

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR
SEMESTER END THEORY EXAMINATION, B.Tech. (D.T.)

Semester	: III (V Dean)	Academic Year	: 2021-2022
Course No.	: DE-308	Course Title	: Refrigeration and Air Conditioning
Credits	: 2+1=3	Total Marks	: 50
Day & Date	: Friday, 01/04/2022	Time	: 02 Hrs.

- Note :**
- 1) All questions from **Section 'A'** are compulsory.
 - 2) Solve **Any Three** questions from **Section 'B'**.
 - 3) Draw neat and well labelled diagram wherever necessary.

SECTION - 'A'

Q. 1 A) Choose the most appropriate answer from the options given below. (05)

- i) The refrigeration system works on which law of thermodynamics
 - a) Zeroth law
 - b) Second Law
 - c) First law
 - d) None of these
- ii) Which of the following is not a refrigerant
 - a) SO_2
 - b) NH_3
 - c) CCl_2F_2
 - d) $\text{C}_2\text{H}_2\text{Cl}_2$
- iii) Tons of refrigeration means
 - a) Mass of fruits held.
 - b) Mass of refrigerant
 - c) Mass of compressor
 - d) Capacity of compressor
- iv) The part of a refrigeration unit in which the refrigerant changes from vapour to liquid is called
 - a) Condenser
 - b) Throttle valve
 - c) Compressor
 - d) Evaporator
- v) A refrigeration system removes heat from a temperature body.
 - a) Higher
 - b) Lower
 - c) Medium
 - d) None of these

B) Do as directed (05)

- i) Write down the order of various processes in vapour compression refrigeration cycle.
- ii) Give the mathematical relationship between COP of refrigerator and COP of heat pump.
- iii) State the formula for calculating COP of refrigeration system.
- iv) Which treatments are given to air for summer air conditioning?
- v) Give examples of secondary refrigerants.

Q. 2 A) Write down the functions of following (05)

- i) Ammonia purifier
- ii) Thermostat
- iii) Sling thermometer
- iv) Flash chamber
- v) Evaporator

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- B) State whether True or False. If false, rewrite the statement after making necessary corrections. (05)
- The term heat pump is applied to the machine whose main objective is to heat a medium which is warmer than its surroundings.
 - In psychometry, the ambient air is considered to be a mixture of dry air and water vapour.
 - Compression is an isothermal process.
 - Refrigeration is the science which deals with the properties of dry air and water vapour.
 - Capillary tube regulates the flow of refrigerant from compressor to the evaporator through strainer.

SECTION - 'B'

- Q. 3 A) What are refrigeration controls? Explain their functions also. (05)
 B) With the help of psychrometric chart, explain the process of dehumidification of air by cooling. (05)
- Q. 4 A) F-22 vapour compression system working between 5°C and 30°C is used to cool 200 litre per hour of water from 26°C to 16°C . If refrigerant after compression is dry and saturated, find the refrigerant flow rate (C_p of water is $4.186 \text{ kJ/kg}^{\circ}\text{C}$). (05)
 B) Discuss the various factors that are considered during design of cold storage? (05)
- Q. 5 A) What is the importance of refrigeration in food industry? (03)
 B) What are the desired properties of an ideal insulating material? (03)
 C) Give the differences between vapour absorption system and vapour compression system. (04)
- Q. 6 A) What is the principles and application of Air Conditioning? (03)
 B) What are the desired properties of an ideal refrigerant? (03)
 C) Draw the diagram and explain the working of any one type of compressor? (04)
- Q. 7 Explain with the help of P-V and T-S diagram the working of vapour compression cycle with dry saturated vapour after compression. (10)
