

16% Mid Semester (Theory) exam

40% Final (theory) exam

- **Specific learning outcome:**

On successful completion of this module the learner will be able to:

1. **Recognize** basic concepts of engineering mechanics
2. **Identify** all types of refrigeration cycles and **analyze** their components
3. **Determine** and **apply** concepts of thermodynamics
4. **Develop** and **sketch** the cycle for better understanding
5. **Determine** all cycle characteristics
6. **Apply** fluid mechanics concepts in refrigeration piping design
7. **Collaborate** with others to solve problems by group or team working.

- **Course Reading List and References:**

Handbook of Air Conditioning and Refrigeration (Second dition)

- Shan K. Wang

Air Conditioning Engineering

- W.P.Jones

Basic Refrigeration and Air Conditioning (Third edition)

- P N Ananthanaryanan

الموسوعة العالمية للتكييف و التبريد

- ريكس ميلر – مارك ميلر

مبادئ هندسة تكييف الهواء والتثليج

الدكتور خالد احمد الجودي

Fundamentals of Engineering Thermodynamics

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Course topics (Theory)	Week
Introduction	Week 1
Basic definitions , Refrigerants and their properties, uses , numbering	Week 2
Theoretical vapor compression refrigeration cycle	Week 3
Actual vapor compression refrigeration cycle , calculation of components capacity, C.O.P.	Week 4
Evaporator selection	Week 5
Condenser selection	Week 6
Midterm Examination	Week 7
Midterm Examination	Week 8
Compressor selection, calculation of mechanical and volumetric efficiency	Week 9
Thermal equilibrium of refrigeration cycle	Week 10
Cascade refrigeration cycles\multi compressors	Week 11
Cascade refrigeration cycles\multi evaporators	Week 12
Cascade refrigeration cycles\with heat exchanger and flash intercooler	Week 13
Vapor absorption refrigeration cycles	Week 14
Final Examination	Week 15
	Week 16
Practical Topics (If there is any)	Week
Calculating the coefficient of performance for an educational refrigerator (COP)	Week 1
Calculate the condenser capacity Q_c	Week 2
Thermal equilibrium for educational refrigerator	Week 3
The total heat transfer coefficient between water and gas in the condenser and the evaporator	Week 4
The effect of temperature of evaporator and condenser on the amount of heat of evaporator and condenser	Week 5
Cooling and dehumidification	Week 6
Relationship between (P_c / P_e) and the amount of heat of condenser and evaporator	Week 7
Relationship between temperature and pressure	Week 8
Sensible and latent heat	Week 9

- **Examinations (question design):**

The following is an example of the examination questions:

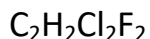


Q1/ Draw a diagram showing the processes going in a real vapor compression refrigeration cycle on the (pressure-enthalpy) diagram, Explain the type and details of each process.

(25 Mark)

Q2/a: What is meant by (Ton Refrigeration) , Prove that :
Ton Refrigeration = 3.517KW

Q2/b: What are the commercial names of the following :



(25 Mark)

Q3/A freezer chamber of capacity (3Ton) of chicken meat which is saved inside the chamber at a temperature of (-18°c) , Calculate the cooling load for the meat knowing that the meat arrives at the store at a temperature of (6°c) .

Take : freezing temperature of meat (-2.8°c) , freezing enthalpy (247kJ/kg) , specific heat of meat before freezing $(3.32\text{kJ/kg}^\circ\text{c})$, specific heat of meat after freezing $(1.77\text{kJ/kg}^\circ\text{c})$, the process requires a total time of (4 hours)

Q4/a: Explain the types of cooling and air conditioning water systems regarding the number of pipes and the design of the return pipe , use diagrams to support your explanations when exists

Q4/b:What are the requirements to design the suction line when:

1. The compressor level is the same as the evaporator level.
2. The compressor level is lower than the evaporator level.
3. The compressor level is higher than the evaporator level.

(25 Mark)

Fady R. Shamoan

Lecturer

Extra notes: no notes

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External Evaluator :

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