



## Question Paper

Module 6:	Power and Automation	
Date: 15 May 2013	Time: 09:30 – 12:00	Duration: 2½ hours

You should have the following for this examination: **one answer book; calculator, pencil, pen and ruler.**

All questions carry equal marks. The maximum marks for each section within a question are shown. Answer **ALL SEVEN** questions, starting each new question (1-7) on a **new** page of the answer book.

1.
  - a) List **FOUR** pieces of safety legislation with which electrical installations must comply in the United Kingdom. (2 marks)
  - b) Considering the use of electricity, give **TWO** safety precautions that should be used to prevent injury to people and damage to plant. (2 marks)
  - c) Define the term "Power Factor". (2 marks)
  - d) State how low power factor can be corrected. (1 mark)
  - e) Describe how automatic water level control works in a boiler. (2 marks)
  - f) Explain why boiler feedwater treatment is necessary. (3 marks)
  
2.
  - a) Calculate what size pulley is required on a motor rotating at 2500rpm to drive a 200mm pulley at 3000rpm. (2 marks)
  - b)
    - i) Describe **TWO** examples of the use of friction in the milling process. (4 marks)
    - ii) State the major disadvantage of friction. (1 mark)
  - c) State **FOUR** points that should be observed to ensure that vee belts work at maximum performance. (2 marks)
  - d) With the aid of sketches, describe what is meant by the term "Arc of Contact". (3 marks)
  
3.
  - a) Describe the hazardous zone classifications for dusts and the corresponding equipment categories. (6 marks)
  - b) Explain the relevance of terminal velocity in screenroom aspirators. (4 marks)
  - c) Explain why compressed air should be dried and conditioned. (2 marks)

*continued overleaf*

4. a) With the aid of a labelled diagram, describe how a Pulse Jet Filter works. (5 marks)
- b) Define the term "Air to Cloth Ratio". (1 marks)
- c) Describe THREE factors that influence the choice of air to cloth ratio. (3 marks)
- d) Describe why a UK flour mill must have effective dust collectors installed. (3 marks)
5. a) i) Describe a modern strain gauge. (2 marks)
- ii) Describe the FOUR advantages of modern strain gauges. (4 marks)
- b) With the aid of a labelled drawing, describe how a load cell works. (4 marks)
- c) Describe TWO examples of the use of load cells in flour mills. (2 marks)
6. a) Describe the basic structure of a PLC system. (6 marks)
- b) Describe how memory is organised in a PLC. (6 marks)
7. a) State FOUR advantages of PLCs over Relay Control Systems. (2 marks)
- b) State the TWO main types of loop controllers used in process control systems. (2 marks)
- c) Explain where in a flour mill you would use a feedback system in preference to a feed forward system. (4 marks)
- d) Describe FOUR examples of process control in a mill. (4 marks)