



TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Applied & Health
Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS
DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY (DSLTL 12J)
APS 2302: PHYSICS TECHNIQUES IV - REFRIGERATION

END OF SEMESTER EXAMINATION
SERIES: APRIL 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (Compulsory)

- a) Describe **THREE** ways in which heat can be transferred from a metal container full of hot water. **(6 marks)**
- b) (i) What is “Refrigeration”? **(2 marks)**
(ii) State **FOUR** application of refrigeration **(4 marks)**
- c) (i) Define Thermal conductivity. **(2 marks)**
(ii) Determine the rate of loss of heat through a window of thickness 6mm and area 2m^2 if the temperature difference between the two sides is 20°C . Given thermal conductivity of glass is $0.8\text{Wm}^{-1}\text{k}^{-1}$. **(5 marks)**
- d) (i) State Charle’s Law **(2 marks)**
(ii) To what temperature must 2 litres of air at 290k be heated at constant pressure in order to increase its volume to 3 litres. **(3 marks)**
- e) Outline the maintenance procedure for the following laboratory equipment:
(i) Microscope **(3 marks)**
(ii) Refrigerators **(3 marks)**

Question Two

- a) Explain the **FIVE** steps in the refrigeration cycles. **(10 marks)**
- b) (i) State Guy-Lussac’s Law of ideal hales. **(2 marks)**
(ii) A motor car tyre contains a fixed mass of air when the air temperature in the tyre was 17°C . After a high speed run the air pressure was found to be 330KN/m^2 . What was the new temperature of the air in the tyre. **(3 marks)**

Question Three

- a) (i) What is meant by the term “Heat”? **(2 marks)**
(ii) Distinguish between good and bad conductors of heat giving examples of each. **(4 marks)**
- b) (i) Explain why your feet feels colder when you stand on a cemented floor than when you stand on a wooden floor. **(2 marks)**
(ii) Use Kinetic theory of gases to explain Boyle’s Law. **(3 marks)**

Question Four

- a) (i) What is a “Refrigerant” **(2 marks)**
(ii) Give **TWO** examples of a refrigerant. **(2 marks)**
- b) (i) Write down the equation of state for ideal gas. **(1 mark)**
(ii) 125cm^3 of a gas are collected at 15°C and 755mm of mercury pressure. Determine the volume of the gas at s.t.p **(4 marks)**

c) Explain THREE common electrical faults in the laboratory. **(6 marks)**

Question Five

a) Discuss the factors that determine the choice of refrigerant used in refrigeration system. **(6 marks)**

b) Distinguish between hermetic compressors and open type compressors. **(4 marks)**

c) Give:

(i) THREE disadvantages of Hermetic compressors **(3 marks)**

(ii) TWO advantages of open type compressors. **(2 marks)**