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## TÜV Rheinland FS Engineer - Examination Rules

### Examination Format

Day four consists of two examinations (Part 1: 2.25 hours duration; Part 2: 2.5 hours duration):

- Part 1: Closed book examination comprising 70 Multiple-Choice questions (where only one answer is correct). No material can be present in addition to the examination paper.
- Part 2: 10 questions comprising multiple parts. Three marks per question are available for a correct answer. Specified information<sup>1</sup> can be taken into the examination but not the training material which is provided to each participant on the course. A scientific calculator can be used in this part.

### Examination Timing

Should the candidate feel that they need more time to study the material prior to sitting the examination then the examination can be arranged on a future date, time and location acceptable to the candidate and ESC Ltd.

### Examination Paper Completion

The examination papers should be completed in a clearly understandable manner. That is:

- Part 1: The answer “letter” should be clearly indicated in the answer box. If the answer is changed then the previous answer shall be completely “crossed out” and replaced by the new answer. If the second answer is required to be reversed, then the third answer must be initialled by the examination invigilator. Any question with more than one answer, without the “crossing out” of one answer will be marked as incorrect.
- Part 2: The answers in part 2 are more descriptive. Therefore, please ensure that the handwriting is legible to the examination marker. This may mean that the answers need to be printed. If the response is not legible the question will be marked as understood by the examination marker.

### Examination Pass Mark

The pass mark for the course is 75%. The pass mark is a combination of both parts, there is no minimum requirement for each paper. Part 1 is worth 70 marks and Part 2 is worth 30 marks.

### Examination Disqualification

The candidate is responsible for the material on their desk during the examination. In advance of the examination the examination rules (this page) will be read to the room.

If during the examination any materials not permitted in Part 1 or Part 2 of the examination are observed, then both Parts of the examination will be deemed invalid and the candidate will be asked to leave the room immediately.

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<sup>1</sup> Specified information includes unmarked copies of IEC 61511:2016, IEC 61508:2010 or the standard extract issued with the course material. The extract will have enough information for completion of the examination.



### **Examination Paper Results**

If the result of the examination has been unsuccessful then the candidate can resit the examination after 3 to 6 months have passed at a future ESC course location or a specific arrangement with the travel expenses paid by the candidate / company.

Upon successful completion of the examination, the examination papers of those who achieve the minimum of 75 marks out of 100 are submitted to TÜV Rheinland together with the eligibility forms and supporting documents.

### **Certification Process**

TÜV Rheinland will contact the candidate and finalise administrative details.

The certificate should be issued within 4 weeks of the documents being submitted to TÜV Rheinland by ESC. When ESC submits the documents to TÜV Rheinland the candidate will receive an email from ESC informing them of the submission and how to contact TÜV Rheinland if contact has not been made with the candidate within 4 weeks.

TÜV Rheinland will issue a license agreement which **MUST** be completed in advance of the certificate being issued. If this is not completed and returned TÜV Rheinland will not issue the certificate.

The certificate will be issued directly to the candidate and for reasons of data protection, TÜV Rheinland do not involve ESC in this information exchange.

### **Examination/ Course Additional Requirements**

If the candidate has any additional requirements that ESC should be aware of in the completion of the course and/or examination these should be communicated to ESC at least 2 weeks in advance of the course in order that suitable arrangements can be made.

ESC will endeavour to accommodate requests within the confines of the facilities available to them.

Examples include (not exhaustive), dyslexia requiring additional support material / time, diabetes requiring additional equipment on the desk during the examination, physical impairment for access to rooms / desk arrangements etc.

### **Online Examination Guidance**

#### **Equipment Requirements:**

The equipment required for the exam is:

- A machine with a working camera and microphone / headset.
- Mirror
- Photographic Identification
- The participant can also have blank paper to assist some of the questions before typing into the system (it is not anticipated that more than 3 sheets of A4 would be required).
- Scientific calculator can be used as per face-to-face exam.

#### **Exam Proctoring:**

The exam will be invigilated by one of our TÜV Rheinland FS Experts.

They will be watching you through the camera and you will be videoed during the whole of the exam.

**Note:** If you are **not happy** with the recording of the exam, then the exam will have to be taken as a Face to Face exam once COVID restrictions are lifted. People will need to be able to travel to one of our ESC offices in the UK.

#### **Room Requirements:**

The room used for the exam must be:

- Sole occupancy of the participant
- Free of materials which are not permitted (as per face to face exam)
  - o Part 1: Closed book examination comprising 70 Multiple-Choice questions (where only one answer is correct). No material can be present in addition to the examination paper.
  - o Part 2: 10 questions comprising multiple parts. Three marks per question are available for a correct answer. Specified information<sup>2</sup> can be taken into the examination but not the training material which is provided to each participant on the course.
- Participants will be requested to use the mirror to show the invigilator the outside of the machine screen (via the camera) for lack of post-it notes.

#### **Pre-exam checks:**

The invigilator will check in advance of the exam start time:

- Photographic ID versus your image on camera
- Mirror check of screen
- Scan of room for others / materials
- Check of both sides of any paper available for the supporting completion of questions (part 2 only)
- Check of 'clean' standard extract (\*clean meaning no hand written notes on the document).

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<sup>2</sup> Specified information includes unmarked copies of IEC 61511:2016, IEC 61508:2010 or the standard extract issued with the course material. The extract will have enough information for completion of the examination.

### **Examination completion**

The examination will be hosted on an on-line system.

Each part of the exam will be provided with a unique link per candidate.

Part 1 will be set in 8 sections:

- Section 1 – Name and date of exam for administrative purposes and required to be completed in order to move on to Sections 2-11 questions.
- Sections 2 to 8: 10 multi-choice questions in each section

Part 2 will be in 11 sections

- Section 1: Name and date of exam for administrative purposes and required to be completed in order to move on to Sections 2-11 questions.
- Sections 2 to 11: 1 multi-part question in each section

The exam can be navigated “backward” and “forward” until you are satisfied with the answer. Each of these questions can be answered in any order. You will have full navigation between the questions at any time. Also you could partially complete a question in Part 2, and then go to another question before returning to the previous partially completed question.

Note: It is the participants responsibility to ensure that all questions are answered.

Back

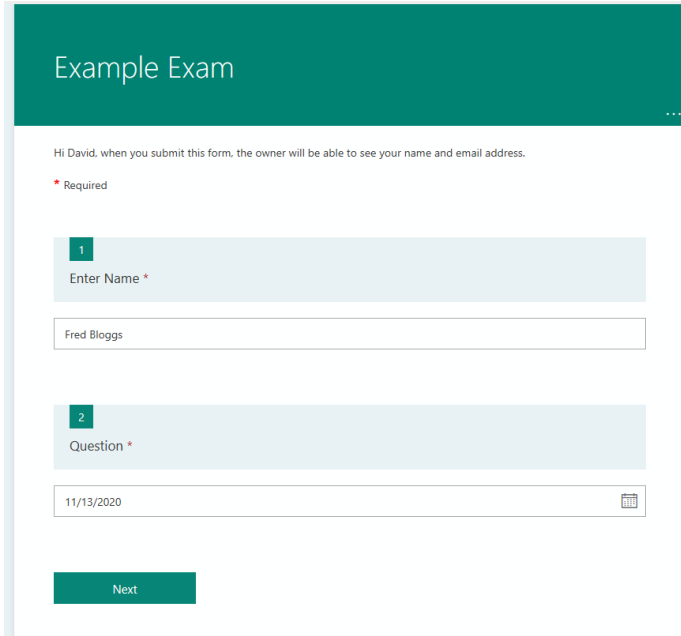
Next

When you have completed the questions , OR the time period allotted for the exam has ended, you must proceed to the final page and click “Submit” on the screen. No further changes can then be made.

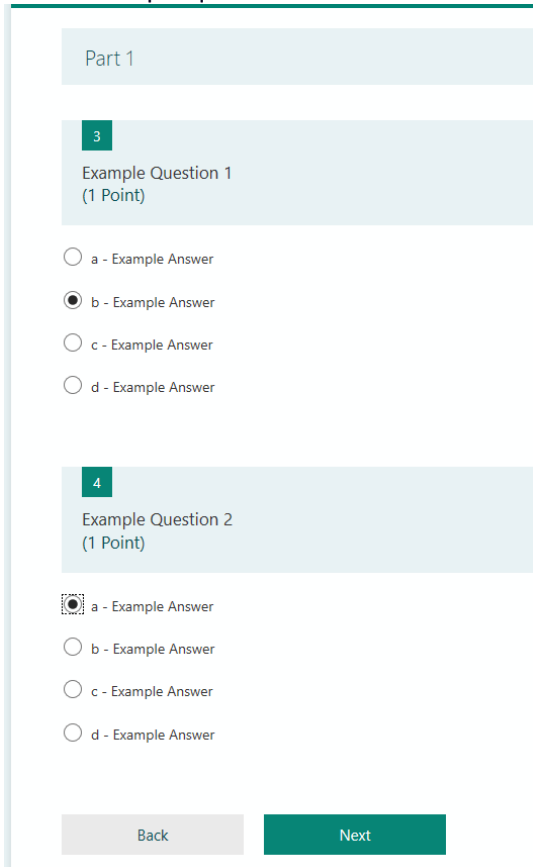
Submit

Part 1 will be completed by selecting a radio button (see image).

### Section 1 part



### Part 1 example questions

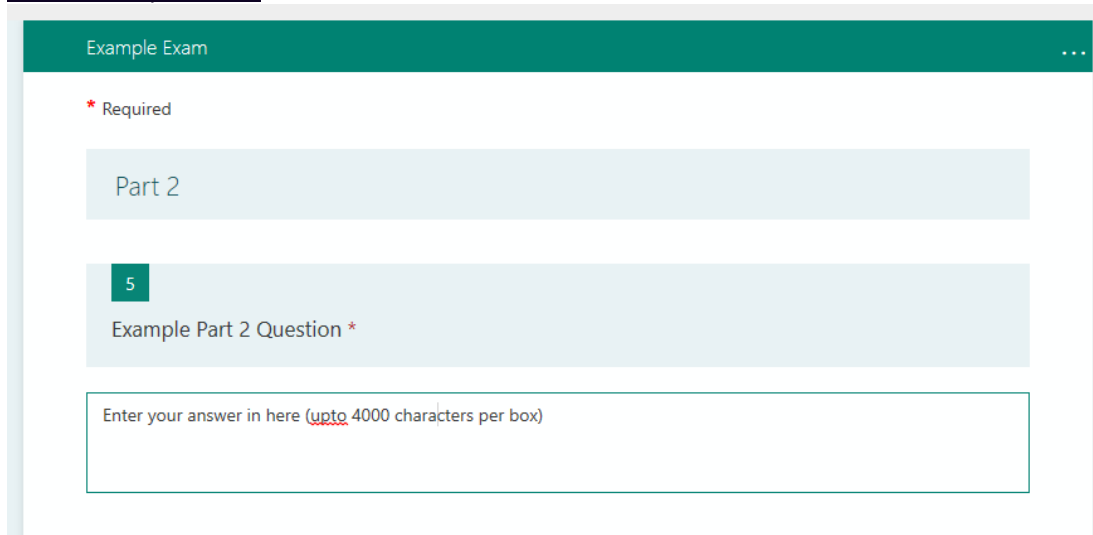


Part 2 will be completed in text format.

The answers will be in three types:

- Pure text
  - Complete these in as much detail as you would on the written paper (each text box is limited to ~4000 characters (so 2 boxes for each part will be provided – the continuation box does not need to be used if not needed).
  - Drawings – the system cannot accept drawings so examples will be given in the question and you can use a description (see example below)
  - Calculations – these need to be typed out, some symbols would normally be used, however please simplify these as detailed below

#### Part 2 Example – text

A screenshot of an online exam interface. At the top, there is a green header bar with the text 'Example Exam' and a three-dot menu icon. Below the header, there is a red asterisk followed by the word 'Required'. The main content area contains a light blue box with the text 'Part 2'. Below this is another light blue box with a green square containing the number '5' and the text 'Example Part 2 Question \*'. At the bottom, there is a white text input box with a green border and the placeholder text 'Enter your answer in here (upto 4000 characters per box)'.

Example Exam

\* Required

Part 2

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Example Part 2 Question \*

Enter your answer in here (upto 4000 characters per box)

Part 2 Example – drawings

The question could be to draw a reliability block diagram. Some suggested options will be presented. The presented images ARE NOT the answer, you will need to select the 'block' to use for each part of the diagram.

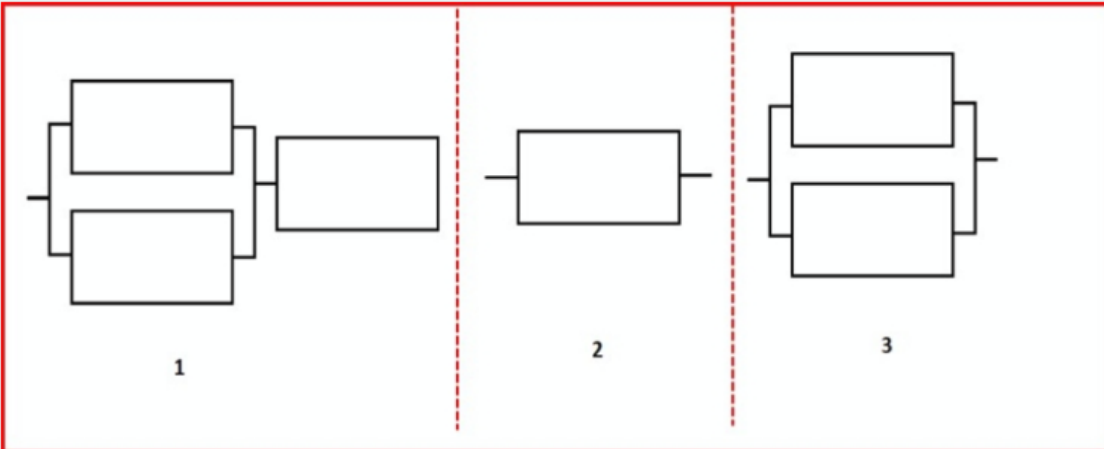
Other functions would be expected to be described rather than drawn. For example, identification of components within a SIF from a plant schematic.

The example screenshot shows how this would be represented:

Draw a reliability block diagram of the SIF with two flow meters (same type) in a 1oo2 voted arrangement closing a valve via a safety relay.

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Example Part 2 Question - Image \*



Item 1 - flow meter (x2 identical) + Item 2 - Relay + Item 2 - Valve |

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Part 2 Example – Calculation

Use the following equivalent terms for the calculation-based questions:

Mathematical Term	Equivalent Term
$\lambda_{du}$	Ldu
$\lambda_{dd}$	Ldd
$\lambda_s$	Ls
$\beta$	B
Squared( <sup>2</sup> )	(2)
Divide by	/
Multiply	*

So the 2003 equation would become:-

$\lambda_{DU}^2 \cdot T_p^2$  equates to **Ldu(2)\*Tp(2)**

The 1003 equation would become:-

$\lambda_{DU}^3 \cdot T_p^3 / 4$  equates to **(Ldu(3)\*Tp(3))/4**

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Example Part 2 Question - Calculation \*

Ldu1 = 1.2E-6, Ldu2 = 1.2E-6, Ldu3 = 1.6E-7  
 Tp = 12 months = 8760 hours

$$\begin{aligned} & (Ldu1(2)*Tp(2))/3 + B(Ldu1*Tp)/2 + (Ldu2*Tp)/2 + (Ldu3*Tp)/2 \\ & = (1.2E-6(2)*8760(2))/3 + 0.1(1.2E-6*8760)/2 + (1.6E-7*8760)/2 + (3.7E-8*8760)/2 \\ & = (3.68E-5) + 0.1(5.26E-3) + (7.01E-4) + (1.62E-4) \\ & = 1.42E-3 \end{aligned}$$

PFd is / isn't good enough to meet the target from question.