

ISTQB Advanced Test Manager Certificate in Software Testing

Sample Paper A - 3 Hour Examination This is not a complete exam paper

Record your surname/last/family name and initials on the Answer Sheet, writing in block capitals at the top and marking the relevant letter in each column.

Attempt all 65 multiple-choice questions.

There are no trick questions.

Pass Mark is 65/100.

Your answers should be indicated inside the box representing your chosen answer to the right of the question number.

Do NOT turn over this page until instructed by the invigilator

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Candidate Name:



SCENARIO 1

The following scenario applies for Questions 1 to 11 inclusive.

Avionics system enhancement.

Aerotech plc is an established avionic systems company that has developed and delivered a series of successful integrated cockpit management systems for advanced passenger aircraft. The Aerotech CM1 family of cockpit management systems integrates flight control, navigation, communications and warning systems into a single display and associated control panel.

Aerotech is now developing a new family of cockpit management systems, CM2, which offers improved performance, new display technology and simpler system controls to further reduce crew workload. The display technology has been used successfully in other cockpit applications for high performance military systems. The system design will utilise existing components of the CM1 family, develop new components, and integrate these via a new architecture that has been developed and tested in the company's R&D department. The development team will be made up of experienced developers and testers from the CM1 project and the architecture project and will use an Agile approach that has been documented after being trialled in the architecture development project. Development and testing tools are being carried over from the CM1 development. Testing personnel are located in separate premises from the developers.

The CM2 family will have 20% more code than the CM1 family and will have a more complex architecture, but about 80% of the CM2 code will be common with CM1. An analysis of the development and test data for the CM1 development has determined that testing took approximately 120 days of effort, broken down into 20 days for test planning and control, 45 days for test analysis and design, days hours for test execution and days hours for test evaluation and reporting.

The Project Manager has requested that an FMEA workshop be staged to assess the key risks identified for the project. The risks are:

Risk Number	Risk Description
1	There may be serious interface issues between the new modules and the original CM1 modules.
2	The CM2 system may not be able to meet the system response times currently achieved by CM1.
3	The new display technology may not exactly meet user expectations.
4	The new architecture may not be able to support all of the required functionality for CM2 with the new display technology.

1 Referring to Scenario 1 – In the CM2 project, which **one** of the following is **MOST LIKELY** to be a factor in causing inaccuracy in any estimates of time, cost or duration of testing?

- A The level of detail in specifications.
- B Assimilation or development of new tools.
- C Training and orientation of team members.
- D The complexity of the development and test processes.

K2 (1mark)

2 Referring to Scenario 1 – Which **three** of the following will need to be given highest priority in the test strategy and planning for the CM2 product family?

- A Timebox planning to achieve early delivery.
- B Detailed system integration testing.
- C Use of development and testing tools.
- D Detailed reviews of unit design.
- E Preparation of a software maintenance plan.
- F Establishing redundancy in the architecture.
- G Regression testing in each timebox.

K4 (3 marks)

3 Referring to Scenario 1 – Four separate estimates have been provided for the initial CM2 development testing effort. Based upon the information provided in the scenario, which estimate is the **MOST** realistic?

- A 144 days.
- B 100 days.
- C 300 days.
- D 170 days.

K3 (2 marks)

- 4 Referring to Scenario 1 – In preparation for the FMEA workshop you need to consider the likelihood, impact and testing activities that would **BEST** mitigate each risk. The table below records **four** possible impact and likelihood combinations (W to Z):

	Impact (severity)	Likelihood
W	Low	High
X	High	Low
Y	High	High
Z	Low	Low

The following lists four possible mitigating testing activities:

- a. System integration testing.
- b. Performance testing.
- c. Usability testing.
- d. Static testing.

Which option below provides the correct pairing of impact and likelihood combinations (W to Z) and testing activities (a to d) for risk number 3?

- A Y, b.
- B W, c.
- C Z, d.
- D X, c.

K3 (1 mark)

- 5 Referring to Scenario 1 – Following the FMEA workshop the test manager initiated test planning so that mitigation of identified risks **COULD** be incorporated into the plan. Which of the following is a further benefit of the decision to begin test planning at this stage? Select **one** option.

- A The test manager has resources allocated for test execution that can be employed earlier.
- B The test plan can be used to get an increase in testing resources and budget to give the test manager some contingency.
- C Critical components that need to be tested early can be identified and, if necessary, their delivery accelerated.
- D The scope of testing can be broadened to include project risks identified in the project plan.

K2 (1 mark)

- 6 Referring to Scenario 1 – The final draft test summary report for CM2 includes the following details: Testing was completed in 110 days. A total of 473 defects were raised, of which 452 were fixed and retested. Three outstanding defects are at priority 2 and one at priority 1. All requirements have been tested and 100% decision coverage achieved.

Which **two** of the following list of additional information would need to be included to complete the test summary report?

- A Product risks covered by the testing.
- B Effort expended on preparation of test environments.
- C Test tools used in system testing.
- D Project risks not covered.
- E Definition of the testing carried out.

K4 (2 marks)

- 7 Referring to Scenario 1 – The Test Manager for CM2 has consulted widely on risk to try to generate a cost-effective test strategy because the cost of development has been well above budget. The co-opted aircrew who contributed to evaluating early versions are very happy with the functionality. The marketing department is concerned that the new version of the system should be at least as intuitive as the previous one, and the development team are slightly concerned that response times appear to be marginally slower than on CM1.

Which **one** of the following would be the **MOST** appropriate content of a test strategy for CM2?

- A Decision testing to achieve 100% coverage of all code; performance testing with scenarios that test up to and beyond expected loads; usability testing conducted by co-opted aircrew; full functional testing of every requirement.
- B Decision testing to achieve 100% coverage of the new code; usability testing conducted by co-opted aircrew, to include response time measurements; functional testing of the highest risk requirements only.
- C Decision testing to achieve 100% coverage of all code; performance testing of the new functionality only; usability testing conducted by the testers from the development team; full functional testing of every safety-related requirement.
- D Statement testing to achieve 100% coverage of all code; usability testing conducted by co-opted aircrew, to include response time measurements; full functional testing of every requirement.

K4 (2 marks)

- 8 Referring to Scenario 1 – The initial testing of CM2 has been completed in 110 days. In total, 473 defects were raised and 452 of these have been fixed and retested. Defects are categorised as priority 1 (needing immediate attention), priority 2 (temporary work around available while investigation proceeds), or priority 3 (acceptable work around available). All requirements have been tested and 100% decision coverage has been achieved. The outstanding defects are mostly at priority 3, but three are at priority 2 and one is at priority 1. The priority 2 defects all relate to response times, which are 8% slower than specified and therefore only 5% faster than those for CM1. The priority 1 defect is related to the new display technology, in that the display intermittently fails to switch from one mode to another on demand. The test manager is drafting a test report to guide the project manager on a release decision.

Which **one** of the options below would be the **MOST** practical guidance to offer the project manager?

- A Release the product but encourage aircrew to report any intermittent switching problems so that the problem can be investigated.
- B Release the product with a warning about intermittent switching problems and slow response.
- C Delay release to investigate the intermittent switching problem and draft a warning about the response shortfall.
- D Hold release until the intermittent switching problem and the response time problems are resolved.

K4 (2 marks)

- 9 Referring to Scenario 1 – A risk-based test strategy was created for the CM2 development project in which the key risks identified were:

- the risk of problems developing in the new components.
- integration of the architecture and new components.
- performance of the entire CM2 system.

To address these risks, which **three** of the following elements are the **MOST** essential inclusions in the test strategy?

- A Regression testing of the architecture with each new component.
- B Performance testing of the new components.
- C Functional testing of the new architecture.
- D Performance testing of the completed system.
- E Functional testing of the reused components.
- F Decision testing of the new components.
- G Usability testing of the architecture.

K3 (3 marks)

- 10 Referring to Scenario 1 – The Agile approach documentation is currently in draft format only and you must agree upon a review plan for the document prior to its use on the CM2 project. Select the **two BEST** options.
- A Conduct a management review to obtain stakeholder buy-in of the process.
 - B Do not hold a review, the process has already been trialled successfully.
 - C Conduct a contractual review to ensure that the process does not risk the attainment of contractual milestones.
 - D Ensure that the client is involved in the document's review.
 - E Ask the author to conduct a walkthrough with representatives from each project team.

K4 (2 marks)

- 11 Referring to Scenario 1 – You have been asked by the project manager to recommend the **MOST** cost-effective testing organisation for the CM2 release. As test manager, which **one** option would you choose?
- A Transfer test implementation and execution activities to the company's off-shore test organisation, which offers much cheaper resource rates.
 - B Outsource all testing activities to a well established quality assurance consultancy firm who offer cheaper resource rates when work is performed at their test lab, but you retain full test management control.
 - C Keep the current CM1 testing personnel but co-locate them with the developers.
 - D Give the developers greater testing responsibility, given experience gained during CM1, to reduce the need for so many independent testers.

K2 (1 mark)

--End of Scenario 1--

- 12** Which **one** of the following is likely to have the greatest impact upon the effectiveness of an inspection of a complex requirements specification?
- A** The review meeting overran the planned **two** hour time box slot by 30 minutes.
 - B** The document author was unable to attend the review meeting.
 - C** The document was made available to the moderator and review team the day before the review meeting.
 - D** The time spent by the review team was incorrectly captured in the project database.
- K2 (1 mark)**

- 13** Which **one** of the following is characteristic of the life cycle for systems of systems?
- A** Informal transfer of information between developers and testers.
 - B** Single level of integration and version control.
 - C** Requirement for regression tests when moving from each level of integration to a higher level.
 - D** No requirement for maintenance testing due to replacement of components.
- K2 (1 mark)**

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SCENARIO 2

The following scenario applies for Question 14.

Introduction of a formal test process.

WebSpace is a small business that provides mobile text messaging using Short Message Services (SMS), and associated services. The company's customers range from small businesses, using text messaging for alerts or marketing purposes, to large enterprises using text messaging for customer relationship management. One challenge of WebSpace's business model is support of the large number of customers running similar but not identical services, and another challenge is the relatively high rate of defects reported through their support web site.

On average, the construction of a new application generates 9 defects. Defect detection relies principally on reviews, which typically identify 5 of the 9 defects per application review and cost 10 person-hours per review to implement. Informal testing is done by the developers and the cost is included in the development activity. A metrics programme has determined that informal testing takes, on average, 5 hours per application and every undetected defect that generates a failure in informal testing costs 10 person-hours to correct.

Typically 1 defect per application reaches the market place. External failure costs vary but the management of WebSpace has decided that the potential impact on their image in the market place is equivalent to 100 person-hours of effort per defect.

Due to the high external failure costs a more formal test process is to be implemented, with formal testing replacing informal testing. The resulting cost impact is as follows:

- The review process and its defect detection rate will remain unchanged at 10 hours per application review and 5 of the 9 application defects being detected during the review process
- Debugging costs for defects found during formal testing remain the same
- Formal testing costs per application will be **three** times as much as the informal testing rate, due to the use of formal test specification templates and techniques.

It is anticipated that there will be an 80% reduction in defects reaching the market place per application.

- 14** Referring to Scenario 2 – What is the current cost of quality in this scenario and what benefit, if any, would be achieved by implementing formal testing? Select **one** option.
- A** Current cost of quality = 145 person-hours/application; benefit from formal testing = 62 person-hours/application.
- B** Current cost of quality = 55 person-hours/application; increase from formal testing = 10 person-hours/application.
- C** Current cost of quality = 195 person-hours/application; benefit from formal testing = 62 person-hours/application.
- D** Current cost of quality = 145 person-hours/application; benefit from formal testing = 80 person-hours/application.

K3 (2 marks)

--End of Scenario 2--

15 Which **two** items in the following list will always be preconditions for execution of a given test created using formal test design techniques?

- a. Test environment ready.
- b. Code reviewed.
- c. Functional specification reviewed.
- d. Expected results defined.
- e. Entry criteria specified for next test level.

- A** a and b.
- B** b and d.
- C** a and d.
- D** c and e.

K2 (1 mark)

16 Which **two** of the following are typical metrics used to measure how testing is progressing towards completion?

- a. Number of approved changes not implemented for this release.
- b. Number of testers deployed against planned team size.
- c. Testing costs compared with those planned and budgeted for.
- d. Total test time planned against effective test time carried out.
- e. Planned use of test tools against actual test tool usage.

- A** a and c.
- B** b and d.
- C** b and e.
- D** c and d.

K2 (1 mark)

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SCENARIO 3

The following scenario applies for Questions 17 and 18.

Introduction of a formal test process.

You are the test manager for an IT services company which has just delivered the first release of a new web-site to its client, FRESHCO, a small supermarket chain. The release included the following features:

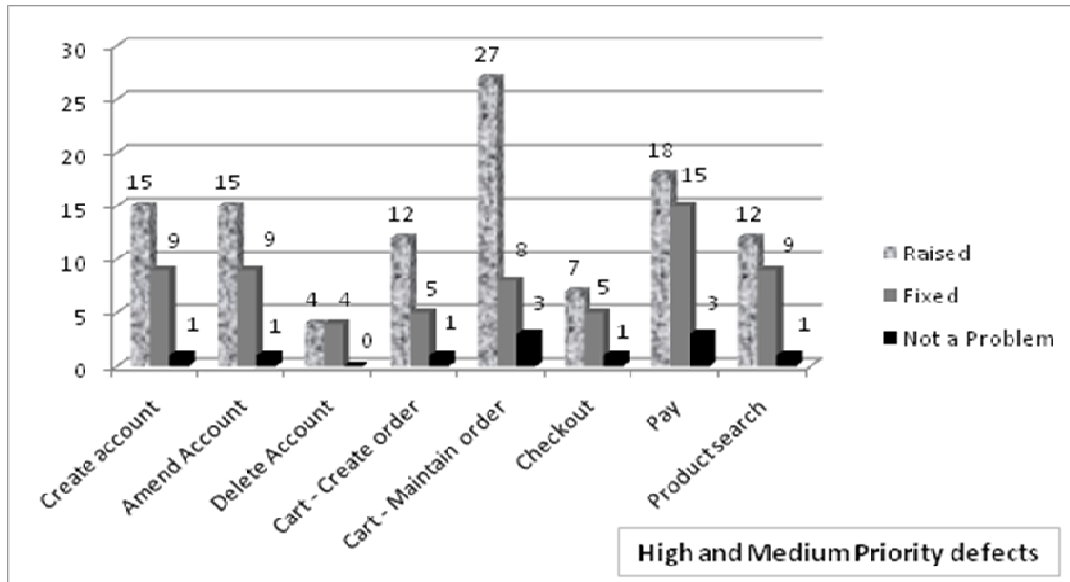
- Customer maintenance (create, amend and delete account)
- Shopping cart facility (create order, add, amend and remove items from order)
- Checkout order
- Pay for order
- Product search

The release was delivered late, primarily due to issues with the failure to correctly interface with external card processing systems when attempting to pay for groceries in the shopping cart and also because the performance of the product search facility failed to meet the contractual response times. Although the interface issues were resolved before implementation, the performance issues were not, resulting in your company incurring financial penalties which will continue to accrue until a satisfactory solution is delivered.

The second release for the web-site will include the following:

- Allow customer to create and use a 'Favourites' list
- Include the facility to maintain multiple delivery addresses in the amend customer account function
- Performance fixes for the product search module
- Other fixes to various residual defects from the first release

- 17 Referring to Scenario 3 – You are to create a defect taxonomy to aid test design for the second release. The taxonomy is to initially cover known problem areas only. The following Release 1 defect report has been produced to assist you in this task.



Taking into consideration the issues encountered in the first release, the contents of the second release and the defect report, which **three** of the following system functions would be the **MOST** important entries in the defect taxonomy? Note that 'closed' defects in the report have been sub-categorised as either 'Fixed' (i.e. fixed and successfully re-tested) or 'Not a Problem'.

- A Create Account.
- B Amend Account.
- C Delete Account.
- D Cart – Create order.
- E Cart – Maintain order.
- F Checkout order.
- G Pay for order.
- H Product search.
- I Maintain Favourites list.

K4 (3 marks)

- 18** Referring to Scenario 3 – You have instigated a lessons learned review following implementation of the first release and attempt to analyse the incident management database from that release. However, it becomes clear to you that insufficient data was being captured during an incident's lifecycle and the process itself seems to be missing important steps, making it hard to establish where improvements could be made. You have therefore decided to seek external guidance to improve the project's incident management process.

Which **one** of the following sources of standards would provide the **BEST** guidance for this task?

- A** International standards.
- B** FRESHCO's live incident reporting standards.
- C** National standards.
- D** Domain specific standards.

K2 (1 mark)

--End of Scenario 3--

- 19** You are testing a new missile guidance system for a commercial aeronautics company. This is the first phase in a multi-phase project, which develops a basic prototype of the new system; subsequent phases add more functionality until the final product has been built, tested and ready for implementation. You already have test and defect management tools from a single vendor, used by the team on previous projects and are keen to invest in a test automation tool for the prototype phase.

You have identified a number of commercial and open source tools which make the following claims:

- A** Tool ABC, from a second vendor, is a stand-alone automation tool that provides basic capture/replay features, is simple to use, quick to learn and much cheaper than its rivals.
- B** Tool XYZ, provided by your current vendor, is feature-rich and interfaces to other tools in the suite but is the **MOST** expensive option.
- C** Open source tool OP1 is free and provides developers the ability to enhance the tool for future use.
- D** Tool PQR, from a third vendor, uses a proprietary scripting language for which free training is provided, can be configured to work on multiple platforms and is mid-priced.

Which **one** of the **four** tools above would be **MOST** suitable for your project?

K2 (1 mark)

- 20** You have recently been appointed test manager for an organisation that was certified at CMMI level 1 maturity following delivery of its last project, which overran schedule and budget. It is already underway with the delivery of its next project for the same customer, a DIY/Home Improvement retailer. Requirement specifications have been agreed and baselined, with development and component testing already underway.

The test team for the last project was staffed by business analysts and developers, and the customer has insisted that this is rectified for the latest project. System test analysis is due to start in **two** weeks time, so you need to urgently recruit new test personnel. You have received a large number of CV's from various recruitment agencies and have an interview schedule in place.

You have found a sample questionnaire covering the recruitment of test personnel and want to refine it for use during the interviews. Which of the following interview questionnaire items would be **MOST** appropriate for the type of test personnel needed? Choose the **three BEST** options.

- A** Does the candidate possess a good working knowledge of the client's business?
- B** Does the candidate have experience in using test management tools?
- C** Does the candidate possess a good working knowledge of specification based test design techniques?
- D** Does the candidate understand a risk-based testing approach?
- E** Does the candidate possess a good working knowledge of structure based test design techniques?
- F** Does the candidate demonstrate good negotiating skills?
- G** Does the candidate demonstrate good communication skills?
- H** Does the candidate have experience in using capture replay tools?

K3 (3 marks)

--End of Exam--