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 442: 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-22 and psychometric chart is allowed

Q1 a. An cold storage operates at evaporator temperature -10°C, Condenser temperature 30°C using refrigerant R-22. Storage material has 50 ton mass and specific heat 0.8 kJ /kgK. Normal temperature is 30°C. Fully loaded cold storage needs 2 hrs to reach designed temperature. Assume standard vapor compression refrigeration cycle, compressor speed 1200 r. p. m, piston diameter 'D', to stroke length 'L' ratio (D/L) = 1.1 and 90 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)

Q1 b. Define unit of refrigeration used commercially. (02)

Or

Q1(a).Flash gas removal is always desirable, however flash gas intercooling may not be always desirable. Justify the statement. (06)

Q1(b). Explain effect of entry of (i) air in VCRS (ii) liquid in compressor of VCRS (06)

(2 x 6=12)

Q 2. Attempt any two questions

(i) Compare Vapor compression refrigerating machine with vapor absorption machines

(ii) Explain steam jet refrigeration system with process diagram.

(iii) Enlist desirable properties of refrigerant – absorbent pair in VARS.

(2 x 6=12)

Q 3. Attempt any two questions

(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

(2 x 6=12)

Q 4. Attempt any two questions

(i) Explain effect of global warming and role of refrigeration industry.

(ii) Explain Comfort air conditioning along with human body behavior with thermal environment.

(iii) Explain nomenclature of refrigerant for C_2H_8; $CHClF_2$; CO_2; $C_2Cl_2F_4$ water.

(2 x 6=12)

Q 5. Attempt any two questions

(i) 500 cmm outside air at 5C and 60% RH are heated and humidified and reheated to maintain room condition at 21°C, 40% RH. The supply air temperature is 45°C, RSHF=0.75, calculate the heat added per second in various heater.

(ii) Explain working of desert air cooler? Why its capacity is not specified in TOR?

(iii)Define relative humidity, wet bulb depression, degree of saturation.