Government College of Engineering, Aurangabad
(An Autonomous Institute of Government of Maharashtra)

B. E. (Mechanical) Examination
End Semester Examination Nov 2016

11 NOV 2016

ME 401: REFRIGERATION AND AIRCONDITIONING

Time: Three Hours *Max. Marks: 60*

"Verify the Course Code and check whether you have got the correct question paper"

N.B:-
1. All questions are compulsory
2. Figures to the right indicate full marks
3. Assume suitable data if necessary and state it clearly
4. Use of non-programmable calculator, P-h chart of R-134a, psychometric chart is allowed

Q1a. An ice plant operates at evaporator temperature -20°C, Condenser temperature 30°C using refrigerant R-134a. Water in the ice cans (5000 kg) at 30°C converted into ice at 0°C in 12 hours. Assume standard vapor compression refrigeration cycle, compressor speed 900 r. p. m, piston diameter 'D', to stroke length 'L' ratio (D/L) = 1.1 and 100 percent volumetric efficiency of compressor, Determine (a) represent cycle on P-h plane (ii) tonnage of the plant (iii) power required, if compressor prime mover efficiency is 0.80. (iv) COP (v) refrigerant flow rate (vi) compressor displacement (vii) piston diameter. (10)

Q1b. Define unit of refrigeration used commercially. (02)

Or

Q1 (a) Explain effect on compressor size, COP, compressor power for same tonnage of VCRS (i) superheat at inlet to compressor due to heat gain in suction line (ii) sub-cooling after condenser in separate heat exchanger (iii) air in the refrigeration system (08)

Q1 (b) Explain advantage of multistage compression and multiple expansion valve in VCRS (04)

Q 2. Attempt any two questions (2 x 6=12)
(i) Compare Vapor compression refrigerating machine with vapor absorption machines
(ii) Role of rectifier in Generator top portion
(iii) Explain role of Generator in vapor absorption system.

Q 3. Attempt any two questions (2 x 6=12)
(i) Represent process of simple air craft air conditioning system on T- S plan and present suitable scheme to compute power required by compressor, power delivered by turbine , while they have specified efficiency.
(ii) Explain (a) skin friction effect (ii) advantage of air as refrigerant in aircraft air conditioning
(iii) Explain (a) capillary tube as expansion device (b) Thermo state with differential setting arrangement

Q 4. Attempt any two questions (2 x 6=12)
(i) Explain nomenclature system of refrigerant for saturated hydrocarbon, organic compounds and azeotrops.
(ii) Explain two applications of Industrial air conditioning.
(iii) Explain six desirable properties of refrigerant.

Q 5. Attempt any two questions (2 x 6=12)
(i) In a cooling application, moist air enters a refrigeration coil at 100 kg/min dry air at 35°C and 50% relative humidity. Apparatus dew point is 5°C and coil bypass factor is 0.15. Determine the outlet state of air and cooling capacity of coil in TOR?
(ii) Define relative humidity, specific humidity, degree of saturation.
(iii) Draw process of desert air cooler on psychometric chart. Why humidifying efficiency of the air cooler shall be less than 85%?