SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Engineering (Mechanical)
Higher National Diploma in Building Services Engineering
First Year, Second Semester Examination – 2016
ME 1209 / BSE 1209 - Introduction to Refrigeration and Air Conditioning

Instructions for Candidates:	No. of questions : 05
Answer **four (04)** questions only	No. of pages : 03
All questions carry equal marks	Time : 02 hours

01. (i) What do you mean by refrigeration process? (3 marks)

(ii) List five different types of refrigeration systems used in the industry. (5 marks)

(iii) Enumerate five important refrigeration applications. (5 marks)

(iv) Explain the following terms,

a) Refrigeration effect
b) COP
c) TR (9 marks)

(v) Explain in brief how the phase change processes of refrigerants could be used to obtain the cooling effect. (3 marks)

[Total 25 Marks]

02. (i) Draw a neat sketch of Simple Vapour Compression Refrigeration System. Name the components. (4 marks)

(ii) What are the four thermodynamic processes involved in the above system? (4 marks)

(iii) Represent the processes involved in the above system on the neat sketches of P-h and T-s diagrams. (8 marks)

(iv) Enthalpy values of refrigerant in a simple vapour compression system are given below.

- Enthalpy of saturated vapour, leaves the evaporator = 560KJ/kg
- Enthalpy after the condensation processes is completed = 250KJ/kg
- Enthalpy of superheated vapour, entering to the condenser = 592KJ/kg

Refrigerant circulates in the system at a rate of 5.5 kg/min. By using above values determine

a) Refrigerating effect (2 marks)

b) Heat rejected at the condenser (2 marks)

c) Work done to the compressor (2 marks)

d) COP (3 marks)

[Total 25 Marks]

03. (i) Define the term "Refrigerant". (2 marks)

(ii) Briefly describe seven properties of refrigerants. (7 marks)

(iii) Write down four refrigerants with refrigerant number and chemical name. (4 marks)

(iv) Compare and contrast Vapour compression and Vapour absorption refrigeration systems. (6 marks)

(v) Describe in brief the function of following components in a Vapour absorption refrigeration system.

a) Generator

b) Absorber

(6 marks)

[Total 25 Marks]

04. (i) Describe in brief the **four** main actions involved in Air Conditioning.

(8 marks)

(ii) Draw a neat sketch of a window type air conditioner and name its components. Write a brief description of each component.

(7 marks)

(iii) State the advantages and disadvantages of split type air conditioners relative to window type air conditioners.

(5 marks)

(iv) "Central air conditioning systems are suitable for large scale applications". Comment on this statement with necessary facts.

(5 marks)

[Total 25 Marks]

05. (i) Sketch the following lines on a skeleton of psychrometric chart,

a) Constant dry bulb temperature line
b) Constant wet bulb temperature line
c) Constant relative humidity line
d) Constant enthalpy line
e) Constant specific volume lines
f) Constant specific humidity lines

(12marks)

(ii) Explain how you would use Sling psychrometer to measure the properties of moist air.

(4 marks)

(iii) Explain how you would you use psychrometric chart to obtain the other properties of moist air with the measurements taken by the Sling psychrometer. (5 marks)

(iv) Briefly explain four important psychrometric processes. (4 marks)

[Total 25 Marks]