THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

DIPLOMA IN ARCHITECTURE STAGE III 08

SEMESTER I EXAMINATIONS

APRIL/MAY 2010 SERIES

BUILDING SERVICES

TIME: 3 HOURS

Instructions to Candidates

Attempt Any **THREE** Questions

Question ONE

(a).   Explain the following psychrometic terms:

   (i).   Absolute humidity
   (ii).   Relative humidity
   (iii).   Specific humidity

                                                                      (3 Marks)

(b).   Most air is at 60% saturation and 24°C wet bulb from the psychrometric
        chart. Determine:

   (i)   Dew point
   (ii)   Dry bulb temperature
   (iii)   Specific enthalpy
   (iv)   Specific volume
   (v)   The density of the air
   (vi)   The humidity ratio

                                                                      (7 Marks)

(c).   (i).   With the aid of a sketch explain the construction of a sling
                psychrometer.

        (ii).   Explain how a sling psychrometer is used to determine the relative
                humidity of moist air.
                                                                      (10 Marks)

Question TWO

(a).   Explain using a skeleton psychrometric chair, the following process;

   (i).   Sensible heating
   (ii).   Sensible cooling
   (iii).   Heating and humidification
   (iv).   Cooling and dehumidification
                                                                      (8 Marks)

(b).   In an air conditioning system, for a precision gauge laboratory, atmosphere
        air at 32°C and 80% relative humidity is first chilled to 10°C to remove
        moisture. The air is then heated until its relative humidity reaches 40%. If
        the air flow rate is 800m³/min, determine:

   (i).   The heat removed in the cooling section in KJ/min.
   (ii).   The heat added in the heating section in KJ/min.
   (iii).   The rate of condensate removal take density of air as 1.25kg/m³.
                                                                      (12 Marks)

Question THREE

(a). Moist air from a room is at 20ºC dry bulb and 40% relative humidity. The air is mixed with outside air at -10ºC and 80% relative humidity. The mass flow rates are 50kg/s and 20kg/s respectively. Determine for the mixture:

    (i). The relative density
    (ii). The enthalpy

(10 Marks)

(b). (i). Use a block diagram to explain the central air conditioning system.
    (ii). Explain the construction of ducts used in conveying air in air conditioning. **(10 Marks)**

Question FOUR

(a). (I). Sketch the following piping arrangements as used in hydronic piping systems:

    (i). Series loop
    (ii). One pipe main
    (iii). Two pipe direct return

(b). State any **TWO** advantages and **TWO** disadvantages of each of the systems mentioned in (a) above. **(15 Marks)**

(c). Sketch a typical hydronic terminal unit. **(5 Marks)**

Question FIVE

(a). (i). Explain briefly the construction of a window air conditioner.
    (ii). Explain how the window units are installed.
    (iii). Explain the checks to be performed during installation of a window air conditioner.

(10 Marks)

(b). (i). Explain using block diagrams the vapour compression refrigeration.

    (ii). State any **FOUR** factors that determine the choice of insulating materials.

(10 Marks)