B.Tech. SEM -VI Mechanical 2014 Course (CBCS) : WINTER - 2017

SUBJECT: REFRIGERATION & AIR- CONDITIONING

Day: **Wednesday** Time: **10.00 AM TO 01.00 PM**

Date: **22/11/2017** **W-2017-2226** 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 Bell- Coloman cycle and derive the expression for COP of Bell- Coleman cycle. A machine working on a carnot cycle operates between 305K and 250K. Determine the COP when it is operated as: **(10)**

i) a refrigerating machine
ii) a heat pump
iii) a Heat Engine

OR

A refrigerator working on Bell-Coleman cycle operates between pressure limits of 1 bar and 8.5 bar. Air is drawn from the cold chamber at 10^0C compressed and then it is cooled to 30^0C before entering the expansion following cylinder. The expansion and compression follows the law $PV^{1.2}$ = const. Determine the theoretical COP of the system. Explain:

i) One Tonnes of refrigeration
ii) Coefficient of performance

Q.2 Explain the effect of followings on performance of VCC cycle. **(10)**

i) Undercooling ii) Superheating

Explain Cascade refrigeration system with neat sketch.

Explain use of flash chamber in multi pressure system.

OR

A vapour compression refrigerator uses R-40 and operates between temperature Limits of 10^0C and 45^0C. At entry to the compressor, the refrigerant is dry saturated and after compression it acquires a temperature of 60^0C. Find the COP of the refrigerator use following table:

Saturation Temperature ^{0}C	Enthalpy KJ/ kg		Entropy KJ/kg	
	Liquid	Vapour	Liquid	Vapour
-10	45	460	0.183	1.6
45	133	483	0.48	1.5

Q.3 Explain practical vapour absorption system with neat sketch. Explain ODP and GWP concepts. **(10)**

OR

Explain classification of refrigerants and their nomencleature.

P. T. O.

Q.4 Explain chemical dehumidification process with neat sketch. Obtain all the psychometric properties of moist air at 40^0C DBT and 20^0C WBT without using psychometric chart. **(10)**

OR

Define and explain following:
i) Moist air ii) DPT iii) RH.
Atmospheric air at 30^0C DBT and 45% RH is to be cooled to 17^0C DBT and 15^0C WBT. Find the amount of heat rejected by the air. Also find sensible heat factor of the process.

Q.5 Give the classification of air conditioning system and explain year- round air conditioning system with neat sketch. **(10)**

OR

Give the classification of condensers used in refrigeration system and explain cooling tower with neat sketch.

Q.6 Explain the mobile air conditioning system used for food preservation. Also give the design procedure of duct design. **(10)**

OR

Derive the expression for an equivalent diameter of a circular duct for a rectangular duct when the quantity of air passing through the rectangular and equivalent circular duct is same. Also explain the cold storage plant used for food storage with block diagram.

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