

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: VI (Old)	Term	: II	Academic Year	: 2018-19
Course No.	: APE 368	Title	: Refrigeration and Air Conditioning		
Credits	: 2 (1+1)	Time	: 14.00 to 16.00	Total Marks	: 40
Day & Date	: Friday, 03.05.2019				

- Note :
1. Solve ANY EIGHT questions from SECTION "A".
 2. All questions from SECTION "B" are compulsory.
 3. All questions carry equal marks.
 4. Draw neat diagrams wherever necessary.

SECTION "A"

- Q.1 Write detail note on reverse carnot cycle.
- Q.2 The temperature limits of an ammonia refrigerating system are 25°C and -10°C . If the gas is dry at the end of compression, calculate the coefficient of performance of the cycle assuming no under-cooling of the liquid ammonia. Use the following table for properties of ammonia :

Temperature	Liquid heat	Latent heat	Liquid entropy
($^{\circ}\text{C}$)	(kJ/kg)	(kJ/kg)	(kJ/kg K)
25	298.9	1166.94	1.1242
-10	135.37	1297.68	0.5443

- Q.3 State differences between a heat engine, refrigerator and heat pump with the neat diagrams and equations.
- Q.4 Write short notes (Any Two):
- a) R-22 as refrigerant
 - b) Dehumidification
 - c) Year-round air conditioning system
- Q.5 In a heating application, moist air enters a stream heating coil at 10°C , 50% RH and leaves at 30°C . Determine the sensible heat transfer, if mass flow rate of air is 100kg of dry air per second. Also determine the steam mass flow rate if steam enters saturated at 100°C and condensate leaves at 80°C .
- Q.6
- a. Define human comfort. Enlist factors affecting human comfort.
 - b. Define psychrometry. Enlist different psychrometric properties of air.
- Q.7 The humidity ratio of atmospheric air at 28°C dry bulb temperature and 760 mm of mercury is 0.016 kg/kg of dry air. Determine 1) partial pressure of water vapour; 2) relative humidity; 3) dew point temperature, and (4) specific enthalpy (use steam table).

(P.T.O.)

- Q.8 a) Define air conditioning, state and explain factors affecting comfort air conditioning.
b) What are the advantages of vapour absorption refrigeration system over vapour Compression refrigeration system?
- Q.9 Atmospheric air with dry bulb temperature of 28°C and a wet bulb temperature of 17°C is cooled to 15°C without changing its moisture content. Find: 1. Original relative humidity; 2. Final relative humidity, and 3. Final wet bulb temperature.
- Q.10 Enlist different desirable properties of an ideal refrigerant. Write in detail about steam jet refrigeration system with neat diagram.

SECTION "B"

- Q.11 Match the following pairs.

'A'

- 1) Ammonia
- 2) R-11
- 3) R-12
- 4) Carbon dioxide

'B'

- a) Boiling point of -29°C at atmospheric pressure
- b) Boiling point of -33.3°C at atmospheric pressure.
- c) Boiling point of 23.77°C at atmospheric pressure
- d) Boiling point is -73.6°C
- e) Boiling point of -128°C at atmospheric pressure

- Q.12 Define the following terms.

- 1) Sensible heating
- 2) Tonne of refrigeration
- 3) Specific humidity
- 4) Dew point temperature

