CHAPTER-2 Refrigeration & Air-Conditioning (Answer key)

1. Refrigerator and heat pump

1	2	3
c	d	c

2. Refrigeration Cycles

1	2	3	4	5	6	7	8	9	10
c	c	c	a	a	b	d	b	d	b
11	12	13	14	15	16	17	18	19	20
a	d	b	c	d	a, b	c	c	c	d
21									
b									

3. Refrigerant and Refrigeration Equipments

1	2	3	
d	c	c	

4. Air Conditioning And Human Comfort

1	2	3	4	5	6	7	8	9	10
a	a	c	d	b	d	b	b	d	c
11	12	13	14	15	16				
c	a	b	c	c	a , d				

Solutions

1. Refrigerator and heat pump

1. (c)

One ton of refrigeration is the amount of heat which is required to abstract from one tone of water at 0ºC to produce in to equivalent ice at 0ºC in a day or 24 hrs.

$$\boxed{1\text{ T.R} = 3.5\,\text{kw} = 210\,\text{kJ/min} = 50\,\text{k–cal/min}}$$

2. (d)

Given data:

$T_L = 4^\circ\text{C} = 277^\circ\text{K},\quad Q_1 = 360\,\text{kJ/min} = 6\,\text{kJ/sec}$

$W = 2\,\text{kW}$

$$\text{C.O.P} = \frac{Q_1}{W} = \frac{6}{2} = 3$$

3. (c)

Given data:

$T_H = 27^\circ\text{C} = 300^\circ\text{K}$

$T_L = -23^\circ\text{C} = 250^\circ\text{K}$

$$\text{COP} = \frac{T_L}{T_H - T_L} = \frac{250}{300 - 250} = 5$$

2.Refrigeration cycles

1. (c)

Bell – coleman cycle is also known as reversed joule or reversed brayton cycle.

2. (c)

Expansion process in throttling device is a isenthalpic process in vapour comp. cycle.

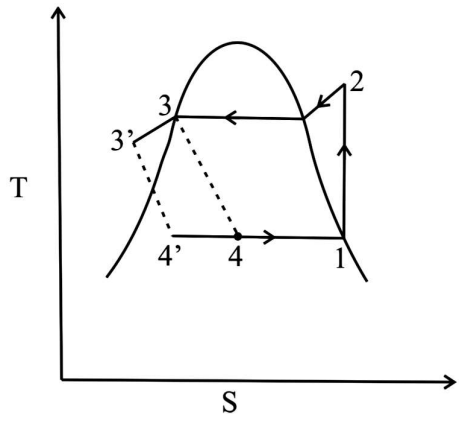
$$\boxed{h_1 = h_2,\quad W_{cv} = 0,\quad \Delta Q = 0}$$

3. (c)

Air refrigeration is used in aircrafts because of its low weight per ton of refrigeration. There is no issue of leaking refrigerant in this system.

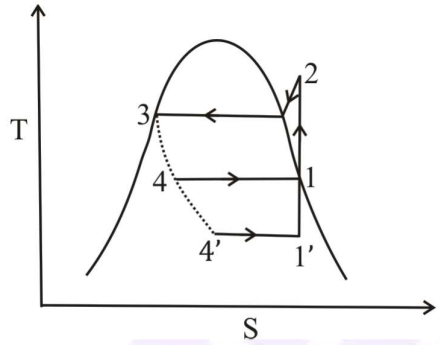
4. (a)

Sub cooling in VCRS, increases the refrigeration effect and has no effect on compressor work.



5. (a)

If the evaporator pressure get reduced then compressor work required is increases and refrigeration effect decreases.



$$\boxed{\text{COP}\downarrow = \frac{Q\downarrow}{W\uparrow}}$$

$\therefore$ COP will decrease.

6. (b)

In ammonia – water vapour absorption system, ammonia is used as refrigerant and water as absorber. Because the capacity of water to absorption of ammonia is very high.

7. (d)

The refrigerant plants are charged by refrigerant from the cylinder at receiver. It is required when refrigerant is leaked out.

