



**TECHNICAL UNIVERSITY OF MOMBASA**

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**Faculty of Engineering and Technology**

**DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING  
DIPLOMA IN ELECTRICAL POWER ENGINEERING  
(DEPE 6 Y3 S2)**

**EEP 2307  
HEATING, REFRIGERATION AND AIR-CONDITIONING**

**END OF SEMESTER EXAMINATIONS**

**SERIES: MAY 2016**

**TIME: 2 HOURS**

**INSTRUCTIONS:**

1. You should have the following for this examination:
    - Answer Booklet
    - Scientific Calculator
    - Drawing Instrument
  2. This paper consists of **FIVE** questions
  3. Answer Question **ONE**, which is **COMPULSORY**, and any other **TWO** Questions.
  4. Question marks are as indicated in each question
  5. Do not write on this question paper.
- This paper consists of **FOUR** printed pages

## QUESTION ONE

a) Explain the vapour compression refrigeration process with the aid of a labelled refrigeration temperature-enthalpy graph

(12 Marks)

b) (i) Using a labelled block diagram, show the vapour compression refrigeration cycle system for a commercial system

(ii) Explain the function of each of the blocks in (i)

(18 Marks)

## QUESTION TWO

a) An Air-Conditioning system can be designed to use HCFC, HFC or CFC class-type of refrigerant.

Two Air-Conditioning systems were found to use refrigerants R22 and R134a respectively

(i) Calculate to determine the refrigerant structure configurations and then establish the class-type, with the aid of a sketch

(ii) State and explain any THREE desirable properties of an ideal refrigerant

(iii) Explain the effects on human-beings of releasing refrigerants to the atmosphere and how it is caused

(20 Marks)

## QUESTION THREE

a) A disabled refrigerator after a compressor replacement requires to be charged.

(i) Explain how the type and quantity of refrigerants for the system can be established

(ii) Describe the charging procedure, with the aid of labelled block diagrams

(20 Marks)

## QUESTION FOUR

a) Distinguish by way of sketches between a haematic and a semi-haematic type of compressors used in Air-Conditioning

b) (i) The DBT and WBT of a sample of air is established as  $37^{\circ}\text{C}$  and  $30^{\circ}\text{C}$ . Using Psychrometric chart determine vacuum

- I. Relative humidity
- II. Dew point
- III. Specific humidity

(ii) A sample of moist air has DBT of  $25^{\circ}\text{C}$  and at saturation state, find

- I. Specific humidity
- II. Relative humidity
- III. Dew point

(20 Marks)

#### QUESTION FIVE

a) (i) Sketch to show a labelled TIG welding system set-up

(ii) Distinguish with the aid of sketches between Direct current straight polarity and Direct current reverse polarity as applied in arc welding

(20 Marks)



# Psychrometric Chart

SI (metric) units  
Barometric Pressure 101.325 kPa (Sea level)  
based on data from  
Carrier Corporation Cat. No. 794-001, dated 1975

