

B.TECH. SEM -VI MECHANICAL 2014 COURSE (CBCS) :
SUMMER - 2018

SUBJECT: REFRIGERATION & AIR- CONDITIONING

Day: **Wednesday**
Date: **06/06/2018**

S-2018-2438

Time: **02.30 PM TO 05.30 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 **psychometric chart** and **steam table** is allowed.
- 5) Assume suitable data if necessary.

Q.1 Explain with neat sketch Reduced ambient air cooling system. Derive the expression for COP of Bell-Coleman cycle with neat sketches. **(10)**

OR

Explain vortex tube refrigeration system with neat sketch. An air refrigeration system used for food storage with 20TR capacity. The temperature of air entering the compressor is 6°C and the temperature at exit of cooler is 25°C. Find :

- i) COP of the system
- ii) Power per ton of refrigeration required by the compressor. The quality of air circulated in the system is 2000 kg/hr. The compression and expansion both follows the law $PV^{1.3} = \text{constant}$ and take $\gamma = 1.4$ and $C_p = 1.0 \text{ kJ/kg K}$ for air.

Q.2 The temperature limits of an ammonia refrigerating plant are 26°C and – 10°C. If the gas is dry at the end of compression, calculate the coefficient of performance of the cycle, assuming no undercooling of the liquid ammonia. Use the following table for properties of ammonia: Draw p-h. and T-s diagrams. **(10)**

Temperature °C	Liquid Heat kJ/ kg	Latent Heat KJ/ Kg	Liquid Entropy KJ/ Kg k
26	298.9	1166.4	1.122
-10	135.2	1294.1	0.541

OR

A vapour compression refrigerator works between the pressure limits of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no under cooling. Determine:

- i) COP of the cycle
- ii) Capacity of the refrigerator if the fluid flow rate is 5 kg/ min. Draw p-h and T-S. diagram Data:

Press bar	Saturation Temp K.	Enthalpy KJ / kg		Entropy KJ/kg K	
		Liquid	Vapour	Liquid	Vapour
6	295	61.9	208	0.197	0.701
2.5	261	-18	234	-0.07	0.89

P. T. O.

