CTSI Professional Competency Framework (CPCF) written examination

Unit 4: Weights and Measures

September 2022

Guidance for this examination

Please ensure that you indicate, clearly at the top of the answer 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 **five** pages, including this front sheet.*

Exam: Weights and Measures	**Exam cycle:** September 2022
Date: 14 September 2022	**Reading time:** 10 minutes
Time: 10:00 – 12:00	**Max.:** 100 marks

Section A
Candidates should attempt to answer three questions.
Each question carries ten marks.
Total: 30 marks.

1. With respect to a non-automatic weighing instrument, what is a module? Explain your answer by reference to one of the modules defined in EN45501 (2015).

(10 marks)

2. Answer both parts:

   (a) Briefly distinguish between an automatic catch-weigher and an automatic checkweigher, referring to the accuracy classes which apply to each.

(5 marks)

   (b) Briefly outline the legislation that would apply to an automatic checkweigher used for checking packages covered by The Packaged Goods Regulations 2006.

(5 marks)
(total: 10 marks)

3. What is a local weights and measures authority and what are its responsibilities?

(10 marks)

4. Answer both parts:

   (a) What are the main requirements for weights outlined in OIML R111 (2004)?

(7 marks)

   (b) What category of weights would a manufacturer use to initially conformity assess a weighing instrument used for commercial transactions by a quarry, and what is the maximum allowed total error of the weights used?

(3 marks)
(total: 10 marks)

5. What is the significance of the CE mark, and can it continue to be used in the UK after the departure of the UK from the EU? Explain your answer in terms of Weights and Measures legislation.

(10 marks)

6. You have a weighing scale manufacturer in your area. Since the UK's departure from the EU, they have noticed an increase in the number of requests for instruments that can weigh in imperial units. They would like to know if they could design and build an instrument that can be used for trade and weigh in imperial units. What advice would you give them? Explain your answer.

(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. You are an Inspector of Weights and Measures, working for a local weights and measures authority in the far north of the United Kingdom. As a result of budget cuts, the authority is not an approved body. The authority is carrying out a project to check for the compliance of weighing instruments used in local jewellers. You visit a local business and carry out an inspection of the non-automatic weighing instrument that you find there. It has a CE mark and the other relevant legal metrology markings, including the suffix 17 after the metrology mark. The instrument is 600g x 0.01g.

   (a) List seven of the markings, besides the CE mark, that you may expect to see on the instrument.
   (7 marks)

   (b) What advice would you give the owner if he wished to replace the instrument in your authority next year?
   (3 marks)

   (c) Explain, in detail, the metrological tests that you would you carry out to ensure that the instrument continues to comply with The Non-Automatic Weighing Instruments Regulations 2016 (as amended).
   (15 marks)

   (d) Using table 7 provided, calculate the maximum permissible error that you would apply at maximum capacity. Express this in terms of grams or ‘e’.
   (5 marks)

   After testing the instrument, you note that the error at maximum capacity is 5 divisions. The trader has a certificate of conformity for the instrument which shows it was initially verified by a local authority approved body in the south of the United Kingdom.

   (e) What actions could you take immediately regarding your findings? Explain your answer.
   (5 marks)
   (total: 35 marks)

Section B continues over the page.

8. You are approached by a local farmer who intends to undertake contract farming for other local farms. He explains that he plans to charge his customers by the hour for the work completed, and by the litre for the volume of fuel used. The charge for the fuel will be determined by an old liquid fuel measuring instrument, at his farm, that he has used to fill up his own vehicles. He invites you to the farm to discuss the proposal and to look at the liquid fuel measuring instrument. You notice that the instrument is not networked to any other devices. The instrument has a data plate which shows the date of manufacture as 2008; it bears a CE mark and M mark, and other relevant markings, but no conformity assessment markings.

   (a) What advice would you give the farmer about using the liquid fuel measuring instrument to determine how much to charge his customers?

   (6 marks)

   The farmer enquires whether he must sell the fuel quantity.

   (b) What advice would you give him?

   (5 marks)

   After further investigation, you discover that the instrument used by the farmer could not be initially conformity assessed as the type-examination had expired. He decides to purchase a new instrument and asks you to conformity assess that instrument.

   (c) What physical tests would you undertake and what errors would you apply? Also, what legal metrology marks would you expect to apply to the new instrument to ensure that it is fully compliant with the legislation? The new instrument is initially conformity assessed by you in September 2021.

   (12 marks)

   The owner of the liquid fuel measuring instrument would like to connect it to his new computer system and print invoices for any fuel sold.

   (d) Would this be possible? Explain your answer.

   (6 marks)

   (e) What function does the pulser serve in a liquid fuel measuring instrument and should it be sealed after the conformity assessment?

   (6 marks)
   (total: 35 marks)

Section B continues over the page.

(9) You work for a local authority approved body and have been approached by a local business in your area that would like to place material measures of length on the market in the UK. The owner has manufactured material measures of length previously, in 2012, and he still has a number of these available to be sold in his factory shop. These bear a CE mark, an M mark and a notified body number. He would also like to import instruments from France, next year, that have not undergone a conformity assessment procedure and do not bear any metrology conformity assessment marks. He would like advice on what steps he should take to enable him to supply these instruments in the UK under The Measuring Instruments Regulations 2016 (as amended).

(a) Can the business owner legally supply the instruments that he has in the store in the UK? Explain your reasons.

(7 marks)

(b) What advice would you give him regarding the conformity assessment procedures necessary to place the newly manufactured measures on the market in GB and who should carry these out?

(11 marks)

(c) What is the significance of the OIML Document R35? Explain the three classes of error that must be applied. Briefly explain how you would undertake a verification.

(9 marks)

(d) Can the material measure of length be conformity assessed in both metric and imperial units for the GB market? Briefly explain your answer.

(5 marks)

(e) A local veterinary practice would like to purchase a material measure of length marked in hands. Is this possible?

(3 marks)
(total: 35 marks)

9. You have recently taken responsibility for a trainee in your department, and that person has come to you with several matters for you to explain.

(a) What is a measuring container bottle?

(8 marks)

(b) What is standard temperature accounting? They would like you to explain what guidance is available on this matter. Outline, briefly, how you would inspect a liquid fuel measuring instrument that utilises standard temperature accounting marks.

(8 marks)

(c) You are asked which WELMEC Guide relates to the control of software in weighing and measuring equipment. Explain the structure of the Guide that relates to instruments under The Measuring Instruments Regulations 2016 and briefly explain what software identification you would expect to find on a liquid fuel measuring instrument.

(8 marks)

(d) The trainee has a project to advise a local producer of yoghurt. The pots are marked 250ml and are filled to the top; no weighing or measuring equipment is used for the process. The packer would like to know how he can make the process fully compliant with The Packaged Goods Regulations 2006 (2006/659).

(11 marks)
(total: 35 marks)

Section B total of 70 marks.

END OF EXAMINATION PAPER.