Question Paper

Module 6:	**Power and Automation**	
Date:	Time:	Duration:
12 May 2021	**09:30 – 12:00**	**2½ hours**

You should have the following for this examination: **one 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)** **Describe the THREE main factors governing energy use in flour milling.** (6 marks)

b) **State the best way to use energy efficiently in the milling process** (1 mark)

c) **Describe how a flour miller can reduce maximum demand charges.** (2 marks)

d) **State THREE reasons why an electrical supply system may be modernised.** (3 marks)

2. **a)** **Describe the TWO advantages of Variable Frequency Drives (VFDs).** (3 marks)

b) **Describe the THREE main components of an electric motor.** (3 marks)

c) **i) State the main purpose of the EU MEPS Scheme.** (2 marks)

ii) Describe the key advantages of the scheme. (4 marks)

3. **a)** **State why it is essential to be in full control of the air used in flour milling.** (1 mark)

b) **Sketch and label a typical positive pressure conveying system.** (5 marks)

c) **State where you would usually choose to use a negative pressure conveying system instead of a positive pressure system.** (1 mark)

d) **State the differences between a negative pressure pneumatic conveying system and a positive pressure system.** (5 marks)

continued overleaf ….

4. **a)** **With the aid of a labelled sketch, describe a notched timing belt drive, explaining its advantages over other types of belt drive.** (6 marks)

b) **Describe FOUR ways in which friction is used in flour milling.** (4 marks)

c) **Explain the main disadvantage of friction.** (2 marks)

5. **a)** **Describe the THREE types of level measurement used for bin stock monitoring.** (6 marks)

b) **Describe a modern strain gauge.** (3 marks)

c) **With the aid of a sketch, describe how strain gauges are used in load cells.** (3 marks)

6. **a)** **Describe the THREE types of PLC system.** (6 marks)

b) **List the THREE main PLC programming languages, stating which is the most widely used.** (4 marks)

c) **State the TWO main types of digital processor used in process control systems.** (2 marks)

7. **a)** **Describe an example of:**

i) a feedback loop used in a flour mill; (2 marks)

ii) a feedforward loop used in a flour mill. (2 marks)

b) **Describe how process control systems are used in the following areas:**

i) Start up, shut down and suspend; (4 marks)

ii) Wheatfeed pelleting. (4 marks)