Total No. of Questions : 4]

SEAT No. :

PE-198

[Total No. of Pages : 3

[6580]-558
B.E. (Mechanical) (Insem.)
HEATING VENTILATION AIR CONDITIONING & REFRIGERATION
(2019 Pattern) (Semester - VII) (402041)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4.***
2) ***Neat diagrams must be drawn wherever necessaly.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Use of steam table and psychrometric chart is allowed.***

Q1) a) Explain the concept of DART in air refrigeration cycles and compare various air refrigeration cycles using DART. **[6]**

b) The following data refers to a bootstrap air cycle evaporative refrigeration cycle used for an evaporator to take 20 tonnes of refrigeration load : **[9]**

Ambient air temperature = 15°C
Ambient air pressure = 0.8 bar
Mach number of flight = 1.2
Ram efficiency = 90%
Pressure of air after main compressor = 4 bar
Pressure of air after secondary compressor = 5 bar
Isentropic efficiency of main compressor = 90%
Isentropic efficiency of secondary compressor = 80%
Isentropic efficiency of cooling turbine = 80%
Temperature of air leaving the first heat exchanger = 170 °C
Temperature of air leaving the second heat exchanger = 155 °C
Cabin pressure = 1 bar :
Cabin temperature = 25 °C
Find :

i) Draw neat temperature entropy plot of given system
ii) Mass of air required to take cabin load
iii) Power required for the refrigeration system
iv) C.O.P. of the system

P.T.O.

OR

Q2) a) Explain the following properties of refrigerants **[8]**

i) Latent heat of vaporization

ii) Boiling point

iii) Miscibility

iv) Specific heat of vapour refrigerant

b) Explain Boot -Strap air refrigeration system with T-S diagram **[7]**

Q3) a) Explain two stage compression with Intercooling and sub cooling by external cooling source. **[6]**

b) A Single Compressor using R-12 as Refrigerant as three evaporators of capacity 10 TR, 20 TR, 30 TR. All evaporators operate at -10°C and the vapors within the compressor are dry and saturated. The condenser temperature is 40°C, the liquid refrigerant leaving the condenser is sub cooled to 30°C. **[9]**

Assuming the Isentropie Compression, Find

i) Mass flow rate of refrigerant flowing through each evaporator.

ii) The power required to drive the compressor

iii) COP of the system

OR

Q4) a) Explain with schematic and P-h diagram a complete two stage compression system with flash chamber acts as intercooler and gas removal. **[6]**

b) With the neat diagram Explain working of Cascade refrigeration system. **[9]**