

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR

Semester : III (New Syllabus)

Academic Year : 2018-2019

Course No. : **DE-307**

Course Title : Refrigeration and Air Conditioning

Credits : 201 3

Total Marks : 50

Day & Date : Monday, 14/01/2019

Time : 15.00 to 17.00 Hrs.

Note : 1) All questions from **Section 'A'** are compulsory.

2) Solve **Any Five** questions from **Section 'B'**.

3) Draw neat and well labelled diagram wherever necessary.

SECTION - 'A'

Q. 1 A) Complete the sentence with suitable word/words.

- i) A refrigerant vapor at temperature above the saturation temperature is called as Vapour.

ii) The correct sequence of thermodynamic processes in a vapor compression refrigeration system is

iii) In LiBr-water refrigeration system is a refrigerant and is an absorbent.

iv) Wet bulb temperature is obtained by following constant line on a psychrometric chart.

v) Use of flash chamber reduces the size of

B) State whether True or False. If false, rewrite the statement after making necessary corrections. (05)

- i) At a constant pressure, RH of air decreases with increase in temperature.

ii) In ammonia refrigerating system, copper tubes are not used.

iii) The main purpose of compressor is to maintain the temperature and pressure of refrigerant gas constant.

iv) The process of cooling the refrigerant below the saturated liquid temperature is known as sub-cooling.

- v) Use of multi-compression increases the life of compressor.

Q. 2 A) Choose the most appropriate answer from the options given below. (05)

- i) The condition of refrigerant before entering the compressor should be

b) Wet vapour

d) Superheated vapour

ii) Pick out the undesirable property for a good refrigerant

b) Low freezing point

d) High viscosity

iii) In refrigeration system, flash chamber is placed

b) Between expansion valve and Evaporator

d) Between evaporator and compressor

iv) The pressure at the inlet of a refrigerant compressor is called as

b) Discharge pressure

d) Back pressure

v) The temperature at which water vapour in air will just start to condense is

b) Dew point temperature

d) Dry bulb temperature

(P.T.O.)

B) State the functions of the following.

(05)

- i) Expansion valve
- ii) Receiver
- iii) Condenser
- iv) Flash chamber
- v) Cooling tower

SECTION – 'B'

- Q. 3. An ammonia refrigerating machine has working temperatures of 35°C in the condenser and -15°C in the evaporator. Calculate the following, if dry vapour enters compressor and leaves at 40°C . No sub-cooling occurs after condensation. (06)
- i) Mass flow of refrigerant
 - ii) The theoretical horsepower per ton of refrigeration
 - iii) The coefficient of performance.
- Q. 4 Give diagram of a vapor compression refrigeration system and describe specific functions of each component. (06)
- Q. 5 What are desirable properties of refrigerants? Describe them in brief. (06)
- Q. 6 Write short notes on the following. (02)
- a) Cooling tower. (02)
 - b) Accumulator (02)
 - c) Dual compressor (02)
- Q. 7 a) With interpretation on psychometric chart, describe adiabatic humidification of air. (03)
- b) Enlist the advantages of multistage vapour compression refrigeration system. (03)
- Q. 8 Discuss the effect of following on COP of VCR system. (02)
- a) Suction and Discharge pressures (02)
 - b) Super heating and sub cooling (02)
 - c) Multi-compression (02)
- Q. 9 a) Find the DPT of air having 40°C DBT and 60% RH using chart. (02)
- b) With a neat well labeled diagram, explain the working principle of ammonia vapour absorption system. (04)

ANSWER KEY

DE-307 (2+1) NEW Syllabus

REFRIGERATION AND AIR CONDITIONING

- Q. 1 A) Complete the sentence with suitable word/words.
- i) A refrigerant vapor at temperature above the saturation temperature is called as **Superheated** vapor.
 - ii) The correct sequence of thermodynamic processes in a vapor compression refrigeration system is **Compression, condensation, expansion and evaporation**.
 - iii) In a LiBr-water refrigeration system, **water** is a refrigerant and **lithium bromide** is an absorbent.
 - iv) Wet bulb temperature is obtained by following constant **Enthalpy** line on a psychometric chart.
 - v) Use of flash chamber reduces the size of **evaporator**.
- B) State whether True or False. If false, rewrite the statement after making necessary corrections.
- i) True
 - ii) True
 - iii) False : The main purpose of compressor is to **raise** the temperature and pressure of refrigerant gas constant.
 - iv) True
 - v) True
- Q. 2 A) Choose the most appropriate answer from the options given below.
- i) a) Saturated liquid
 - ii) d) High viscosity
 - iii) b) Between expansion valve and Evaporator
 - iv) a) Suction pressure
 - v) b) Dew point temperature
- B) State the functions of the following.
- i) Expansion valve : To throttle high pressure liquid refrigerant to lower pressure.
 - ii) Receiver : To act as intermediate storage vessel for liquid refrigerant.
 - iii) Condenser : To liquefy vapour refrigerant
 - iv) Flash chamber : To separate and bypass vapour formed during throttling to compressor.
 - v) Cooling tower : To cool the water with adiabatic humidification of air.
