



Question Paper

Module 6:	Power and Automation	
Date: 16 May 2018	Time: 09:30 – 12:00	Duration: 2½ hours

You should have the following for this examination: **answer book, 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) State **THREE** points that should be considered when making an electric circuit safe by isolation. (3 marks)
 - b) Describe how a generator works to produce Alternating Current (AC) electricity. (3 marks)
 - c) Describe the **TWO** basic uses for water in flour mills, giving a practical example of **EACH**. (2 marks)
 - d) Describe briefly **FOUR** reasons why energy efficiency is important in flour milling. (4 marks)

2.
 - a) Describe a three-phase squirrel cage motor, stating the **THREE** main components and their purpose. (4 marks)
 - b) Describe Variable Frequency Drives, stating their **TWO** main advantages. (4 marks)
 - c)
 - i) Sketch and label the main parts of a roller chain. (2 marks)
 - ii) Explain why it is important that a roller chain is correctly tensioned. (2 marks)

3.
 - a) Describe the significance of terminal velocity in pneumatic conveying systems. (2 marks)
 - b) Describe **BOTH** a positive pressure conveying system **AND** a negative pressure conveying system, fully explaining the differences between them. (8 marks)
 - c) Describe how to balance a negative pressure conveying system manually. (2 marks)

continued overleaf

4. a) With the aid of a labelled diagram, describe how a pulse jet filter works. (5 marks)
- b) Define what is meant by the term “air to cloth ratio”. (1 mark)
- c) Describe briefly THREE factors that influence the choice of air to cloth ratio. (3 marks)
- d) Explain why a UK flour mill must have effective dust collectors installed. (3 marks)
5. a) Explain why it is important to monitor bin stocks. (3 marks)
- b) Describe THREE ways of measuring the LEVEL of stock in a bin. (6 marks)
- c) Describe how load cells are used to monitor the stock in a bin. (3 marks)
6. a) With the aid of sketches, describe how plant is controlled by:
i) Traditional relay-based controls;
ii) Programmable Logic Control (PLC). (8 marks)
- b) State the main differences between PLC and relay control systems. (3 marks)
- c) State the TWO advantages of using PLC in the mill. (1 mark)
7. a) i) Describe the difference between a feedforward loop and a feedback loop, explaining how EACH system works. (4 marks)
- ii) State which system you would use for wheat damping, and explain your choice. (4 marks)
- b) Explain how an Enterprise Resource Planning (ERP) system is used in a flour mill. (4 marks)