General Comments

Candidates should focus on answering the question that is asked, and ensure the answer is in the context of the scenario given in the question. General statements or comments on the validity of the scenario, or techniques given in the scenario, will not earn marks and so waste time that could be better spent answering the question. Similarly candidates should avoid repeating or rephrasing the question or scenario at the start of their answer. The amount of detail given and the length of an answer should reflect the number of marks allocated to the question.

Section A
Answer Section A questions in Answer Book A

A1. You have been hired as a User Experience consultant to help with the design and evaluation of User Interfaces for the following systems.

Your answers must relate specifically to the scenarios given.

a) Describe how you would undertake a direct observation usability evaluation of a mobile banking application. (10 marks)

b) Describe how you would create an online survey to determine users’ opinions of their experience with a social media website. (10 marks)

c) Describe THREE advantages an online survey has over a postal survey. (3 marks)

d) Describe TWO disadvantages of an online survey compared with a postal survey. (2 marks)

A1. Answer Pointers

These are open-ended questions, so answers will vary but any reasonable answers will be accepted. Marks will be given for clear explanations and good examples.
a) This would usually be done using task-based testing. The testing would use one or more well defined scenarios including typical tasks users of mobile banking apps perform, such as log in, check account balances, transfer between accounts, make payments etc. Any special areas the stakeholders require testing should be included. A range of typical users should be used, and information on user characteristics and experience/familiarity with the platform gathered. If the app is cross-platform then a selection of devices and operating systems should be used for the testing. The scenarios would follow protocols to enable the collection of appropriate timing and error data. Direct observation may be supplemented by video recording, but in this instance keystroke/event monitoring is probably impractical. As a rule of thumb 30 or more users are required for a study, with greater numbers being required if a wide range of devices and operating systems are being tested. Metrics should be gathered including time to completion of scenario, errors made, type of error, error recovery, amount of help used/required. Results should be collated and analysed. In addition, observations from the testers should be recorded to clarify and give details with regard to issues encountered by users etc..

(10 marks)

b) Online questionnaires allow relatively large and efficient sampling of users. Various strategies can be employed to tempt users into participating, such as prize draws, additional features, special status etc. Questions should be carefully structured to address issues the developers want evaluated. User metrics should be gathered, either at the beginning or the end (probably most common), such as age, socio-economic group, frequency of site use etc. Specific tasks could be addressed “How easy do you find it to ...” or more general questions such as “How do you rate your experience ...”. Where possible rating or ranking systems should be used to allow easy, automated collation of results. Users could also be asked free-text questions such as “What can we do to improve ...”. The results should be collated and correlated with user metrics. They should also be correlated with individual usage statistics and user profile information from the site where possible.

(10 marks)

c) Advantages - any 3 of:

- only need to produce once
- no paper/postage
- can modify/update easily
- results automatically collated - saves time and avoids errors
- can be easier to do online recruiting

(3 marks)

d) Disadvantages - any 2 of:

- can be difficult to recruit sufficient numbers for online
- more expensive to design and build
- can exclude certain demographics
- can have self-selecting responders

(2 marks)
A1. Examiners' Guidance Notes

For questions a) and b), answers should describe the steps necessary to undertake the task described in the question. Most answers included some points that were valid in that context, but many failed to have sufficient structure and coherence to gain good marks. In respect of question a) it should be noted that using a focus group is not acceptable as a direct observation usability evaluation.

A2. With respect to Graphical User Interface (GUI) design, answer the following:

a) What is a mental model? (3 marks)

b) Describe why mental models are important in user-centred design. (6 marks)

c) What is a metaphor in a GUI? (3 marks)

d) Describe why metaphors are used in GUIs? (6 marks)

e) Give THREE examples of metaphors used in an operating system such Windows® or macOS™. (3 marks)

f) Give TWO examples of how colours are used as metaphors in GUIs. (4 marks)

A2. Answer Pointers

The questions are open-ended and answers will vary, but should cover the following points. Marks are awarded for accuracy and depth of answers.

a) A mental model is a transient and ever-changing model that users hold of the way a systems functions and how they perform tasks using the system. (3 marks)

b) Users' mental models must be understood for successful design of a GUI. If a GUI does not facilitate the development of, or violates existing users’ mental models they will find it more difficult to learn and use the system. (6 marks)

c) A metaphor uses familiar objects, usually from outside computing, to describe elements in GUIs or systems. (3 marks)

d) Metaphors are used to help the user develop an appropriate mental model of the system. By exploiting the familiar objects, actions or preconceptions of the user, they help bridge the gulf between their mental model of the system and the reality of it.

Although widely stated, it is actually erroneous that they exploit the superiority of recognition over recall by long-term memory - that applies to icons. (6 marks)
e) Any three of the following or any other reasonable example:
Desktop, Trash can/Recycle bin, Folder, Document, Dock, Menu.
(1 mark each - 3 marks)

f) Any two of the following or any other reasonable example:
Red for alerts, Red for potentially dangerous action, Green for continue/next,
Grey-out for inactive.
(2 marks each - 4 marks)

A2. Examiners’ Guidance Notes

The answers to the first four sections of this question required knowledge of the
theory of user interface design which is core to the syllabus, and should have been
gained through reading basic textbooks. Unfortunately a number of the answers
failed to show any level of knowledge of these areas. In particular icons were
described instead of metaphors in the last four sections of the question.

A3. CashIsUs Bank is purchasing a new model of Automated Teller Machine
(ATM). They hire you, as a user interface design expert, to evaluate the
usability of the ATM’s user interface.

a) Define what is meant by each of the following aspects of the usability of
the user interface:

i) performance (2 marks)

ii) accessibility (2 marks)

b) Describe how you would evaluate the performance of the user
interface, indicating the metrics you would use. (10 marks)

c) Describe the special measures you would take to evaluate the
accessibility of the user interface. Your answer should include
reference to the metrics, protocols and evaluation techniques you
would use. (11 marks)

A3. Answer Pointers

These are open-ended questions and students’ answers will vary, but should be
along the following lines. Any reasonable answer will be accepted and marks will be
given for clear explanations and good examples.

a. i. Performance can be defined as the speed and efficiency with which a
task is accomplished using the user interface. This is usually measured
with respect to system specifications or compared to other systems. (2 marks)

ii. Accessibility can be taken to mean the extent to which the user
interface enables users with disabilities to perform tasks - usually compared with non-disabled users.

(2 marks)

b. You would use the specifications for the system to determine the tasks required of the user interface and any specified time requirements/restrictions. In addition, any comparative systems either in the specifications or otherwise can be identified.

The main metric will be time to completion of tasks using the prototype interface, while other metrics would include number and types of errors, error recovery and use of help systems.

A protocol would be designed which includes an appropriate number and range of tasks to cover key required functionality. The tasks should evaluate all forms of interaction in the interface, including any buttons or touch screen elements.

The evaluation would then be carried out with a representative sample of users, recording times and errors as above. Results would be compared with the specification or with comparative systems tested in the same way.

(10 marks)

c. Usually accessibility issues would be considered throughout the design and development of the product, and should be written into the specification. Any evaluation should ensure that the user interface meets the specification. Any legislative or regulatory accessibility requirements applicable to the location the machines will be used in must be researched and compliance with these included in the evaluation.

Users with a range of disabilities would commonly be recruited for the study, but users with specific disabilities may be required in some circumstances. Such users are commonly recruited through disability support organisations, students with disabilities, local rehabilitation or disability services departments, seniors organisations centres and independent living organisations.

A suitable protocol would be designed which includes an appropriate number and range of tasks to cover key required functionality and the issues faced by disabled users. This must include evaluation of all forms of interaction in the interface such as buttons and touch screen elements.

When carrying out the evaluation, specific data regarding the users’ disabilities should be gathered. The location for testing - i.e. lab or field must be physically accessible, and any assistive technology required such as magnifiers must be available.

Pilot tests should be used to determine if extra time is required for the evaluation and evaluators must be aware that fatigue is a common problem in disabilities particularly when using assistive technology and therefore breaks and support may be required.
Some devices are available that attempt to imitate the difficulties of disabled users, such as gloves to make fingers clumsy and spectacles to simulate particular visual problems, but these are often not realistic evaluation tools.

A3. Examiners’ Guidance Notes

Section a) was generally well answered, but like question A1, answers to the other sections too often consisted of scattered points and lacked structure and coherence. The metrics used for evaluation studies are common to many methodologies, and a sound knowledge of these and the metrics used in particular methodologies would be relevant for this and many other questions commonly asked. To emphasise once again, facial expression of the user is not a valid usability metric.

Section B
Answer Section B questions in Answer Book B

B4. Conceptual Design is the first stage in most User Centred Design approaches and is considered to be the most important part of the design process.

a. What are the main characteristics of Conceptual Designs? (5 marks)

b. Briefly outline the kinds of methods, tools and techniques commonly used to produce Conceptual Designs. (5 marks)

c. Provide an annotated simple Conceptual Design for a new interface for a mobile phone. (15 marks)

B4. Answer Pointers

Conceptual Design as a first stage in User Centred Design is considered to be the most important part of the design process. They are the key determinants of whether a system will be usable.

a. What are the main characteristics of Conceptual Designs? (5 marks)

Bookwork: Conceptual designs are usually one page diagrams that show the main objects and associated attributes, main operations and the relationships between objects and between objects and operations. 1 mark for each.

b. Briefly outline the kinds of methods, tools and techniques commonly used to design Conceptual Designs. (5 marks)

Synthesis: Often Conceptual Designs are drawn as diagrams. Storyboards and associated techniques for constructing these are frequently used as a platform for expressing Conceptual Designs. With the advent of UML, Use Case diagrams are
often used to produce Conceptual Designs. Answers are not restricted to these examples. Any other graphical representation platforms are acceptable if placed in context.

c. Provide an annotated simple Conceptual Design for a new interface for a mobile smart phone.

(15 marks)

Problem solving is very open ended. What is expected is a diagram that identifies sensible objects, specifies attributes, shows operations and relationships, i.e. this would show that the candidate understands what conceptual designs are all about.

A good answer might look something like:

![Conceptual Design](image)

Marks will be awarded on the basis of showing main components and an understanding of how these are linked, used and annotated.

**B4. Examiners’ Guidance Notes**

While there were a number of good answers showing understanding and preparation there were also quite a few attempts that were poor. These answers did not show that candidates understood the question or material and seemed to be a reflection of poor preparation. In many instances candidates did not seem to understand what is meant by a conceptual design in the context of UI development or user centred approaches.

**B5. Address each of the following:**

a. Briefly explain what is meant by Usability Criteria? (5 marks)

b. How might you go about setting Usability Criteria for a web site? (5 marks)

c. How can sorting tasks be used to evaluate the usability of a web site? (5 marks)

d. Discuss the difference between Usability and User Experience (UX) (10 marks)
B5. Answer Pointers

a. Briefly explain what is meant by Usability Criteria? (5 marks)

Usability Criteria refers to a measurement in evaluation, usually in the form of a metric. This could be latency, error rate, success rate, number of clicks or subjective judgements like satisfaction ratings.

b. How might you go about setting Usability Criteria for a web site? (5 marks)

There is no agreed approach to setting criteria, but typically:

- Brainstorming with design team and or clients.
- Reference to published literature.
- A priori reasoning.
- Focus groups.
- Survey.
- Etc.

c. How can sorting tasks be used to evaluate the usability of a web site? (5 marks)

Sorting methods are used to determine relationships between objects in design. Cf. Clustering and Mind Maps. A possible approach here is to take all objects in the interface and ask users to sort them according to relationships. These logical groupings can then be compared to the layout (groupings) of the interface. This gives an idea of how well user “mental models” have been transferred to the design.

d. Discuss the difference between Usability and User Experience (UX) (10 marks)

Usability (U) usually refers to how things work and efficiency in user interaction whereas UX tries to take account of how the user subjectively reports own experiences in interaction. While usability measures can take account of UX it was Donald Norman who advocated the term UX in an attempt to expand on the more empirical use of usability. U and UX frequently correlate as might be expected, i.e. if something is highly usable users report a good UX. However, U and UX can have a negative relationship, i.e. something is hard to use but users report high UX – they like it. Or users don’t like something that has high U. In safety critical systems and military interfaces there is often separation between U and UX.

B5. Examiners’ Guidance Notes

This question produced a wide range of answers. Some attempts were very good indeed while some others were very poor. The range of marks awarded was between 24/25 and 1/25. In a) some candidates were not clear about what is meant
by usability criteria and the links to definitions and measurement. In section b) too many candidates did not seem to have read the question in detail and therefore did not focus on how criteria might be set. This involves a number of methodologies. However, some answers were near to perfect. For section c) there were a number of good answers showing preparation and understanding. However, too many candidates did not seem to know much if anything about the use of sorting although these techniques are fundamental in HCI. Final section d) produced many good answers but sadly a number of candidates did not seem to know the difference between Usability and Ux.

**B6.** Scenarios and Use Cases are often used in modern User Centred Design.

a. What are the main advantages that Scenarios and Use Cases offer UI design teams? (5 marks)

b. In the context of Scenario Based Design what is meant by the term Stakeholder? (5 marks)

c. In Scenario Based Design low fidelity prototypes often take the form of storyboards. Design a simple but annotated storyboard that shows an interface and simple dialogue that prints a document. (15 marks)

**B6. Answer Pointers**

a. What are the main advantages that Scenarios and Use Cases offer UI design teams? (5 marks)

In essence the main advantages are that Scenarios and Use Cases offer ways for designers and users to communicate. Scenarios and Use Cases are easy to understand and have been shown to aid communication between stakeholders and designers but also within design teams.

b. In the context of Scenario Based Design what is meant by the term Stakeholder? (5 marks)

In SBD all interested parties are included in the requirements capture and considerations. Hence users are clearly stakeholders but other parties e.g. organisational management and various people who may contribute to the design work also have an interest. Collectively they are the stakeholders.

c. In Scenario Based Design low fidelity prototypes often take the form of storyboards. Design a simple but annotated storyboard that shows an interface and simple dialogue that prints a document. (15 marks)
The key to storyboards as used in SBD is clear annotation of frames in terms of titles, objects and other attributes, detailed labelling and descriptions of links which are events based on user or system actions and general annotations. This is an open ended question but a typical SBD storyboard style is shown below.

B6. Examiners’ Guidance Notes

A relatively small number of candidates chose to attempt this question but overall there were some very good answers showing knowledge and understanding. A few attempts were poor and seemed to be a reflection of no preparation. In sections a) and b) good answers were provided but candidates should ensure that they address the question and provide only relevant and precise answers. Section c) provided mostly good storyboards but candidates need to ensure that transitions between frames are specified and that a high level of annotations is provided.