

Refrigeration and Air Conditioning

1. Pick up the wrong statement. A refrigerant should have

- (a) Low specific heat of liquid
- (b) high boiling point
- (c) high latent heat of vaporisation
- (d) higher critical temperature
- (e) low specific volume of vapour.

Ans: b

2. A standard ice point temperature corresponds to the temperature of

- (a) water at 0°C
- (b) ice at - 4°C
- (c) solid and dry ice
- (d) mixture of ice, water and vapour under equilibrium conditions under NTP conditions
- (e) mixture of ice and water Under equilibrium conditions.

Ans: e

3. Vapour compression refrigeration is some what like

- (a) Carnot cycle
- (b) Rankine cycle
- (c) reversed Carnot cycle
- (d) reversed Rankine cycle
- (e) none of the above.

Ans: e

4. Which of the following cycles uses air as the refrigerant

- (a) Ericsson
- (b) Stirling
- (c) Carnot
- (d) Bell-coleman
- (e) none of the above.

Ans: d

5. Ammonia-absorption refrigeration cycle requires

- (a) very little work input
- (b) maximum work input
- (c) nearly same work input as for vapour compression cycle
- (d) zero work input
- (e) none of the above.

Ans: a

6. An important characteristic of absorption system of refrigeration is

- (a) noisy operation
- (b) quiet operation
- (c) cooling below 0°C
- (d) very little power consumption
- (e) its input only in the form of heating.

Ans: b

The relative coefficient of performance is

- (a) actual COP/theoretical COP
- (b) theoretical COP/actual COP
- (c) actual COP x theoretical COP
- (d) 1-actual COP x theoretical COP

(e) 1-actual COP/theoretical COP.

Ans: a

8. Clapeyron equation is a relation between

- (a) temperature, pressure and enthalpy
- (b) specific volume and enthalpy
- (c) temperature and enthalpy
- (d) temperature, pressure, and specific volume
- (e) temperature, pressure, specific volume and enthalpy.

Ans: e

19. Clapeyron equation is applicable for registration at

- (a) saturation point of vapour
- (b) saturation point of liquid
- (c) sublimation temperature
- (d) triple point
- (e) critical point.

Ans: a

10. In vapour compression cycle, the condition of refrigerant is saturated liquid

- (a) after passing through the condenser
- (b) before passing through the condenser
- (c) after passing through the expansion throttle valve
- (d) before entering the expansion valve
- (e) before entering the compressor.

Ans: a

11. In vapour compression cycle, the condition of refrigerant is very wet vapour

- (a) after passing through the condenser
- (b) before passing through the condenser
- (c) after passing through the expansion or throttle valve
- (d) before entering the expansion valve
- (e) before entering the compressor.

Ans: e

12. In vapour compression cycle, the condition of refrigerant is high pressure saturated liquid

- (a) after passing through the condenser
- (b) before passing through the condenser
- (c) after passing through the expansion or throttle valve
- (d) before entering the expansion valve
- (e) before entering the compressor.

Ans: d

13. In vapour compression cycle the condition of refrigerant is superheated vapour

- (a) after passing through the condenser
- (b) before passing through the condenser
- (c) after passing through the expansion or throttle valve
- (d) before entering the expansion valve
- (e) before entering the compressor.

Ans: b

14. In vapour compression cycle the condition of refrigerant is dry saturated vapour

- (a) after passing through the condenser
- (b) before passing through the condenser
- (c) after passing through the expansion or throttle valve
- (d) before entering the expansion valve

(e) before entering the compressor..

Ans: e

15. The boiling point of ammonia is

- (a) -100°C
- (b) -50°C
- (c) -33.3°C
- (d) 0°C
- (e) 33.3°C .

Ans: c

16. One ton of refrigeration is equal to the refrigeration effect corresponding to melting of 1000 kg of ice

- (a) in 1 hour
- (b) in 1 minute
- (c) in 24 hours
- (d) in 12 hours
- (e) in 10 hours.

Ans: c

17. One ton refrigeration corresponds to

- (a) 50 kcal/min
- (b) 50 kcal/kr
- (c) 80 kcal/min
- (d) 80 kcal/hr
- (e) 1000 kcal/day.

Ans: a

18. In S.J. unit, one ton of refrigeration is equal to

- (a) 210 kJ/min
- (b) 21 kJ/min
- (c) 420 kJ/min
- (d) 840 kJ/min
- (e) 105 kJ/min.

Ans: a

19. The vapour compression refrigerator employs the following cycle

- (a) Rankine
- (b) Carnot
- (c) Reversed Rankine
- (d) Brayton
- (e) Reversed Carnot.

Ans: e

20. Allowable pressure on high-pressure side or ammonia absorption system is of the order of

- (a) atmospheric pressure
- (b) slightly above atmospheric pressure
- (c) 2-4 bars
- (d) 5-6 bars
- (e) 7-10 bars.

Ans: d

21. The moisture in a refrigerant is removed by

- (a) evaporator
- (b) safety relief valve
- (c) dehumidifier

- (d) driers
- (e) expansion valve

Ans: d

22. The condensing pressure due to the presence of non-condensable gases, as compared to that actually required for condensing temperatures without non-condensable gases,

- (a) will be higher
- (b) will be lower
- (c) will remain unaffected
- (d) may be higher or lower depending upon the nature of non-condensable gases
- (e) unpredictable.

Ans: a

23. Critical pressure of a liquid is the pressure

- (a) above which liquid will remain liquid
- (b) above which liquid becomes gas
- (c) above which liquid becomes vapour
- (d) above which liquid becomes solid
- (e) at which all the three phases exist together.

Ans: a

24. Critical temperature is ' the temperature above which

- (a) a gas will never liquefy
- (b) a gas will immediately liquefy
- (c) water will evaporate
- (d) water will never evaporate
- (e) none of the above.

Ans: a

25. The refrigerant for a refrigerator should have

- (a) high sensible heat
- (b) high total heat
- (c) high latent heat
- (d) low latent heat
- (e) low sensible heat

Ans: c

26. Rating of a domestic refrigerator is of the order of

- (a) 0.1 ton
- (b) 5 tons
- (c) 10 tons
- (d) 40 tons
- (e) 100 tons.

Ans: a

27. The COP of a domestic refrigerator

- (a) is less than 1
- (b) is more than 1
- (c) is equal to 1
- (d) depends upon the make
- (e) depends upon the weather conditions.

Ans: b

28. The domestic refrigerator uses following type of compressor

- (a) centrifugal
- (b) axial

- (c) miniature sealed unit
 - (d) piston type reciprocating
 - (e) none of the above.
- Ans: d

29. Presence of moisture in a refrigerant affects the working of
- (a) compressor
 - (b) condenser
 - (c) evaporator
 - (d) expansion valve.
 - (e) heat transfer.
- Ans: d

30. Refrigeration in aeroplanes usually employs the following refrigerant
- (a) Co₂
 - (b) Freon-11
 - (c) Freon-22
 - (d) Air
 - (e) none of the above.
- Ans: d

31. Domestic refrigerator working on vapour compression cycle uses the following type of expansion device
- (a) electrically operated throttling valve
 - (b) manually operated valve
 - (c) thermostatic valve
 - (d) capillary tube
 - (e) expansion valve.
- Ans: d

32. Air refrigeration operates on
- (a) Carnot cycle
 - (b) Reversed Carnot cycle
 - (c) Rankine cycle
 - (d) Ericsson cycle
 - (e) Brayton cycle.
- Ans: e

33. Air refrigeration cycle is used in
- (a) domestic refrigerators
 - (b) commercial refrigerators
 - (c) air conditioning
 - (d) gas liquefaction
 - (e) such a cycle does not exist.
- Ans: d

34. In a vapour compression cycle, the refrigerant immediately after expansion valve is
- (a) liquid
 - (b) sub-cooled liquid
 - (c) saturated liquid
 - (d) wet vapour
 - (e) dry vapour.
- Ans: d

35. The vapour pressure of refrigerant should be
- (a) lower than atmospheric pressure
 - (b) higher than atmospheric pressure

- (c) equal to atmospheric pressure
 - (d) could be anything
 - (e) none of the above.
- Ans: b

36. For better COP of refrigerator, the pressure range corresponding to temperature in evaporator and condenser must be
- (a) small
 - (b) high
 - (c) equal
 - (d) anything
 - (e) under some conditions small and under some conditions high.
- Ans: a

37. The bank of tubes at the back of domestic refrigerator are
- (a) condenser tubes
 - (b) evaporator tubes
 - (c) refrigerant cooling tubes
 - (d) capillary tubes
 - (e) throttling device.
- Ans: a

38. The higher temperature in vapour compression cycle occurs at
- (a) receiver
 - (b) expansion valve
 - (c) evaporator
 - (d) condenser discharge
 - (e) compressor discharge.
- Ans: e

39. Highest temperature encountered in refrigeration cycle should be
- (a) near critical temperature of refrigerant
 - (b) above critical temperature
 - (c) at critical temperature
 - (d) much below critical temperature
 - (e) could be anywhere.
- Ans: d

40. In refrigerator, liquid receiver is required between condenser and flow controlling device, if quantity of refrigerant for system is
- (a) less than 2 kg
 - (b) more than or equal to 3.65 kg
 - (c) more than 10 kg
 - (d) there is no such consideration
 - (e) none of the above.
- Ans: b

41. Absorption system normally uses the following refrigerant
- (a) Freon-11
 - (b) Freon-22
 - (c) CO₂
 - (d) SO₂
 - (e) ammonia.
- Ans: e

42. One of the purposes of sub-cooling the liquid refrigerant is to
- (a) reduce compressor overheating

- (b) reduce compressor discharge temperature
- (c) increase cooling effect
- (d) ensure that only liquid and not the vapour enters the expansion (throttling) valve
- (e) none of the above.

Ans: d

43. The value of COP in vapour compression cycle is usually

- (a) always less than unity
- (b) always more than unity
- (c) equal to unity
- (d) any one of the above
- (e) none of the above.

Ans: b

44. In a refrigeration system, heat absorbed in comparison to heat rejected is

- (a) more
- (b) less
- (c) same
- (d) more for small capacity and less for high capacity
- (e) less for small capacity and more for high capacity.

Ans: b

45. Condensing temperature in a refrigerator is the temperature

- (a) of cooling medium
- (b) of freezing zone
- (c) of evaporator
- (d) at which refrigerant gas becomes liquid
- (e) condensing temperature of ice.

Ans: d

46. Formation of frost on evaporator in refrigerator

- (a) results in loss of heat due to poor heat transfer
- (b) increases heat transfer rate
- (c) is immaterial
- (d) can be avoided by proper design
- (e) decreases compressor power.

Ans: a

47. In refrigerators, the temperature difference between the evaporating refrigerant and the medium being cooled should be

- (a) high, of the order of 25°
- (b) as low as possible (3 to 11°C)
- (c) zero
- (d) any value
- (e) none of the above.

Ans: b

48. In a flooded evaporator refrigerator, an accumulator at suction of compressor is used to

- (a) collect liquid refrigerant and prevent it from going to compressor
- (b) detect liquid in vapour
- (c) superheat the vapour
- (d) collect vapours
- (e) increase refrigeration effect.

Ans: a

49. Accumulators should have adequate volume to store refrigerant charge at least

- (a) 10%
- (b) 25%
- (c) 50%
- (d) 75%
- (e) 100%.

Ans: c

50. At lower temperatures and pressures, the latent heat of vaporisation of a refrigerant

- (a) decreases
- (b) increases
- (c) remains same
- (d) depends on other factors
- (e) none of the above.

Ans: b

51. A refrigeration cycle operates between condenser temperature of + 27°C and evaporator temperature of- 23°C. The Carnot coefficient of performance of cycle will be

- (a) 0.2
- (b) 1.2
- (c) 5
- (d) 6
- (e) 10.

Ans: c

52. Which of the following is not a desirable property of a refrigerant

- (a) high miscibility with oil
- (b) low boiling point
- (c) good electrical conductor
- (d) large latent heat
- (e) non-flammable.

Ans: c

53. In vapour compression refrigeration system, refrigerant occurs as liquid between

- (a) condenser and expansion valve
- (b) compressor and evaporator
- (c) expansion valve and evaporator
- (d) compressor and condenser
- (e) none of the above.

Ans: c

54. Pick up the correct statement about giving up of heat from one medium to other in ammonia absorption system

- (a) strong solution to weak solution
- (b) weak solution to strong solution
- (c) strong solution to ammonia vapour
- (d) ammonia vapour to weak solution
- (e) ammonia vapour to strong solution.

Ans: b

55. Efficiency of a Carnot engine is given as 80%. If the cycle direction be reversed, what will be the value of COP of reversed Carnot cycle

- (a) 1.25
- (b) 0.8
- (c) 0.5
- (d) 0.25
- (e) none of the above.

Ans: d

56. Highest pressure encountered in a refrigeration system should be

- (a) critical pressure of refrigerant
- (b) much below critical pressure
- (c) much above critical pressure
- (d) near critical pressure
- (e) there is no such restriction.

Ans: b

57. If a heat pump cycle operates between the condenser temperature of $+27^{\circ}\text{C}$ and evaporator temperature of -23°C , then the Carnot COP will be

- (a) 0.2
- (b) 1.2
- (c) 5
- (d) 6
- (e) 10.

Ans: d

58. A certain refrigerating system has a normal operating suction pressure of 10 kg/cm gauge and condensing pressure of about 67 kg/cm. The refrigerant used is

- (a) Ammonia
- (b) Carbon dioxide
- (c) Freon
- (d) Brine
- (e) Hydrocarbon refrigerant.

Ans: b

59. Aqua ammonia is used as refrigerant in the following type of refrigeration system

- (a) compression
- (b) direct
- (c) indirect
- (d) absorption
- (e) none of the above.

Ans: d

60. If the evaporator temperature of a plant is lowered, keeping the condenser temperature constant, the h.p. of compressor required will be

- (a) same
- (b) more
- (c) less
- (d) more/less depending on rating
- (e) unpredictable.

Ans: b

61. In a refrigeration cycle, the flow of refrigerant is controlled by

- (a) compressor
- (b) condenser
- (c) evaporator
- (d) expansion valve
- (e) all of the above.

Ans: d

62. Where does the lowest temperature occur in a vapour compression cycle ?

- (a) condenser
- (b) evaporator
- (c) compressor
- (d) expansion valve

(e) receiver.

Ans: b

63. The leaks in a refrigeration system using Freon are detected by

- (a) halide torch which on detection produces greenish flame lighting
- (b) sulphur sticks which on detection gives white smoke
- (c) using reagents
- (d) smelling
- (e) sensing reduction in pressure.

Ans: a

64. rick up the incorrect statement

- (a) lithium bromide used in vapour absorption cycle is nonvolatile
- (b) lithium bromide plant can't operate below 0°C
- (c) a separator is used in lithium bromide plant to remove the unwanted water vapour by condensing
- (d) concentration of solution coming out of lithium bromide generator is more in comparison to that entering the generator
- (e) weak solution in liquid heat exchanger gives up heat to the strong solution.

Ans: c

65. The lower horizontal line of the refrigeration cycle plotted on pressure-enthalpy-diagram represents

- (a) condensation of the refrigerant vapour
- (b) evaporation of the refrigerant liquid
- (c) compression of the refrigerant vapour
- (d) metering of the refrigerant liquid
- (e) none of the above.

Ans: b

66. Mass flow ratio of NH₃ in comparison to Freon-12 for same refrigeration load and same temperature limits is of the order of

- (a) 1 : 1
- (b) 1 : 9
- (c) 9 : 1
- (d) 1 : 3
- (e) 3 : 1

Ans: b

67. Freon group of refrigerants are

- (a) inflammable
- (d) toxic
- (c) non-inflammable and toxic
- (d) non-toxic and inflammable
- (e) non-toxic and non-inflammable.

Ans: e

68 Ammonia is

- (a) non-toxic
- (b) non-inflammable
- (c) toxic and non-inflammable
- (d) highly toxic and inflammable
- (e) none of the above.

Ans: d

69. In vapour compression cycle using NH₃ as refrigerant, initial charge is filled at

- (a) suction of compressor

- (b) delivery of compressor
- (c) high pressure side close to receiver
- (d) low pressure side near receiver
- (e) anywhere in the cycle.

Ans: c

70. Short horizontal lines on pressure-enthalpy chart show

- (a) constant pressure lines
- (b) constant temperature lines
- (c) constant total heat lines
- (d) constant entropy lines
- (e) constant volume lines.

Ans: a

71. On the pressure-enthalpy diagram, condensation and desuperheating is represented by a horizontal line because the process

- (a) involves no change in volume
- (b) takes place at constant temperature
- (c) takes place at constant entropy
- (d) takes place at constant enthalpy
- (e) takes place at constant pressure.

Ans: e

72. One ton of the refrigeration is

- (a) the standard unit used in refrigeration problems
- (b) the cooling effect produced by melting 1 ton of ice
- (c) the refrigeration effect to freeze 1 ton of water at 0°C into ice at 0°C in 24 hours
- (d) the refrigeration effect to produce 1 ton of ice at NTP conditions
- (e) the refrigeration effect to produce 1 ton of ice in 1 hour time.

Ans: c

73. Superheating in a refrigeration cycle

- (a) increases COP
- (b) decreases COP
- (c) COP remains unaltered
- (d) other factors decide COP
- (e) unpredictable.

Ans: b

74. For proper refrigeration in a cabinet, if the temperature and vapour pressure difference between cabinet and atmosphere is high, then

- (a) bigger cabinet should be used
- (b) smaller cabinet should be used
- (c) perfectly tight vapour seal should be used
- (d) refrigerant with lower evaporation temperature should be used
- (e) refrigerant with high boiling point must be used.

Ans: c

75. Choose the correct statement

- (a) A refrigerant should have low latent heat
- (b) If operating temperature of system is low, then refrigerant with low boiling point should be used
- (c) Precooling and subcooling of refrigerant are same
- (d) Superheat and sensible heat of a refrigerant are same
- (e) Refrigerant is inside the lube in case of a direct-expansion chiller.

Ans: b

76. The suction pipe diameter of refrigerating unit compressor in comparison to delivery side is

- (a) bigger
- (b) smaller
- (c) equal
- (d) smaller/bigger depending on capacity
- (e) unpredictable.

Ans: a

77. Moisture in freon refrigeration system causes

- (a) ineffective refrigeration
- (b) high power consumption
- (c) freezing automatic regulating valve
- (d) corrosion of whole system
- (e) breakdown of refrigerant.

Ans: c

78. The advantage of dry compression is that

- (a) it permits higher speeds to be used
- (b) it permits complete evaporation in the evaporator
- (c) it results in high volumetric and mechanical efficiency
- (d) all of the above
- (e) none of the above.

Ans: d

79. Choose the wrong statement

- (a) Temperature of medium being cooled must be below that of the evaporator
- (b) Refrigerant leaves the condenser as liquid
- (c) All solar thermally operated absorption systems are capable only of intermittent operation
- (d) frost on evaporator reduces heat transfer
- (e) refrigerant is circulated in a refrigeration system to transfer heat.

Ans: a

80. Under-cooling in a refrigeration cycle

- (a) increases COP
- (b) decreases COP
- (c) COP remains unaltered
- (d) other factors decide COP
- (e) unpredictable.

Ans: a

81. For obtaining high COP, the pressure range of compressor should be

- (a) high
- (b) low
- (c) optimum
- (d) any value
- (e) there is no such criterion.

Ans: b

82. The coefficient of performance is the ratio of the refrigerant effect to the

- (a) heat of compression
- (b) work done by compressor
- (c) enthalpy increase in compressor
- (d) all of the above
- (e) none of the above.

Ans: d

83. The C.O.P of a refrigeration cycle with increase in evaporator temperature, keeping condenser temperature constant, will

- (a) increase
- (b) decrease
- (c) remain unaffected
- (d) may increase or decrease depending on the type of refrigerant used
- (e) unpredictable.

Ans: a

84. Vertical lines on pressure-enthalpy chart show constant

- (a) pressure lines
- (b) temperature lines
- (c) total heat lines
- (d) entropy lines
- (e) volume lines.

Ans: c

85. Most of the domestic refrigerators work on the following refrigeration system

- (a) vapour compression
- (b) vapour absorption
- (c) carnot cycle
- (d) electrolux refrigerator
- (e) dual cycle.

Ans: a

86. The general rule for rating refrigeration systems (excepting for CO₂ system) is to approximate following h.p. per ton of refrigeration

- (a) 0.1 to 0.5 h.p. per ton of refrigeration
- (b) 0.5 to 0.8 h.p. per ton of refrigeration
- (c) 1 to 2 h.p. per ton of refrigeration
- (d) 2 to 5 h.p. per ton of refrigeration
- (e) 5 to 10 h.p. per ton refrigeration.

Ans: c

87. Reducing suction pressure in refrigeration cycle

- (a) lowers evaporation temperature
- (b) increases power required per ton of refrigeration
- (c) lowers compressor capacity because vapour is lighter
- (d) reduces weight displaced by piston
- (e) all of the above.

Ans: e

88. Cooling water is required for following equipment in ammonia absorption plant

- (a) condenser
- (b) evaporator
- (c) absorber
- (d) condenser and absorber
- (e) condenser, absorber and separator (rectifier).

Ans: e

89. The refrigeration effect in a dry evaporator compared to flooded evaporator in a similar plant is

- (a) same
- (b) more
- (c) less

- (d) more or less depending on ambient conditions
- (e) unpredictable.

Ans: c

90. The C.O.P. of a refrigeration cycle with lowering of condenser temperature, keeping the evaporator temperature constant, will

- (a) increase
- (b) decrease
- (c) may increase or decrease depending on the type of refrigerant used
- (d) remain unaffected
- (e) unpredictable.

Ans: a

91. Which of the following refrigerants has lowest freezing point

- (a) Freon-12
- (b) NH₃
- (c) CO₂
- (d) Freon-22
- (e) SO₂.

Ans: d

92. The COP of a vapour compression plant in comparison to vapour absorption plant is

- (a) more
- (b) less
- (c) same
- (d) more/less depending on size of plant
- (e) unpredictable.

Ans: a

93. The C.O.P. of a domestic refrigerator in comparison to domestic air conditioner will be

- (a) same
- (b) more
- (c) less
- (d) dependent on weather conditions
- (e) unpredictable.

Ans: c

94. The evolution of heat of solution takes place in ammonia absorption plant when

- (a) ammonia vapour goes into solution
- (b) ammonia vapour is driven out of solution
- (c) lithium bromide mixes with ammonia
- (d) weak solution mixes with strong solution
- (e) lithium bromide is driven out of solution.

Ans: a

95. The change in evaporator temperature in a refrigeration cycle, as compared to change in condenser temperature, influences the value of C.O.P.

- (a) more
- (b) less
- (c) equally.
- (d) unpredictable
- (e) none of the above.

Ans: a