



## Question Paper

<b>Module 6:</b>	<b>Power and Automation</b>	
Date: <b>14 May 2014</b>	Time: <b>09:30 – 12:00</b>	Duration: <b>2½ hours</b>

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 the **FOUR** stages of supplying electricity to factories. (2 marks)
  - b) When designing a mill's Electrical Distribution System, describe the first planning stage. (2 marks)
  - c) Define the term "Diversity Factor" and describe how it can be applied. (2 marks)
  - d)
    - i) Define the terms "direct current" and "alternating current". (2 marks)
    - ii) Describe both direct and alternating current, fully explaining the differences between them. (4 marks)
  
2.
  - a) List **THREE** advantages and **THREE** disadvantages of a fully automated mill. (6 marks)
  - b) Describe the legal requirements for gas safety in the UK. (3 marks)
  - c) State why the risk of Legionellosis has to be controlled. (1 mark)
  - d) State the systems and conditions that can lead to a risk of Legionellosis. (2 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) Describe **THREE** common types of belt drive. (3 marks)
- b) Calculate what size pulley is required on a motor rotating at 1300rpm to drive a 350mm pulley at 300rpm. (4 marks)  
*(Show all workings and round answer to nearest mm.)*
- c) i) Define what is meant by the term “Air to Cloth Ratio”. (2 marks)
- ii) Describe **THREE** factors that influence the choice of air to cloth ratio. (3 marks)
5. a) i) Sketch a Pitot Tube, labelling its key features. (3 marks)
- ii) List the **THREE** parameters measured by a Pitot Tube. (1 mark)
- iii) Outline how each measurement is obtained. (3 marks)
- b) Describe how air speed in a duct is calculated using a Pitot Tube, including the formula used. (5 marks)
6. a) Describe the basic structure of a PLC system. (6 marks)
- b) State **FOUR** advantages of PLCs over Relay Control Systems. (2 marks)
- c) Describe the **TWO** main types of PLC programme storage. (2 marks)
- d) State the **TWO** main types of loop controllers used in process control systems. (2 marks)
7. a) Describe how memory is organised in a PLC. (6 marks)
- b) Sketch and label:
- i) a feedback control loop; (1 mark)
- ii) a feedforward control loop. (1 mark)
- c) Explain where in a flour mill you would use a feedback system in preference to a feedforward system. (2 marks)
- d) Outline **FOUR** examples of process control in a mill. (2 marks)