



Notes: a) Exam in two parts

b) Answer each part in separate section

**Part one**

**Question (1)**

**(20 Marks)**

- 1.1 Explain with sketch the Propeller-type anemometer? (3 Marks)
- 1.2 How can laser anemometer be used for measuring wind speed? (3 Marks)
- 1.3 Explain with sketch how can the rotational movement of wind vane be transformed to digital output? (3 Marks)
- 1.4 How can pressure tube anemometer be used for measuring wind speed? (3 Marks)
- 1.5 What is the main field of application of hot wire anemometer and why? (3 Marks)
- 1.6 A pressure tube anemometer contains five perpendicular pairs of tubes. The pressure difference for each pair is recorded as follows:

Pair number	1	2	3	4	5
Pressure difference, N/m <sup>2</sup>	22	18	27	30	13

- a) Which pair is in correct position and why?
- b) Find the wind speed in location at this moment.
- You can make any suitable assumptions for the missed data. (5 Marks)

**Question (2)**

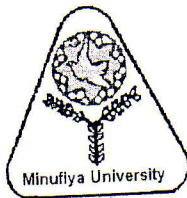
**(30 Marks)**

- 2.1 Drive an expression to determine the volume of gas required in the bulb of a gas filled system thermometers related to the lowest and highest temperature and pressure on the scale? (5 Marks)
- 2.2 Explain with sketch how can platinum resistance thermometer be constructed? (4 Marks)
- 2.3 Drive an expression to determine the radius of curvature  $r$  of a bimetallic strip of two metals of equal thickness in the form of a cantilever of length  $L$ ? (5 Marks)
- 2.4 Show with sketch how can temperature difference between two points be measured by using series connection of thermocouples? (4 Marks)
- 2.5 Explain with sketch the components and the operation of disappearing filament optical type pyrometer? (4 Marks)
- 2.6 A bimetallic strip element has one end fixed and other free, with the length of cantilever being 40 mm. The thickness of each metal is 1 mm, and the element is initially straight at 20°C. Calculate the radius of curvature when the temperature is raised to 180°C. One of the metals is Invar with a negligible thermal expansion coefficient while the second is a nickel chrome alloy with an. expansion coefficient of  $12.5 \times 10^{-6}/^{\circ}\text{C}$ . (8 Marks)

End of part one, with best wishes

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 First Semester Exam, 2013-2014  
 Date of Exam: 13/01/2014  
 Total Marks: 100 Marks



Subject: Measurements and control of  
 refrigeration and air conditioning  
 Code: MPE 508  
 Year: Post graduate, Diploma  
 Time Allowed: 3 hours

**Part II: Control Devices**

(50 Marks)

**Question (3):**

With the aid of drawing, explain the function and operation method of the following instruments:

- 1) Overload
- 2) Thermostat,
- 3) Low pressure Control.
- 4) Solenoid valve,
- 5) Thermostatic expansion valve,
- 6) Volume damper,
- 7) Fire Damper.

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*With our best wishes.*

This exam measures the following ILOs.

Question No	Knowledge & Understanding Skills	Intellectual Skills	Professional Skills
1	KU1 , KU3, KU5	I1 , I5 , I6	PP1, PP5
2	KU1 , KU3, KU5	I1 , I5 , I6	PP1, PP5
3	KU1 , KU3, KU5	I1 , I5 , I6	PP1, PP5