Sub Code:EAG502

Paper Id: 910041 Roll No: | | | | | | | | | | | | | |

B. TECH.
(SEM-V) THEORY EXAMINATION 2019-20
REFRIGERATION & AIR CONDITIONING

Time: 3 Hours *Total Marks: 100*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Write Refrigerant R-11 classification?
b. List psychometric properties of air.
c. Differentiate between Natural and Mechanical refrigeration.
d. Define Wet bulb temperature.
e. What is defrosting?
f. Define degree of saturation.
g. Discuss effect of moisture and oil miscibility in refrigerants.
h. What is sensible heat factor?
i. Discuss the nomenclature used for classifying refrigerants.
j. Define Energy performance ratio & express its relationship with COP.

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Draw a labelled sketch and explain working of window air conditioning system.
b. Explain with neat sketch the various losses in the duct?
c. Describe the different method of air conditioning duct design. Why are damper are required in some system?
d. A R-12 vapour compression refrigeration system has a condensing temperature of 50°C. The refrigeration capacity is 7 tons. The liquid leaving the condenser is saturated liquid and compression is isentropic. Determine refrigerant flow rate and power require running the compressor.
e. Discuss the effect of variation of evaporator and condenser temperatures on the C.O.P. of Carnot cycle.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain simple air refrigeration system in detail with COP expression.
(b) A refrigeration system is working on reversed Carnot cycle between higher and lower temperature of 40 °C respectively. Determine its C.O.P. It is desired to increase the C.O.P. of the cycle to 4.75 by changing the temperature of the cycle. If the increase (or decrease) in higher temperature is equal to the decrease (or increase) in lower temperature, calculate the new temperature of the cycle.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Define primary refrigerant. What are the desirable properties of a primary refrigerant? Give the refrigerant number for the following: $CHClF_2$, NH_3, $CH_3CH_2CH_2CH_3$.

(b) A refrigeration system using R-12 as refrigerant consist three evaporators of capacity 20TR at -10 °C, 30TR at 5°C and 10 TR at 10°C.the vapours leaving three evaporators are dry and saturated. The system is provided with individual compressor and multiple expansion valves. The condenser temperature is 40°C and the liquid refrigerant leaving the condenser is sub cooled to 30°C. Assuming isentropic compression in each compressor find mass of refrigerant through each evaporator, power required, cop of the system.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) With the help of schematic diagram, explain the working of a practical aqua ammonia vapour refrigeration system. Highlight the advantage of using Analyzer, Rectifier and Heat Exchangers. Derive an expression for the maximum COP of a simple vapour refrigeration system.

(b) Describe a simple vapor compression refrigeration system with the help of P-H & T-s diagram. Also show the effect of following parameters on the performance of the system (i) Superheating of refrigerant vapor (ii) Sub cooling of condensate.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are the desirable properties of an ideal refrigerant?

(b) Discuss in detail the secondary refrigerants.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Write notes on frictional losses and dynamic losses in a flow through a duct. Write the expression for frictional pressure drop in ducts.

(b) What is the importance of psychometric chart and how different psychometric processes are represented on it? Draw the following process on a psychometric chart describing them in brief: (i) Sensible heating and cooling (ii) Latent heating and cooling i.e. humidification & dehumidification (iii) Cooling & dehumidification (iv) Cooling & humidification.