QUESTION BANK

AUTOMOBILE / MECHANICAL ENGINEERING

THERMAL ENGINEERING I (TH-4)

3RD SEMESTER

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UNIT I

BASIC CONCEPT AND FIRST LAW

PART - A

1. What do you understand by pure substance?
2. Define thermodynamic system.
3. Name the different types of system.
4. Define thermodynamic equilibrium.
5. What do you mean by quasi-static process?
6. Define Path function.
7. Define point function.
8. Explain homogeneous and heterogeneous system.
9. What is a steady flow process?
10. Prove that for an isolated system, there is no change in internal energy.
11. Indicate the practical application of steady flow energy equation.
12. Explain Mechanical equilibrium.
13. Explain Chemical equilibrium.
14. Explain Thermal equilibrium.
15. Define Zeroth law of Thermodynamics.
16. What are the limitations of first law of thermodynamics?
17. What is perpetual motion machine of first kind?
18. Differentiate between Microscopic and Macroscopic?
19. Differentiate Quasi static and non Quasi static process?
20. Differentiate reversible process and irreversible process?

PART — B

1. a) A rigid tank containing 0.4m’ of air at 400 kPa and 30°C is connected by a valve to a piston cylinder device with zero clearance. The mass of the piston is such that a pressure of 200 kPa is required to raise the piston. The valve is opened slightly and air is allowed to flow into the cylinder until the pressure of the tank drops to 200 kPa. During this process, heat is exchanged with the surrounding such that the entire air remains at 30°C at all times. Determine the heat transfer for this process.

   b) A reciprocating air compressor taken in 2m /min air at 0.11MPa, 293K which it delivers at 1.5 Mpa, 384 K to an after cooler where the air where the air is cooled at constant pressure to 298 K. the power absorbed by the compressor is 4.15 kW.

Determine the heat transfer in (i) the compressor (ii) the cooler. State your assumptions.

2. In a turbo machine handling an incompressible lluid with a density of 1000kg/m’ the conditions of the lluid at the rotor entry and exit are as given below:

	1. Inlet	Exit
Pressure	1.15 MPa	0.05MPa
Velocity	30 m/sec	**15.5** m/sec
Height above datum	10 m	2m

If the volume flow rate of the fluid is 40 m^3/s, estimate the net energy transfer from the fluid as work.

3. Three grams of nitrogen gas at 6 atm and 160°C is expanded adiabatically to double its initial volume and then compressed again at constant volume to its initial state. Calculate the work done on the gas. Draw the p-V diagram for the process. Specific heat ratio of nitrogen is 1.4.
4. Describe steady flow energy equation and
   - deduce suitable expression for the expansion of gas in a ga turbine with suitable assumptions.
   - apply the equation to a nozzle and derive an equation for velocity at exit.
   - Derive the suitable expression for the ideal compressor and specify the assumptions onder which such equation is aplicable.
5. a) Air expands isentropic process through a nozzle from 784 kPa and 220°C to an exit presssure of 98 kPa. Detrmine the exit velocity and the mass flow rate, if the exit area is $0.0006m^2$.

   b) In an air compressor, air flows steadily at the rate of 0.5 kg/sec. At entry to the compressor, air has a pressure of 105 kPa and specific volume of 0.86 m'/kg and at exit of the compressor those corresponding values are 705 kPa and 0.16 m'/kg. neglect kinetic and potential energy change. The internal energy of air leaking the compressor is 95 kJ/kg greater than that of air entering. The cooling water in the compressor absorbs 60 kJ/sec. of heat from the air. Find power required to drive the compressor.

6. Calculate the power developed and diameter of the inlet pipe, if a gas enters into the gas turbine at 5 kg/sec, 50 m/s with an enthalpy of 0.9MJ/kg. the heat loss to the surrounding **is 0.025** MJ/kg. the heat loss to the surrounding is 0.025 MJ/kg. the heat loss to the surrounding **is 0.025** MJ/kg. assume **100** kPa and **300** K at the inlet.
7. a. Define the following terms:
    - Thermodynamics
    - Macroscopic approach
    - Continuum

   b. A gas of mass 1.5 kg undergoes a quasistatic expansion, which follows a relationship P=a+bV, where 'a' and 'b' are constants. The initial and final pressures are 1000 kPa and 200 kPa respectively and the corresponding volumes are 0.2 m' and 1.2 m . The specific internal energy of the gas is given by the relation U = (1.5PV — 85) kJ/kg, where P is in kPa and V is in m'. Calculate the net heat transfer and the maximum internal energy of the gas attained during expansion.
8. a) Define enthalpy. How is it related to internal energy?
   b) A fluid is confined in a cylinder by a spring loaded, frictionless piston so that the pressure in the fluid is a linear function of the volume (p = a + bV) where U is in kJ, p is in kPa and V in cubic meter. If the fluid changes from an initial state of 170 kPa, **0.03** m' to a final state of 400 kPa, **0.06** m^3, with no work other than that done on the piston, find the direction and magnitude of the work and heat transfer.
9. The electric heating system used in many houses consists of simple duct with resistance wire. Air is heated as it flows over resistance wires. Consider a 15 kW electric heating system. Air enters the heating section at **100** kPa and 17oC with a volume flow rate of **150** m3/min. if heat is lost from the air in the duct to the surroundings at a rate of 200 W, determine the exit temperature of air.

UNIT II

LAWS OF THERMODYNAMICS

PART - A

1. Define Clausius statement.
2. What is Perpetual motion machine of the second kind?
3. Define Kelvin Planck Statement.
4. Define Heat pump.
5. Define Heat engine.

6. What are the assumptions made on heat engine?
7. State Carnot theorem.
8. What is meant by reversible process?
9. What is meant by irreversible process?
10. Explain entropy?
11. Define availability.
12. Define available energy and unavailable energy.
13. Explain the term source and sink.
14. What do you understand by the entropy principle?
15. What are the important characteristics of entropy?
16. What is reversed Carnot heat engine? What are the limitations of carnot cycle?
17. Why Rankine cycle is modified?
18. Name the various vapour power cycle.
19. Define efficiency ratio.
20. Define overall efficiency.

PART — B

1) Air is compressed by an adiabatic compressor from **100** kPa and 12°C to a pressure of 800 kPa at a steady rate of 0.2 kg/s. if the isentropic efficiency of the compressor is 80 percent, determine the exit temperature of air and the required power input to the compressor.
2) a) A 200 m' rigid tank initially contains atmospheric air at 100 kPa and 300 K and is to be used as storage vessel for compressed air at 1 MPa and 300 K. Compressed air is to be supplied by a compressor that takes in atmospheric air at P, = 100 kPa and T, = 300 K. determine the minimum work required for this process.

   b) The interior lighting of refrigerators is provided by incandescent lamps whose switches are actuated by the opening of the refrigerator door. Consider a refrigerator whose 40 W light bulp remains on continuously as a result of a malfuntion of the switch. If the refrigerator has a co efficient performance of 1.3 and the cost of electricity is Rs. 8 per kWh, determine the increase in the energy consumptionof the refrigerator and its cost per year if the switch is not fixed.
3) a. A carnot heat engine receives 650 kJ of heat from a source of unknown temperature and rejects 250 kJ of it to a sink at 297 K. determine the temperature of the source and the thermal efficiency of the heat engine.

   b. A carnot heat engine receives heat from a reservoir at 1173 K at a rate of 800 kJ/min and reject the waste heat to the ambient air at 300 K. the entire work output of the heat engine is used to drive a refrigerator that removes heat from the refrigerated space at 268 K and transfers it to the same ambient air at 300 K. determine the maximum rate of the heat removal from the refrigerated space and the total rate of heat rejection to the ambient air.
4) a. what are the conditions for reversibility? Explain.

   b. An heat exchanger circulates 5000 kg/hr of water to cool oil from 150°C to 50°C. The rate of flow of oil is 2.5 kJ/kg.K. the water enters the heat exchanger at 21°C. Determine the net change in entropy due to heat exchange process, and the amount of work obtained if cooling of oil is done by using the heat to run a carnot engine with sink temperature of 21°C.

5) a. deduce clausius inequality and interpret it.

b. An ideal gas of 0.12 m3 is allowed to expand isentropically from 300 kPa and 120oC to 100 kPa, 5 kJ of heat is then transferred to the gas at constant pressure. Calculate the change in entropy for each process. Assume y=1.4 and Cp=1.0035 kJ/kg.K. if these two processes are replaced by a reversible polytropic expansion, find the index of expansion between original and final states. What will be the total changes in entropy?

6) a) A heat engine operating between two reservoirs at **100** K and **300** K is used to drive heat pump which extracts heat from the reservoir at 300 K at a rate twice that at which engine rejects heat to it. If the efficiency of the engine is 40 % of the maximum possible and the co efficient of performance of heat pump is 50 % of the maximum possible, make calculations for the temperature of the reservoir to which the heat pump rejects heat. Also work out the rate of heat rejection from the heat pump if the rate of supply of heat to the engine is 50 kW.

b) Two kg of air at 500 kPa, 80°C expands adiabatically in a closed system until its volume is doubled and its temperature becomes equal to that of the surroundings which is at **100** kPa, 5°C for this process, determine

The maximum work

The change in availability and

The irreversibility

For air taken, C, = 0.718 kJ/kg. K, u=C, T where C, is constant and Pv = mRT where P is pressure in kPa, V volume in m , 'm' mass in kg, R a constant equal to 0.287 kJ/kg K and T temperature in K.

7) a. deduce the efficiency of carnot cycle in terms of temperature from its p-V diagram.

b. Air is compressed from 100 kPa and 300 K to 5 bar isothermally and then it receives heat at constant pressure. It is finally returns to its initial condition by a constant volume path. Plot the cycle on p-V and T-s diagram and calculate the net heat and work transfer.

8) a) Bring out the concept of entropy and importance of T-s diagram.

b) Five kg of water at 303 K is mixed with one kg of ice at 0°C. The system is open to atmosphere. Find the temperature of the mixture and the changr of entropy for both ice and water. Assume Cp of water as 4.18 kJ/kg-K and latent heat of ice as 334.5 kJ/kg. comment on the result based on the principle of increase in entropy.

9) a) define the tern 'Irreversible process' and 'Reversible process'. Give an example of each.

b) In a Carnot cycle the maximum pressure and temperature are limited to 18 bar and 410°C. The volume ratio of isentropic compression is 6 and isothermal expansion is 1.5. assume the volume of the air at the beginning of isothermal expansion as 0.18m . show the cycle on p-V and T-s diagrams and determine

- the pressure and temperature at main points
- thermal efficiency of the cycle

UNIT III

PROPERTIES PROCESSES OF PERFECT GAS

1. Define Ideal gas.
2. Define Real gas.
3. What is equation of state?
4. State Boyle's law.
5. State Charle's law.
6. Explain the construction and give the use of generalized compressibility chart.
7. What do you mean by reduced properties?
8. Explain law of corresponding states.
9. Explain Dalton's law of partial pressure.
10. State Avogadro's Law.
11. What is Joule-Thomson coefficient?
12. What is compressibility factor?
13. What is partial pressure?
14. Define Dalton's law of partial pressure.
15. How does the Vander Waal's equation differ from the ideal gas equation of state?
16. Using the definition of mass and mole fractions derive a relation between them?
17. What is significance of compressibility factor?
18. Write the maxwell equation and its significance?
19. Is water vapour is ideal gas? Why?
20. In atmospheric air (at 101325 Pa) contains 21% oxygen and 79% nitrogen (vol. %), what is the partial pressure of oxygen.

PART — B

1) a) A rigid tank contains 2 k mol of N_2 and 6 k mol of CO_2 gases at 300 K and 15 MPa. Estimate the volume of the tank on the basis of

- The ideal gas equation of state
- Compressibility factors and Amagat's law, and
- Compressibility factors and Dalton's law.

b) An insulated rigid tank is divided into two compartments by a partition. One compartment contains 7 kg of oxygen gas at 40oC and 100 kPa, and the other compartment contains 4 kg of nitrogen gas at 20oC and **150** kPa. Now the partition is removed, and the two gases are allowed to mix. Determine

- the mixture temperature
- the mixture pressure after equlilibrium has been established.

2) a) Using the ideal gas equation of state, verify

- the cyclic relation and
- the reciprocity relation at constant P.

b) Show that the internal energy of an ideal gas and an incompressible substance is a function of temperature only, u = u (T).

c) Derive expression ( )T and ( ) in terms of P,v, and T only.

3) In 5 kg of mixture of gases at **1.013** bar and **300** K the various constituents gases are as follows, 80% N_2› 18% 2› 2% CO_2 Determine the specific heat at constant pressure, gas constant for the constituents and mixture and also molar mass of mixture taking y = 1.3 for CO_2universal gas constant = 8314 J/kg.K.

4) Derive the Clausius Clapeyron equation and Vander Waal's equations.

5) a) Using the Claypeyron equation. Estimate the value of the enthalpy of vapourization of refrigerant R-134a at 293 K, and compare it with the tabulated value.

b) Show that C —C, = R for an ideal gas.

6) a) Show that the Joule — Thomson co efficient of an ideal gas is zero.

b) Using the cyclic relation and the first Maxwell relation, derive other three Maxwell relations.

7) a) Deduce the Maxwell relations

b) Explain joule thompson effect with the help of T-p diagram and derive the expression for Joule Thompson co efficient. Show that the value of this co efficient for an ideal gas is zero.

8) a) what are the differences between real and ideal gases?

b) write down the Vander Waal's equation of state for real gases and how is it obtained from ideal gas equation by incorporating real gas corrections?

c) A tank contains 0.2m' of gas mixture composed of 4 kg of Nitrogen, 1 kg of oxygen and 0.5 kg of carbon-di oxide. If the temperature is 20°C, determine the total pressure, gas constant and molar mass of the mixture.

9) a) Entropy is a function of any two properties like P and V, P and T etc., for a pure substance with the help of Maxwell's Equation. Prove

- Tds = Cv.dT + T [ß/k].dv
- Tds = Cv.dT — V.ßdp.T
- Tds = [K Cv/ß].dp + [Cp/vß].dv.

b) Determine chage of Internal energy and change of entropy when the gas obeys Vander Waal's equation.

10) a) write down the Dalten's law of partial pressure and explain its importance.

b) 0.45 kg of CO and 1 kg of air iscontained in a vessel of volume 0.4 m' at 15,C. Air has 23.3% of0_2 and 76.7% of N_2 by mass. Calculate the partial pressure of each constituents and total pressure in the vessel. Molar masses of CO,O2and N^2 are 28, 32 and 28 kg/k mol.

UNIT IV

INTERNAL COMBUSTION ENGINE

PART — A

1. What is Internal combustion engine?
2. What is a piston?
3. What is a flywheel?
4. What is a crank-shaft?
5. Define scavenging.
6. Define detonation.
7. What is a spark plug?
8. Write the main components of I.C engine.
9. Write the types of fuel injection system.
10. What is common-rail-injection system?

PART — B

1.Explain and classify I.C engine.
2.Explain the main components of I.C engine.
3.write the working principle of 2-stroke petrol engine.
4. write the working principle of 2-stroke diesel engine.
5. write the working principle of 4-stroke petrol engine.
6. write the working principle of 4-stroke diesel engine.
7.Write the difference between petrol and diesel engine.
8.Write the difference between 2-stroke and 4-stroke engine.
9.Write construction and working of simple carburetor.
10.Explain about fuel injector.
11.Explain about valve timing diagram.

UNIT V

AIR STANDARD CYCLE

PART – A

1. What is humidification and dehumidification?
2. absolute humidity and relative humidity.
3. What is effective temperature?
4. Represent the following psychometric process using skeleton psychometric chart?
5. Define Relative humidity.
6. Define degree of saturation.
7. What is meant by dry bulb temperature (DBT)?
8. What is meant by wet bulb temperature (WBT)?
9. Define dew point depression.
10. What is meant by adiabatic saturation temperature (or) thermodynamic wet bulb temperature?
11. Define sensible heat and latent heat.
12. What are the important psychometric process?
13. What is meant by adiabatic mixing?
14. What are the assumptions made in Vander Waal's equation of state?
15. Define coefficient of volume expansion.
16. State Helmholtz function.
17. What are thermodynamic properties?
18. Define throttling process.
19. Define isothermal compressibility.
20. Define psychometric.

PART — B

[1] a) A 5m x 5m x 3m room contains air at 25°C and 100 kPa at a relative humidity of 75 percent. Determine

- The partial pressure of dry air,
- The specific humidity
- The enthalpy per unit mass of the dry air, and
- The masses of the dry air and water vapour in the room

b) the dry and the wet bulp temperatures of atmospheric air at 1 atm (101.325 kPa) pressure are measured with a sling psychrometer and determined to be 25°C and 15°C respectively. Determine

- the specific humidity
- the relative humidity
- the enthalpy per unit mass of the dry air, and
- the masses of the dry air and water vapour in the room.

[2] a) What is sensible heat? How is the sensible heat loss from a human body affected by the

- skin temperature
- environment temperature, and
- air motion.

b) Saturated air leaving the cooling section of an air conditioning system at 14°C at a rate of 50 m^3/min is mixed adiabatically with the outside air at 32°Cand 60 percent relative humidity, at a rate of 20 m /min. assuming that the mixing processes occurs at a pressure of 1 atm, determine the specific humidity, the relative humidity, the dry bulb temperature, and the volume flow rate of the mixture.

[3] a) For the atmospheric air at room temperature of 30°C and relative humidity of 60%. Determine partial pressure of air, humidity ratio,dew point temperature, density and enthalpy of air.

b) Two streams of moist air, one having flow rate of 3 kg/s at 30°C and 30% relative humidity, other having flow rate of 2 kg/s at 35°C and 85% relative humiddity get mixed adiabatically. Determine specific humidity and partial pressure of water vapour after mixing. Take Cp; stream = 1.86 kJ/kg.K

[4] a) What is the lowest temperature that air can attain in an evaporative cooler if it enters at 1 atm, 302 K, and 40 percent relative humidity?

b) consider a room tjat contains air at 1 atm, 308 K, and 40% relative humidity. Using the psychrometric chart, determine: the specific humidity, the enthalpy, the wet bulb temperature, the dew point temperature and the specific volume of the air.

[5] An air conditioning system is to take in outdoor air at 263 K and 30 percent relative humidity at a steady rate of 45 m^3/min and to condition it to 298 K and 60 percent relative humidity. The outdoor air is first heated to 295 K in the heating section and then humidified by the injection of hot steam in the humidifying section. Assuming the entire process takes place at a pressure of 100 kPa, determine (i) the rate of heat supply in the heating section and (ii) the mass How rate of the steam required in the humidifying section.

[6] a) Draw the psychrometric chart and show any two psychrometric processes on it.

b) A sample of moist air at 1 atm and 25°C has a moisture content of 0.01% by volume. Determine the humidity ratio, the partial pressure of water vapour, the degree of saturation, the relative humidity and the dew point temperature.

[7] a) Describe the process of adiabatic mixing of two streams in terms of humidity and / or enthalpy.

b) The temperature of the windows ina house on a day in winter is 5°C. When the temperature in the room is 23°C, and the barometric pressure is 74.88 cm Hg, what would be the maximum relative humidity that could be maintained in the room without condensation on the windows panes? Undr these conditions, find the partial pressure of the water vapour and air, the specific humidity and the density of the mixture.

[8]a) The atmospheric air at 30°C DBT and 75% RH enters a cooling coil at the rate of 200 m /min. the coil dew point temperature is 14°C and the by pass factor is 0.1 determine

- The temperature of air leaving the coil
- Capacity of the cooling coil in TR
- The amount of water vapour removed.
- Sensible heating factor for the process.

b) The volume flow rate of air is 800 m /min of re circulated at 22°C DBT and 10°C dew point temperature is to be mixed with 300 m^3/min of fresh air is 30°C DBT and 50% RH. Determine the enthalpy, specific volume, humidity ratio and dew point temperature of the mixture.

[9] a) Differentiate between

- Dry bulb temperature and wet bulb temperature
- Wet bulb depression and dew point depression

b) Air at 16°C and 25°C relative humidity passes through a heater and then through a humidfier to reach final dry bulb temperature of 30°C and 50% relative humidity. Calculate the heat and moisture added to the air. What is the sensible heat factor.

[10] a) In an adiabatic mixing of two streams, derive the relationship among the ratio of mass of streams, ratio of enthalpy change and ratio of specific humidity change.

b) Saturate air at 20°C at a rate of 1.167 m'/sec is mixed adiabatically with the outside air at 30°C and 50% relative humidity at a rate of 0.5 m /sec. assuming adiabatic mixing condition of 1 atm, determine specific humidity, relative humidity, dry bulb temperature and volume flow rate of the mixture.

UNIT VI

FUEL AND COMBUSTION

PART – A

1. Define fuel.
2. Write the different type of fuel with example.
3. Write the application of solid ,liquid and gaseous fuel.
4. Give examples of solid fuels.
5. Give examples of liquid fuels
6. Give examples of gaseous fuels.
7. Define octane number.
8. Define cetane number.
9. What is calorific value of fuel?

THERMODYNAMICS MULTIPLE CHOICE QUESTIONS ANSWERS:-

1. Which of the following variables controls the physical properties of a perfect gas
(a) pressure
(b) temperature
(c) volume
(d) all of the above
(e) atomic mass.
Answer: d

2. Which of the following laws is applicable for the behavior of a perfect gas
(a) Boyle's law
(b) Charles'law
(c) Gay-Lussac law
(d) all of the above
(e) Joule's law.
Answer: d

3. The unit of temperature in S.I. units is
(a) Centigrade
(b) Celsius
(c) Fahrenheit
(d) Kelvin
(e) Rankine.
Answer: d

4. The unit of mass in S.I. units is
(a) kilogram
(b) gram
(c) tonne
(d) quintal
(e) newton.
Answer: a

5. The unit of time in S.I. units is
(a) second
(b) minute
(c) hour
(d) day

(e) year.
Answer: a

6. The unit of length in S.I. units is
(a) meter
(b) centimeter
(c) kilometer
(d) millimeter.
Answer: a

7. The unit of energy in S.I. units is
(a) watt
(b) joule
(c) joule/s
(d) joule/m
(e) joule m.
Answer: b

8. According to Gay-Lussac law for a perfect gas, the absolute pressure of given mass varies directly as
(a) temperature
(b) absolute
(c) absolute temperature, if volume is kept constant
(d) volume, if temperature is kept constant
(e) remains constant,if volume and temperature are kept constant.
Answer: c

9. An ideal gas as compared to a real gas at very high pressure occupies
(a) more volume
(b) less volume
(c) same volume
(d) unpredictable behaviour
(e) no such correlation.
Answer: a

10. General gas equation is
(a) PV=nRT
(b) PV=mRT
(d) PV = C
(c) PV=KiRT

(e) Cp-Cv = Wj
Answer: b

11. According to Dalton's law, the total pres sure of the mixture of gases is equal to
(a) greater of the partial pressures of all
(b) average of the partial pressures of all
(c) sum of the partial pressures of all
(d) sum of the partial pressures of all divided by average molecular weight
(e) atmospheric pressure.
Answer: c

12. Which of the following can be regarded as gas so that gas laws could be applicable, within the commonly encountered temperature limits.
(a) 02, N2, steam, C02
(b) Oz, N2, water vapour
(c) S02, NH3, C02, moisture
(d) 02, N2, H2, air
(e) steam vapours, H2, C02.
Answer: d

13. The unit of pressure in S.I. units is
(a) kg/cm2
(b) mm of water column
(c) pascal
(d) dynes per square cm
(e) bars
Answer: c

14. A closed system is one in which
(a) mass does not cross boundaries of the system, though energy may do so
(b) mass crosses the boundary but not the energy
(c) neither mass nor energy crosses the boundaries of the system
(d) both energy and mass cross the boundaries of the system
(e) thermodynamic reactions take place.
Answer: a

15. Temperature of a gas is produced due to
(a) its heating value

(b) kinetic energy of molecules
(c) repulsion of molecules
(d) attraction of molecules
(e) surface tension of molecules.
Answer: b

16. According to kinetic theory of gases, the absolute zero temperature is attained when
(a) volume of the gas is zero
(b) pressure of the gas is zero
(c) kinetic energy of the molecules is zero
(d) specific heat of gas is zero
(e) mass is zero.
Answer: c

17. Kinetic theory of gases assumes that the collisions between the molecules are
(a) perfectly elastic
(b) perfectly inelastic
(c) partly elastic
(d) partly inelastic
(e) partly elastic and partly inelastic.
Answer: a

18. The pressure'of a gas in terms of its mean kinetic energy per unit volume E is equal to
(a) E/3
(b) E/2
(c) 3E/4
(d)2E/3
(e) 5E/4.
Answer: d

19. Kinetic energy of the molecules in terms of absolute temperature (T) is proportional to
(a) T
(b) j
(c) J2
(d) Vr
(e) 1/Vr.

Answer: a

20. Superheated vapour behaves
(a) exactly as gas
(b) as steam
(c) as ordinary vapour
(d) approximately as a gas
(e) as average of gas and vapour.
Answer: d

21. Absolute zero pressure will occur
(a) at sea level
(b) at the center of the earth
(c) when molecular momentum of the system becomes zero
(d) under vacuum conditions
(e) at a temperature of – 273 °K
Answer: c

22. No liquid can exist as liquid at
(a) – 273 °K
(b) vacuum
(c) zero pressure
(d) centre of earth
(e) in space.
Answer: c

23. The unit of power in S.I. units is
(a) newton
(b) pascal
(c) erg
(d) watt
(e) joule.
Answer: d

24. The condition of perfect vacuum, i.e., absolute zero pressure can be attained at
(a) a temperature of – 273.16°C
(b) a temperature of 0°C
(c) a temperature of 273 °K
(d) a negative pressure and 0°C temperature
(e) can’t be attained.

Answer: a

25. Intensive property of a system is one whose value
(a) depends on the mass of the system, like volume
(b) does not depend on the mass of the system, like temperature, pressure, etc.
(c) is not dependent on the path followed but on the state
(d) is dependent on the path followed and not on the state
(e) remains constant.
Answer: b
26. Specific heat of air at constant pressure is equal to
(a) 0.17
(b) 0.21

(c) 0.24
(d) 1.0
(e) 1.41
Answer : c

27. Characteristic gas constant of a gas is equal to
(a) C/Cv
(b) Cv/Cp
(c) Cp – Cv
(d) Cp + Cv
(e) Cp x Cv
Answer: c

28. The behaviour of gases can be fully determined by
(a) 1 law
(b) 2 laws
(c) 3 laws
(d) 4 laws
Answer: d

29. The ratio of two specific heats of air is equal to
(a) 0.17
(b) 0.24
(c) 0.1
(d) 1.41
(e) 2.71.
Answer: d

30. Boyle's law i.e. pV = constant is applicable to gases under
(a) all ranges of pressures
(b) only small range of pressures
(c) high range of pressures
(d) steady change of pressures
(e) atmospheric conditions.
Answer: b

31. Which law states that the internal energy of a gas is a function of temperature
(a) Charles' law
(b) Joule's law
(c) Regnault's law
(d) Boyle's law
(e) there is no such law.

Answer: b

32. The same volume of all gases would represent their
(a) densities
(b) specific weights
(c) molecular weights
(d) gas characteristic constants
(e) specific gravities.
Answer: c

33. Which law states that the specific heat of a gas remains constant at all temperatures and pressures
(a) Charles' Law
(b) Joule's Law
(c) Regnault's Law
(d) Boyle's Law
(e) there is no such law.
Answer: c

34. An open system is one in which
(a) mass does not cross boundaries of the system, though energy may do so
(b) neither mass nor energy crosses the boundaries of the system
(c) both energy and mass cross the boundaries of the system
(d) mass crosses the boundary but not the energy

(e) thermodynamic reactions do not occur.
Answer: c

35. According to which law, all perfect gases change in volume by l/273th of their original volume at 0°C for every 1°C change in temperature when pressure remains constant
(a) Joule's law
(b) Boyle's law
(c) Regnault's law
(d) Gay-Lussac law
(e) Charles' law.

Answer: e

36. Gases have
(a) only one value of specific heat
(b) two values of specific heat
(c) three values of specific heat

(d) no value of specific heat
(e) under some conditions one value and sometimes two values of specific heat.
Answer: b

37. According to Avogadro's Hypothesis
(a) the molecular weights of all the perfect gases occupy the same volume under same conditions of pressure and temperature
(b) the sum of partial pressure of mixture of two gases is sum of the two
(c) product of the gas constant and the molecular weight of an ideal gas is constant
(d) gases have two values of specific heat
(e) all systems can be regarded as closed systems.
Answer: a

38. Extensive property of a system is one whose value
(a) depends on the mass of the system like volume
(b) does not depend on the mass of the system, like temperature, pressure, etc.
(c) is not dependent on the path followed but on the state
(d) is dependent on the path followed and not on the state
(e) is always constant.
Answer: a

39. Work done in a free expansion process is
(a) + ve
(b) -ve
(c) zero
(d) maximum
(e) minimum.
Answer: c

40. The statement that molecular weights of all gases occupy the same volume is known as
(a) Avogadro's hypothesis
(b) Dalton's law
(c) Gas law
(d) Law of thermodynamics
(e) Joule's law.
Answer: a

41. To convert volumetric analysis to gravimetric analysis, the relative volume of each constituent of the flue gases is
(a) divided by its molecular weight
(b) multiplied by its molecular weight

(c) multiplied by its density
(d) multiplied by its specific weight
(e) divided by its specific weight.
Answer: b

42. If a gas is heated against a pressure, keeping the volume constant, then work done will be equal to
(a) + v
(b) – ve
(c) zero
(d) pressure x volume
(e) any where between zero and infinity.
Answer: c

43. An isolated system is one in which
(a) mass does not cross boundaries of the system, though energy may do so
(b) neither mass nor energy crosses the boundaries of the system
(c) both energy and mass cross the boundaries of the system

(d) mass crosses the boundary but not the energy
(e) thermodynamic reactions do not occur.
Answer: b

44. Properties of substances like pressure, temperature and density, in thermodynamic coordinates are
(a) path functions
(b) point functions
(c) cyclic functions
(d) real functions
(e) thermodynamic functions.
Answer: b

45. Which of the following quantities is not the property of the system
(a) pressure
(b) temperature
(c) specific volume
(d) heat
(e) density.
Answer: d

46. According to Avogadro's law, for a given pressure and temperature, each molecule of a gas
(a) occupies volume proportional to its molecular weight

(b) occupies volume proportional to its specific weight
(c) occupies volume inversely proportional to its molecular weight
(d) occupies volume inversely proportional to its specific weight
(e) occupies same volume.
Ans: e

47. Mixture of ice and water form a
(a) closed system
(b) open system
(c) isolated system
(d) heterogeneous system
(e) thermodynamic system.
Answer: d

48. Which of the following is the property of a system
(a) pressure and temperature
(b) internal energy
(c) volume and density
(d) enthalpy and entropy
(e) all of the above.
Ans: e

49. On weight basis, air contains following parts of oxygen
(a) 21
(b) 23
(c) 25
(d) 73
(e) 79.
Answer: b

50. Which of the following is not the intensive property
(a) pressure
(b) temperature
(c) density
(d) heat
(e) specific volume.
Answer: d

51. Which of the following items is not a path function
(a) heat
(b) work

(c) kinetic energy
(d) vdp
(e) thermal conductivity.
Ans: e

52. Work done in an adiabatic process between a given pair of end states depends on
(a) the end states only
(b) particular adiabatic process
(c) the value of index n
(d) the value of heattransferred
(e) mass of the system.
Answer: a

53. Heat and work are
(a) point functions
(b) system properties
(c) path functions
(d) intensive properties
(e) extensive properties.

Answer: c

54. Which of the following parameters is constant for a mole for most of the gases at a given temperature and pressure
(a) enthalpy
(b) volume
(c) mass
(d) entropy
(e) specific volume.
Answer: b

55. The value of n = 1 in the polytropic process indicates it to be
(a) reversible process
(b) isothermal process
(c) adiabatic process
(d) irreversible process
(e) free expansion process.
Answer: b

56. Solids and liquids have
(a) one value of specific heat (ft) two values of specific heat
(c) three values of specific heat

(d) no value of specific heat
(e) one value under some conditions and two values under other conditions.
Answer: a

57. A perfect gas at 27°C is heated at constant pressure till its volume is double. The final temperature is
(a) 54°C
(b) 327°C
(c) 108°C

(d) 654°C
(e) 600°C
Answer: b

58. Curve A in Fig. 1.1 compared to curves B and C shows the following type of expansion
(a) pV"=C
(b) isothermal
(c) adiabatic
(d) free expansion
(e) throttling.
Answer: b

59. If value of n is infinitely large in a polytropic process pV" = C, then the process is known as constant
(a) volume
(b) pressure
(c) temperature
(d) enthalpy
(e) entropy.
Answer: a

60. The index of compression n tends to reach ratio of specific heats y when
(a) flow is uniform and steady
(b) process is isentropic
(c) process is isothermal

(d) process is isentropic and specific heat does not change with temperature
(e) process is isentropic and specific heat changes with temperature.
Answer: d

61. Change in enthalpy of a system is the heat supplied at
(a) constant pressure

(b) constant temperature
(c) constant volume
(d) constant entropy
(e) N.T.P. condition.
Answer: a

62. The term N.T.P. stands for
(a) nominal temperature and pressure
(b) natural temperature and pressure
(c) normal temperature and pressure
(d) normal thermodynamic practice
(e) normal thermodynamic pressure.
Answer: c

63. A heat exchange process in which the product of pressure and volume remains constant is known as
(a) heat exchange process
(b) throttling process
(c) isentropic process
(d) adiabatic process
(e) hyperbolic process.
Ans: e

64. In an isothermal process, the internal energy of gas molecules
(a) increases
(b) decreases
(c) remains constant
(d) may increase/decrease depending on the properties of gas
(e) shows unpredictable behaviour.
Answer: c

65. Zeroth law of thermodynamics
(a) deals with conversion of mass and energy
(b) deals with reversibility and irreversibility of process
(c) states that if two systems are both in equilibrium with a third system, they are in thermal equilibrium with each other
(d) deals with heat engines
(e) does not exist.
Answer: c

66. If a certain amount of dry ice is mixed with same amount of water at 80°C, the final temperature of mixture will be

(a) 80°C
(b) 0°C
(c) 40°C

(d) 20°C
(e) 60°C.
Answer: b

67. The basis for measuring thermodynamic property of temperature is given by
(a) zeroth law of thermodynamics
(b) first law of thermodynamics
(c) second law of thermodynamics
(d) third law of thermodynamics
(e) Avogadro's hypothesis.
Answer: a

68. One watt is equal to
(a) 1 Nm/s
(b) 1 N/mt
(c) 1 Nm/hr
(d) 1 kNm/hr
(e) 1 kNm/mt.
Answer: a

69. Work done is zero for the following process
(a) constant volume
(b) free expansion
(c) throttling
(d) all Of the above
(e) none of the above.
Answer: d

70. For which of the following substances, the gas laws can be used with minimum error
(a) dry steam
(b) wet steam
(c) saturated steam
(d) superheated steam
(e) steam at atmospheric pressure.
Answer: d

71. In a non-flow reversible process for which p = (- 3V+ 15) x 105N/m2,V changes from 1 m to 2 m3. The work done will be about

(a) 100 xlOO5 joules

(b) lxlO5 joules

(c) 10 xlO5 joules

(d) 10 xlO5 kilo joules

(e) 10xl04kiojoules.

Answer: c

72. The value of the product of molecular weight and the gas characteristic constant for all the gases in M.K.S. unit is

(a) 29.27 kgfm/mol°K

(b) 8314kgfm/mol°K

(c) 848kgfm/mol°K

(d) 427kgfm/mol°K

(e) 735 kgfm/mol°K.

Answer: c

73. On volume basis, air contains following parts of oxygen

(a) 21

(b) 23

(c) 25

(d) 77

(e) 79.

Answer: a

74. Universal gas constant is defined as equal to product of the molecular weight of the gas and

(a) specific heat at constant pressure

(b) specific heat at constant volume

(c) ratio of two specific heats

(d) gas constant

(e) unity.

Answer: d

75. The value of the product of molecular weight and the gas characteristic constant for all the gases in S.I. units is

(a) 29.27 J/kmol°K

(b) 83.14J/kmol°K

(c) 848J/kmol°K

(d) All J/kmol °K

(e) 735 J/kmol °K.
Answer: b

76. For which of the following substances, the internal energy and enthalpy are the functions of temperature only
(a) any gas
(b) saturated steam
(c) water
(d) perfect gas
(e) superheated steam.
Answer: d

77. In a free expansion process
(a) work done is zero
(b) heat transfer is zero
(c) both (a) and (b) above
(d) work done is zero but heat increases
(e) work done is zero but heat decreases.
Answer: c

78. If a gas vapour is allowed to expand through a very minute aperture, then such a process is known as
(a) free expansion
(b) hyperbolic expansion
(c) adiabatic expansion
(d) parabolic expansion
(e) throttling.
Ans: e

79. The specific heat of air increases with increase in
(a) temperature
(b) pressure
(c) both pressure and temperature
(d) variation of its constituents
(e) air flow
Answer: a

80. If a fluid expands suddenly into vacuum through an orifice of large dimension, then such a process is called
(a) free expansion

(b) hyperbolic expansion
(c) adiabatic expansion
(d) parabolic expansion
(e) throttling.
Answer: a

81. Which of the following processes are thermodynamically reversible
(a) throttling
(b) free expansion
(c) constant volume and constant pressure
(d) hyperbolic and pV = C
(e) isothermal and adiabatic.
Ans: e

82. Which of the following processes is irreversible process
(a) isothermal
(b) adiabatic
(c) throttling
(d) all of the above
(e) none of the above.
Answer: c

83. In order that a cycle be reversible, following must be satisfied
(a) free expansion or friction resisted expansion/compression process should not be encountered
(b) when heat is being absorbed, temperature of hot source and working sub¬stance should be same
(c) when beat is being rejected, temperature of cold source and working sub-stance should be same
(d) all of the above
(e) none of the above.
Answer: d

84. For a thermodynamic process to be reversible, the temperature difference between hot body and working substance should be
(a) zero
(b) minimum
(d) maximum
(d) infinity
(e) there is no such criterion.

Answer: a

85. Minimum work in compressor is possible when the value of adiabatic index n is equal to
(a) 0.75
(b) 1
(c) 1.27

(d) 1.35
(e) 2.
Answer: b

86. Molecular volume of any perfect gas at 600 x 103 N/m2 and 27°C will be
(a) 4.17m3/kgmol
(b) 400 m3/kg mol
(c) 0.15 m3/kg mol
(d) 41.7 m3/kg mol
(e) 417m3/kgmol.
Answer: a

87. A gas is compressed in a cylinder by a movable piston to a volume one-half its original volume. During the process 300 kJ heat left the gas and internal energy remained same. The work done on gas in Nm will be
(a) 300 Nm
(b) 300,000 Nm
(c) 30 Nm
(d) 3000 Nm
(e) 30,000 Nm.
Answer: b

88. The more effective way of increasing efficiency of Carnot engine is to
(a) increase higher temperature
(b) decrease higher temperature
(c) increase lower temperature
(d) decrease lower temperature
(e) keep lower temperature constant.
Answer: d

89. Entropy change depends on

(a) heat transfer
(b) mass transfer
(c) change of temperature
(d) thermodynamic state
(e) change of pressure and volume.
Answer: a

90. For reversible adiabatic process, change in entropy is
(a) maximum
(b) minimum
(c) zero

(d) unpredictable
(e) negative.
Answer: c

91. Isochoric process is one in which
(a) free expansion takes place
(b) very little mechanical work is done by the system
(c) no mechanical work is done by the system
(d) all parameters remain constant
(e) mass and energy transfer do not take place.
Answer: c

92. According to first law of thermodynamics
(a) work done by a system is equal to heat transferred by the system
(b) total internal energy of a system during a process remains constant
(c) internal energy, enthalpy and entropy during a process remain constant
(d) total energy of a system remains constant
(e) entropy of a system remains constant.
Answer: d

93. Energy can neither be created nor destroyed but can be converted from one form to other is inferred from
(a) zeroth low of thermodynamic
(b) first law of thermodynamics
(c) second law to thermodynamics
(d) basic law of thermodynamics
(e) claussius statement.
Answer: b

94. First law of thermodynamics furnishes the relationship between
(a) heat and work
(b) heat, work and properties of the system
(c) various properties of the system
(d) various thermodynamic processes
(e) heat and internal energy.
Answer: b

95. Change in enthalpy in a closed system is equal to heat transferred if the reversible process takes place at constant
(a) pressure
(b) temperature

(c) volume
(d) internal energy
(e) entropy.
Answer: a

96. In an isothermal process, the internal energy
(a) increases
(b) decreases
(c) remains constant
(d) first increases and then decreases
(e) first decreases and then increases.
Answer: c

97. Change in internal energy in a closed system is equal to heat transferred if the reversible process takes place at constant
(a) pressure
(b) temperature
(c) volume
(d) internal energy
(e) entropy.
Answer: c

98. According to first law of thermodynamics
(a) mass and energy are mutually convertible
(b) Carnot engine is most efficient

(c) heat and work are mutually convertible
(d) mass and light are mutually convertible
(e) heat flows from hot substance to cold substance.
Answer: c

99. Total heat of a substance is also known as
(a) internal energy
(b) entropy
(c) thermal capacity
(d) enthalpy
(e) thermal conductance.
Answer: d

100. First law of thermodynamics
(a) enables to determine change in internal energy of the system
(b) does not help to predict whether the system will or not undergo a change

(c) does not enable to determine change in entropy
(d) provides relationship between heat, work and internal energy
(e) all of the above.
Ans: e

101. Addition of heat at constant pressure to a gas results in
(a) raising its temperature
(b) raising its pressure
(c) raising its volume
(d) raising its temperature and doing external work
(e) doing external work.
Answer: d

102. Carnot cycle has maximum efficiency for
(a) reversible engine
(b) irreversible engine
(c) new engine
(d) petrol engine
(e) diesel engine.
Answer: a

103. Measurement of temperature is based on

(a) thermodynamic properties
(b) zeroth law of thermodynamics
(c) first law of thermodynamics
(d) second law of thermodynamics
(e) joule's law.
Answer: b

104. Carnot cycle efficiency depends upon
(a) properties of the medium/substance used
(b) condition of engine
(c) working condition
(d) temperature range of operation
(e) effectiveness of insulating material around the engine.
Answer: d

105. Carnot cycle efficiency is maximum when
(a) initial temperature is 0°K
(b) final temperature is 0°K
(c) difference between initial and final temperature is 0°K
(d) final temperature is 0°C

(e) initial temperature is minimum possible.
Answer: b

106. An engine operates between temperatures of 900°Kandr2 and another engine between T2 and 400°K For both to do equal work, value of T2 will be
(a) 650°K
(b) 600°K
(c) 625°K
(d) 700°K
(e) 750°K.
Answer: a

107. If heat be exchanged in a reversible manner, which of the following property of the working substance will change accordingly
(a) temperature
(b) enthalpy
(c) internal energy
(d) entropy
(e) all of the above.

Answer: d

108. If a system after undergoing a series of processes, returns to the initial state then
(a) process is thermodynamically in equilibrium
(b) process is executed in closed system cycle
(c) its entropy will change due to irreversibility
(d) sum of heat and work transfer will be zero
(e) no work will be done by the system.
Answer: d

109. Which of the following represents the perpetual motion of the first kind
(a) engine with 100% thermal efficiency
(b) a fully reversible engine
(c) transfer of heat energy from low temperature source to high temperature source
(d) a machine that continuously creates its own energy
(e) production of energy by temperature differential in sea water at different levels.
Ans:

110. An actual engine is to be designed having same efficiency as the Carnot cycle. Such a proposition is
(a) feasible
(b) impossible

(c) possible
(d) possible, but with lot of sophistications
(e) desirable.
Answer: d

112. A manufacturer claims to have a heat engine capable of developing 20 h.p. by receiving heat input of 400 kcal/mt and working between the temperature limits of 227° C and 27° C. His claim is
(a) justified
(b) not possible
(c) may be possible with lot of sophistications
(d) cost will be very high
(e) theroretically possible.
Answer: b

113. In a Carnot cycle, heat is transferred at

(a) constant pressure
(b) constant volume
(c) constant temperature
(d) constant enthaply
(e) any one of the above.
Answer: c

114. A diathermic wall is one which
(a) prevents thermal interaction
(b) permits thermal interaction
(c) encourages thermal interaction
(d) discourages thermal interaction
(e) does not exist.
Answer: b

115. An adiabatic wall is one which
(a) prevents thermal interaction
(b) permits thermal interaction
(c) encourages thermal interaction
(d) discourages thermal interaction
(e) dos not exist.
Answer: a

116. The door of a running refrigerator inside a room was left open. Which of the following statements is correct?
(a) The room will be cooled to the temperature inside the refrigerator.

(b) The room will be cooled very slightly.
(c) The room will be gradually warmed up.
(d) The temperature of the air in room will remain unaffected.
(e) any one of above is possible depending on the capacity.
Answer: c

117. Compressed air coming out from a punctured football
(a) becomes hotter
(b) becomes cooler1
(c) remains at the same temperature
(d) may become hotter or cooler depend-ing upon the humidity of the surround¬ing air
(e) attains atmospheric temperature.

Answer: b

118. Water contained in a beaker can be made to boil by passing steam through it
(a) at atmospheric pressure
(b) at a pressure below the firuosphejric pressure
(c) at a pressure greater than atmospheric pressure
(d) any pressure
(e) not possible.
Answer: c

119. During throttling process
(a) heat exchange does not take place
(b) no work is done by expanding steam
(c) there is no change of internal energy of steam
(d) all of the above
(e) entropy decreases.
Answer: d

120. The energy of molecular motion appears as
(a) heat
(b) potential energy
(c) surface tension
(d) friction
(e) increase in pressure.
Answer: a

121. A sudden fall in the barometer reading is a sign of approaching
(a) fine weather
(b) rains

(c) storm
(d) cold wave
(e) hot wave.
Answer: c

122. The unit'of universal gas constant is
(a) watts/°K
(b) dynes/°C
(c) ergscm/°K
(d)erg/°K

(e) none of the above.
Answer: d

123. Calorie is a measure of
(a) specific heat
(b) quantity of heat
(c) thermal capacity
(d)entropy
(e) work.
Answer: b

124. I kgf/cm2 is equal to
(a) 760 mm Hg
(b) zero mm Hg
(c) 735.6 mm Hg
(d) 1 mm Hg
(e) lOOmmHg.
Answer: c

125. Barometric pressure is equal to
(a) 760 mm Hg
(b) zero mm Hg
(c) 735.6 mm Hg
(d) 1 mm Hg
(e) 100mm Hg.
Answer: a

126. One barometric pressure or 1 atmospheric pressure is equal to
(a) 1 kgf/cnr2
(b) 1.033 kgf/cm2
(c) 0 kgf/cm2
(d) 1.0197 kgf/cm2

(e) 100 kgf/cm2.
Answer: b

127. The first law of thermodynamics is the law of
(a) conservation of mass
(b) conservation of energy
(c) conservation of momentum

(d) conservation of heat
(e) conservation of temperature.
Answer: b

128. A perpetual motion machine is
(a) a thermodynamic machine
(b) a non-thermodynamic machine
(c) a hypothetical machine
(d) a hypothetical machine whose opera-tion would violate the laws of thermodynamics
(e) an inefficient machine.
Answer: d

129. Kelvin Planck’s law deals with
(a) conservation of heat
(b) conservation of work
(c) conversion of heat into work
(d) conversion fo work into heat
(e) conservation of mass.
Answer: c

130. According to Clausis statement of second law of thermodynamics
(a) heat can’t be transferred from low temperature source to high temperature source
(b) heat can be transferred for low temperature to high temperature source by using refrigeration cycle.
(c) heat can be transferred from low temperature to high temperature source if COP of process is more than unity
(d) heat can’t be transferred from low temperature to high temperature source without the aid of external energy
(e) all of the above.
Answer: d

131. Thermal power plant works on
(a) Carnot cycle
(b) Joule cycle

(d) Rankine cycle
(d) Otto cycle
(e) Brayton cycle.
Answer: c

132. Which of the following is an irreversible cycle
(a) carnot
(b) Stirling
(c) ericsson
(d) all of the above
(e) none of the above.
Ans: e

133. Otto cycle consists of following four processes
(a) two isothermals and two isentropics
(b) two isentropics and two constant volumes
(c) two isentropics, one constant volume and one constant pressure
(d) two isentropics and two constant pres-sures
(e) none of the above.
Answer: b

134. The efficiency of a Carnot engine depends on
(a) working substance
(b) design of engine
(c) size of engine
(d) type of fuel fired
(e) temperatures of source and sink.
Ans: e

135. For same compression ratio and for same heat added
(a) Otto cycle is more efficient than Diesel cycle
(b) Diesel cycle is more efficient than Otto cycle
(c) efficiency depends on other factors
(d) both Otto and Diesel cycles are equally efficient
(e) none of the above.
Answer: a

136. The efficiency of Carnot cycle is maximum for
(a) gas engine
(b) well lubricated engine
(c) petrol engine
(d) steam engine

(e) reversible engine.

Ans: e

137. Carnot cycle is
(a) a reversible cycle (ft) an irreversible cycle
(c) a semi-reversible cycle
(d) a quasi static cycle
(e) an adiabatic irreversible cycle.
Answer: a

138. Diesel cycle consists of following four processes
(a) two isothermals and two isentropics
(b) two isentropics, and two constant volumes.
(c) two isentropics, one constant volume and one constant pressure
(d) two isentropics and two constant pressures
(e) none of the above.
Answer: c

139. If both Stirling and Carnot cycles operate within the same temperature limits, then efficiency of Stirling cycle as compared to Carnot cycle
(a) more
(b) less
(c) equal
(d) depends on other factors
(e) none of the above.
Answer: c

140. Stirling and Ericsson cycles are
(a) reversible cycles
(b) irreversible cycles
(c) quasi-static cycles
(d) semi-reversible cycles
(e) adiabatic irreversible cycles.
Answer: a

141. A cycle consisting of two adiabatics and two constant pressure processes is known as
(a) Otto cycle
(b) Ericsson cycle
(c) Joule cycle
(d) Stirling cycle

(e) Atkinson cycle.

Answer: c

142. Reversed joule cycle is called
(a) Carnot cycle
(b) Rankine cycle
(c) Brayton cycle
(d) Bell Coleman cycle
(e) Dual cycle.
Answer: c

143. Brayton cycle consists' of following four processes
(a) two isothermals and two isentropics
(b) two isentropics and two constant volumes
(c) two isentropics, one constant volume and one constant pressure
(d) two isentropics and two constant pres-sures
(e) none of the above.
Answer: d

144. Which of the following cycles is not a reversible cycle
(a) Carnot
(b) Ericsson
(c) Stirling
(d) Joule
(e) none of the above.
Ans: e

145. The cycle in which heat is supplied at constant volume and rejected at constant pressure is known as
(a) Dual combustion cycle
(b) Diesel cycle
(c) Atkinson cycle
(d) Rankine cycle
(e) Stirling cycle.
Answer: c

146. The efficiency of Diesei cycle with decrease in cut off
(a) increases
(b) decreases

(c) remains unaffected
(d) first increases and then decreases
(e) first decreases and then increases.
Answer: a

147. Which of the following cycles has maximum efficiency
(a) Rankine
(b) Stirling
(c) Carnot
(d) Brayton
(e) Joule.
Answer: c

148. The ideal efficiency of a Brayton cycle without regeneration with increase ni pressure ratio will
(a) increase
(b) decrease
(c) remain unchanged
(d) increase/decrease depending on application
(e) unpredictable.
Answer: a

149. The ideal efficiency of a Brayton cycle with regeneration, with increase in pressure ratio will
(a) increase
(b) decrease
(c) remain unchanged
(d) increase/decrease depending on ap-plication
(e) unpredictable. ”
Answer: b

150. The following cycle is used for air craft refrigeration
(a) Brayton cycle
(b) Joule cycle
(c) Carnot cycle
(d) Bell-Coleman cycle
(e) Reversed-Brayton cycle.
Ans: e