

9251

# T.E. (Mech) (Sem-VI) (CBCGS)

## Refrigeration and Air Conditioning

University of Mumbai

Examinations Summer 2022

Time: 2 hour 30 minutes

Refrigeration & Air-conditioning (MEC604)

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	A boot strap air cooling system has
Option A:	One heat exchanger
Option B:	Two heat exchanger
Option C:	Three heat exchanger
Option D:	Four heat exchanger
2.	In vapour compression refrigeration system, the lowest temperature during the cycle occurs after
Option A:	Compression
Option B:	Condensation
Option C:	Expansion
Option D:	Evaporation
3.	An Electrolux refrigerator has
Option A:	Only one liquid pump
Option B:	Only two liquid pump
Option C:	No liquid pump
Option D:	Three liquid pump
4.	The refrigerant R-717 is
Option A:	Air
Option B:	Water
Option C:	Ammonia
Option D:	Carbon di oxide
5.	The condensing medium used in Evaporative condenser is
Option A:	Air
Option B:	Water
Option C:	Ammonia
Option D:	Air and water
6.	The ratio of sensible heat to total heat is known as
Option A:	Specific humidity
Option B:	Relative humidity
Option C:	Apparatus dew point
Option D:	Sensible heat factor
7.	The alignment circle marked is marked on psychrometric chart at
Option A:	20°C DBT and 50% RH
Option B:	26°C DBT and 50% RH
Option C:	22°C DBT and 70% RH
Option D:	23°C DBT and 75% RH

8.	The human body in a cooled space constitutes cooling load of
Option A:	Sensible heat only
Option B:	Latent heat only
Option C:	Sensible and latent heat only
Option D:	Solar heat
9.	In refrigeration system, the expansion device is connected between
Option A:	Compressor and condenser
Option B:	Condenser and evaporator
Option C:	Evaporator and compressor
Option D:	Condenser and receiver
10.	The vertical and uniformly spaced lines on a psychrometric chart
Option A:	Dry bulb temperature
Option B:	Dew point temperature
Option C:	Wet bulb temperature
Option D:	Specific humidity

<b>Q2.</b>	<b>Write any Four out of Six</b>	<b>(5 marks each)</b>
A	Atmospheric air with dry bulb temperature of 28°C and a wet bulb temperature of 17°C is cooled to 15°C without changing its moisture content. Find by using psychrometric chart 1. Original relative humidity 2. Final relative humidity 3. Final wet bulb temperature	
B	State different methods of air refrigeration system and Explain any one of them.	
C	Explain simple vapor absorption refrigeration systems	
D	A refrigerating system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35°C and the lower temperature is -15°C. The capacity is to be 12 tonnes. Determine 1. Coefficient of performance 2. Power required	
E	Write a note on comfort chart	
F	What are methods of duct design? Explain any one method.	

Q3.	Solve any Two out of Three				(10 marks each)
A	A vapor compression refrigerator uses methyl chloride and operates between temperature limits of -10°C and 15°C. At entry to the compressor, the refrigerant is dry and saturated and after compression it acquires a temperature of 60°C. Assume $C_p = 1.09$ Find				
	1. Coefficient of Performance of the refrigerator,				
	Saturation temp in °C	Enthalpy in kJ/kg		Entropy in kJ/kg.K	
		Liquid	Vapour	Liquid	Vapour
	-10	45.4	460.7	0.183	1.637
	45	133.0	483.6	0.485	1.587
B	A simple air cooled system is used for an aeroplane having a load of 10 tonnes. The atmospheric pressure and temperature are 0.9 bar and 10°C respectively. The pressure				

	<p>increase to 1.013 bar due to ramming. The temperature of the air reduced by 50°C in heat exchanger. The pressure in the cabin is 1.01 bar and temperature of air leaving the cabin is 25°C. Determine</p> <ol style="list-style-type: none"> <li>1. Power required to take the load of cooling in the cabin</li> <li>2. Coefficient of performance of the system.</li> </ol> <p>Assume that all the expansion and compression are isentropic. The pressure of the compressed air is 3.5 bar.</p>
C	State the various sources of internal heat gain and external heat gain in cooling load estimation.

<b>Q4.</b>	<b>Solve any Two out of Three</b>	<b>(10 marks each)</b>
A	Explain simple vapor absorption refrigeration systems	
B	Define and classify Refrigerant and state its properties. State names of primary and secondary refrigerant.	
C	Write a note on Cooling tower and its type.	