J/gK and that of ice to be half of this value, and taking the latent heat of fusion of ice at 0°C to be 335 J/g, calculate the total entropy change of the system. Also find the change in entropy of the Universe.
- (3) Explain the joule's experiment for first law of thermodynamics.
- (4) Explain with neat sketch Vapour Compression Refrigeration System.