

B.Tech. SEM -VI Mechanical 2014 Course (CBCS) : WINTER - 2018

SUBJECT: REFRIGERATION AND AIR CONDITIONING

Day: Thursday
Date: 15/11/2018

W-2018-2493

Time: 10.00 AM TO 01.00 PM
Max. Marks: 60

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Use of **psychrometric chart** and **steam table** is allowed.
- 5) Assume suitable data if necessary.

Q.1 Explain simple air regenerative air Refrigeration system. A Bell-Coleman refrigerator works between 4 bar and 1bar pressure Limits. After compression the cooling water reduces the air temperature to 17°C . What is the lowest temperature produced by the ideal machine? Compare the cop of this machine with that of ideal cannot cycle machine working between the same pressure Limits the temperature at the beginning of compression is -13°c . (10)

OR

Q.1 Explain thermoelectric refrigeration system with neat sketch. Explain and derive the Brayton refrigeration cycle coefficient of performance formulation. (10)

Q.2 Find the therotical COP of NH_3 machine working between the temperature range of 24°C and -5°C . The dryness fraction of NH_3 gas during the suction stroke is 0.6. Following properties are given. (10)

Temperatup $^{\circ}\text{C}$	Liquid		Vapour		Latent Heat KJ/Kg
	Enthalpy/ KJ/ Kg	Entropy KJ/ KgK	Enthalpy/ KJ/ Kg	Entropy KJ/ KgK	
24	164	0.59	281	0.991	117.2
-5	72.2	0.28	321	1.21	248.2

Discuss the Effect of Under cooling on the performance of VCC.

OR

Q.2 Explain cascade refrigeration system with sketch. A vapour compression refrigerator uses R-40 and operates between temperature Limits of -10°C and 46°C . At entry to the compressor, the refrigerant is dry saturated and after compression it acquires a temperature of 61°C . Find the COP of the refrigerator. Use following properties. (10)

Saturation Temp. $^{\circ}\text{C}$	Enthalpy/ KJ/ Kg		Entropy KJ/KgK	
	Liquid	Vapour	Liquid	Vapour
-10	45.2	460	0.182	1.62
46	132	483.2	0.485	1.57

Q.3 Explain with examples secondary refrigerants. Discuss simple Vapour absorption system with sketch. (10)

OR

Q.3 Differentiate between VCC and VAC. Discuss GWP and ODP with some examples. (10)

P.T.O.

- Q.4** Explain the following: (10)
- i) Dew point Temperature
 - ii) Wet Bulb Temperature
 - iii) Degree of saturation
 - iv) Chemical dehumidification
 - v) Adiabatic Mixing of two air streams

OR

- Q.4** Calculate all the Psychrometric properties of air for DBT = 30⁰C, DPT = 14⁰C (10)
and Barometric pressure of 750mm of Hg.
Explain the humidification and Dehumidification process.

- Q.5** Classify the condensers and explain any one with neat sketch. Also explain all round air conditioning system. (10)

OR

- Q.5** Explain semi hermetically sealed compressor. Discuss with neat sketch split air conditioning system. (10)

- Q.6** Explain the ice plant refrigeration system with neat sketch. Discuss the methods of determination of duct size. (10)

OR

- Q.6** Discuss the pressure Losses in duct. Give the industrial applications of refrigerators with some examples for food processing. (10)

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