

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR
SEMESTER END THEORY EXAMINATION, B. Tech. Dairy Technology 2019-20

Semester	: III (New Syllabus)	Academic Year	: 2019-2020
Course No.	: DE-307	Course Title	: Refrigeration & Air Conditioning
Credits	: 2+1=3	Total Marks	: 50
Day & Date	: Saturday, 11.01.2020	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) Choose the most appropriate answer from the options given below. (05)

- i) Freon group of refrigerants are
 - a) Inflammable
 - b) Toxic
 - c) Non-inflammable and Toxic
 - d) Non-Toxic and non-inflammable
- ii) For obtaining high COP, the pressure range of compressor should be
 - a) High
 - b) Low
 - c) Optimum
 - d) Any value
- iii) A reversible engine has ideal thermal efficiency of 30%. When it is used as a refrigerating machine with all other conditions unchanged, the coefficient of performance will be
 - a) 1.33
 - b) 2.33
 - c) 3.33
 - d) 4.33
- iv) In a refrigerating system, the expansion device is connected between the
 - a) Compressor and condenser
 - b) Condenser and receiver
 - c) Receiver and evaporator
 - d) Evaporator and compressor
- v) The vapour compression refrigerator employs the following cycle
 - a) Rankine
 - b) Carnot
 - c) Reversed Ranking
 - d) Reversed Carnot

B) Define the following terms. (05)

- i) Coefficient of Performance.
- ii) Psychrometry
- iii) Specific humidity
- iv) Refrigerant
- v) 1 ton of refrigeration

Q. 2 A) Give the formulae of the following. (05)

- i) Heat absorbed in evaporator
- ii) By pass factor of coil
- iii) Volumetric efficiency
- iv) Chemical formula of R-12
- v) Energy performance ratio of a heat pump

- B) State whether the following statements are True or False. If False, rewrite the statement after making necessary corrections. (05)
- Wet bulb depression is the difference between dry bulb temperature and wet bulb temperature.
 - The sensible heat ratio expresses the ratio between the sensible heat load and total heat load.
 - Mechanical refrigeration is producing heat by machine.
 - Unit which produces cooling effect in the refrigeration systems is evaporator.
 - A heat pump operating between temperature T_2 and lower Temperature T_1 has COP of $T_1 / (T_2 - T_1)$.

SECTION – 'B'

- Q. 3. Discuss the effect of superheating and sub-cooling the refrigerant in vapour compression system with the help of p-h and T-s diagrams. (06)
- Q. 4. Differentiate between air cooled condenser and water cooled condenser. (06)
- Q. 5. Draw a neat sketch of Automatic expansion valve and explain its working? (06)
- Q. 6. A) State the chemical formula of R-22. (02)
 B) State the desirable properties of refrigerant. (02)
 C) What is defrosting in refrigeration system? (02)
- Q. 7. A) A machine working on a Carnot cycle operates between 305 K and 260 K. Determine the COP when it is operated as a refrigerating machine and a heat pump. (03)
 B) Draw a well-labeled diagram of centrifugal compressor. (03)
- Q. 8. Write short notes on. (02)
 A) Absorber (02)
 B) Rectifier (02)
 C) Heat Exchanger (02)
- Q. 9. A) State advantages of vapour absorption refrigeration system over compression refrigeration system. (02)
 B) A cold fish storage plant is required to store 20 Tonnes of fish. The fish is supplied at a Temperature of 30°C . The specific heat of fish above freezing point is 2.93 kJ/kg K . The specific heat of fish below freezing point is 1.26 kJ/kg K . The fish is stored in cold storage which is maintained at -8°C . The freezing point of fish is -4°C . The latent heat of fish is 235 kJ/kg . If the plant requires a 75 kW to drive it, find: (04)
 i) The capacity of plant.
 ii) Time taken to achieve freezing.
