

## CTSI Professional Competency Framework (CPCF) written examination

### Weights and Measures written examination

September 2023

### Guidance for this examination

Please ensure that you indicate clearly at the top of the answer booklet, by ticking (✓) the relevant box on the front of your examination booklet, the law viewpoint from which you will be answering: English, Scottish or Welsh.

The examiners may expect candidates to show knowledge of legislation which is in place but not in force (i.e. has been enacted) and regulations which have been made but are not yet in force, if they are directly relevant to the subject matter of the examination.

### Examination structure

There are two sections to the examination paper:

**Section A** Consists of six questions.  
Candidates should attempt to answer three questions.  
Total allocation of marks is 30 marks.  
Suggested time allocation is 30 minutes.

**Section B** Consists of four questions.  
Candidates should attempt to answer two questions.  
Total allocation of marks is 70 marks.  
Suggested time allocation is 90 minutes.

Total time allowed – two hours (plus ten minutes' reading time).

### Note:

The Weights and Measures paper is a **closed book**; no materials are permitted to be taken into the examination room.

*The examination paper has **eight** pages, including this front sheet.*

**Section A**

Candidates should attempt to answer three questions.

Each question carries ten marks.

Total: 30 marks.

**1. Answer both parts of the question:**

- (a) Distinguish between three different types of dimensional measuring instrument. Give an example of what each may be used for. (6 marks)
- (b) What weights and measures offences may have been committed if you find an inaccurate dimensional measuring instrument being used for trade? (4 marks)
- (Total: 10 marks)

**2. Answer both parts of the question:**

- (a) Explain the meaning of the “presumption of conformity” in the context of the Measuring Instruments Regulations 2016 (as amended) with respect to weighing and measuring instruments that are being placed on the market or put into service. (3 marks)
- (b) Using examples, explain the difference between ‘normative documents’ and ‘designated standards’ and explain whether a manufacturer must use these. (7 marks)
- (Total: 10 marks)

**3. Answer both parts of the question:**

- (a) With respect to automatic weighing instruments, what is a control instrument and what regulatory requirements would be applicable? (6 marks)
- (b) Outline how you would use an integral control instrument on an automatic check-weigher. (4 marks)
- (Total: 10 marks)

**Section A continues over the page.**

4. **Answer both parts of the question:**

(a) What is an authorised representative? (5 marks)

(b) What tasks can they undertake with respect to placing weighing and measuring instruments on the market? (5 marks)

(Total: 10 marks)

5. **Answer both parts of the question:**

(a) What is a 'pre-package' for the purposes of the Weights and Measures (Packaged Goods) Regulations 2006? (5 marks)

(b) Contrast this with 'pre-packed' for the purposes of S94 of the Weights and Measures Act 1985. (5 marks)

(Total: 10 marks)

6. **Answer both parts of the question:**

(a) Briefly explain the function of the analogue to digital converter in a weighing instrument. (5 marks)

(b) Contrast an analogue load cell with a digital load cell. (5 marks)

(Total: 10 marks)

**Section A total of 30 marks.**

**End of Section A.**

## Section B

Candidates should attempt to answer two questions.

Each question carries 35 marks.

Total: 70 marks.

### 7. Answer all parts of the question:

#### Supporting document for question 7 on the next page

You are an Inspector of Weights and Measures and make an inspection visit to a local fishmonger and see a wide range of fish in sealed packages. You inspect the labels and notice that they are all marked "200g" and have a unit price marked as "£18/kg" and a use by date. They do not bear an e mark.

- (a) What other legislation would apply to the weights and measures control of these packages? Explain your answer. (8 marks)
- (b) What are the three packers' rules? (6 marks)

You count the packages in the chiller in the shop and discover there are 32 all with the same use by date, and you carry out some weight checks. You do not remove the fish from the packages. The heaviest is 209g and the lightest is 187g.

- (c) What actions would you take next? Explain your answer. (6 marks)

The fishmonger tells you that there are another 150 packages in the freezer at the back of the shop which have different use by dates as they were packed at different times. You go and check them and discover that there are 100 with the same use by date as those in the front of the shop.

- (d) How would you determine the batch that you would use for a reference test? Explain your answer. (5 marks)
- (e) How would you decide whether a reference test should be destructive or non-destructive? (5 marks)
- (f) The results of a reference test show that there are seven packages below 186 grams net weight. Has the reference test been passed? Explain your answer. (5 marks)

(Total: 35 marks)

**Question 7 supporting document continues over the page.**

**SCHEDULE 3****Regulation 2****Tolerable negative error**

In calculating the amount of a tolerable negative error in a case where the error is to be calculated as a percentage of the nominal quantity, the amount shall be rounded up to the nearest one-tenth of a gram or millilitre.

<i>Nominal quantity in grams or millilitres</i>	<i>Total negative error</i>	
	<i>As a percentage of nominal quantity</i>	<i>g or ml</i>
5 to 50	9	–
from 50 to 100	–	4.5
from 100 to 200	4.5	–
from 200 to 300	–	9
from 300 to 500	3	–
from 500 to 1,000	–	15
from 1,000 to 10,000	1.5	–
from 10,000 to 15,000	–	150
above 15,000	1	–

<i>Number in group</i>	<i>Number in sample</i>	<i>Number of defective packages</i>	
		<i>Acceptance criterion</i>	<i>Rejection criterion</i>
100 to 500	50	3	4
501 to 3,200	80	5	6
3,201 and above	125	7	8

**Section B continues over the page.**

8. **Answer all parts of the question:**

You work for a weights and measures authority that is also an approved body for module F and F1. You notice that a local pizzeria has a marketing campaign where they are advertising selling takeaway pizza by length.

You go to visit the pizzeria and note that there is price per cm and price per inch. You ask for 20cm of pizza and notice that the length of the pizza is measured by some marks on the edge of the counter. You seem to have a very large piece of pizza and as you are an inquisitive inspector of weights and measures you decide to measure it when you get back to the office and see that is just over 50cm long.

(10 inches = 25.4 centimetres)

- (a) Is it permissible to sell pizza by length? (4 marks)
- (b) Is it possible to have a price in both centimetres and inches? Explain your answer. (5 marks)
- (c) Explain why any material measure of length used to measure the pizza would need to meet the requirements of the Measuring Instruments Regulations 2016. Also, regarding those regulations, explain the procedural and technical requirements that would need to be met if material instruments are to be placed on the market. (8 marks)

The pizzeria accepts your advice and agrees to purchase a material measure of length. They discover that they can buy one online from a supplier in France.

- (d) What conformity markings, supplementary metrology markings and inscriptions must the material measure of length be marked with? (6 marks)
- (e) What obligations may arise from purchasing the instruments from France? (5 marks)

The owner of the pizzeria discovers that he can purchase the unmarked instruments much cheaper and asks whether you can initially conformity assess them.

- (f) Explain the difference between module F and F1 and whether it is possible that you could undertake the conformity assessment for them. (4 marks)
- (g) Explain briefly how you would undertake the conformity assessment. (3marks)

(Total: 35 marks)

**Section B continues over the page.**

9 **Answer all parts of the question:**

You are doing an inspection of a local fuel station. You undertake a physical inspection of the measuring instrument and note the various parts. You notice that the liquid fuel instrument is marked M21.

- (a) What is a pulser? Explain briefly how it works. (6 marks)

You decide to take some fuel from the liquid fuel measuring instrument to check the accuracy of the meter, using your working standard measures.

- (b) Outline the legislative requirements regarding those measures. (5 marks)

- (c) What physical tests would you undertake and apply when testing the accuracy of the meter? (6 marks)

- (d) You take a 20-litre measure and note that the delivered quantity is 300ml less than indicated. What actions could you take? (6 marks)

Upon further investigation, you decide to interrogate the checksum of the instrument and note that it is different from the one indicated in the type-examination certificate.

- (e) Contrast a version number with a checksum. (6 marks)

- (f) With reference to the essential requirements of the Measuring Instruments Regulations 2016 and the WELMEC Guide 7.2, explain why this is important. (6 marks)

(Total: 35 marks)

**Section B continues over the page.**

10 **Answer all parts of the question:**

You are working as an inspector of weights and measures and, whilst out on inspection, you notice a weighbridge that has been there for many years being worked on at the entrance to a local recycling centre.

Five days later, you receive a notification that a local weighbridge manufacturer, Bloggs and Son, has initially conformity assessed the weighbridge.

You decide to visit the site to carry out an inspection. Due to budget cuts, you do not have a weighbridge test unit. You ask to see the paperwork that the engineer has left behind. You ascertain that the weighbridge was initially conformity assessed by Bloggs and Son on 23<sup>rd</sup> August 2023. The recent work was a replacement load cell and is a different brand from the one that was used when the instrument was first placed on the market. The instrument is marked with a CE mark, an M23 and the identification of a European notified body. There is a declaration of conformity with a date of 23<sup>rd</sup> August 2023.

- (a) Should the weighbridge have been initially conformity assessed? (5 marks)
- (b) Is it possible to use a different brand of load cell to the one that was originally used? Explain your answer. (5 marks)
- (c) Can Bloggs and Son undertake a re-qualification of the weighbridge? Explain your answer and outline your actions that could arise. (5 marks)
- (d) You decide to go back with a weighbridge unit and decide to undertake a full inspection. You have a trainee with you and will check the instrument following the procedures outlined in EN45501. Outline in detail that procedure and the errors that could be applied. (15 marks)
- (e) What conformity assessment marks and inscriptions would you expect to see on the instrument? The markings are on a label on the back of the indicator. Is this acceptable? (5 marks)

(Total: 35 marks)

**End of Section B.**

**END OF EXAMINATION PAPER.**