Solver: Anusha Datta

1) a) i) Three possible answers (other answers are possible):
- Blinking colours: should ideally blink at 2-4 blinks per second (Hz), no more than 4 colours on a screen
- Audio: soft tones for positive, harsh for emergency
- Different sizes: up to 4 sizes, with larger sizes attracting more attention

ii) User attention grabbing can be effectively accomplished by using only one technique, and so the need for multiple techniques does not arise. Using too many of these attention-grabbing techniques simultaneously is not advisable as they can prove to be too much, and overwhelm the user. This, in turn, will create an unpleasant user experience.

Editor's note: It would also be good to mention how human's bottom-up attention control works where humans pay more attention to features which standout **pre-attentively**. With too many techniques going on, it defeats the purpose of having certain features standing out and thus attention is not given subconsciously.

b) Strengths *(any 3 of the following):*
- More accurate information about tasks
- More opportunity for users to influence design decisions
- A sense of participation that builds users' ego investment in successful implementation
- Potential for increased user acceptance of final system

Weaknesses *(any 3 of the following):*
- Be more costly
- Lengthen the implementation period
- Build antagonism with people not involved or whose suggestions rejected
- Force designers to compromise their design to satisfy incompetent participants

c) A mental model is a **user's idea** of how a device or software works or behaves. Mental models are an important consideration in user interface design. If the user interface responds in a manner that fits user's mental model, it results in small or no gulfs of execution and evaluation. Hence, there would be greater satisfaction levels among users.

d) i) The golden rule 'offer informative feedback' states that for every user action, the system should provide feedback. Visual approaches such as simple jargon-free system messages, highlighting of selected icons and progress bars can help convey useful user feedback. A good example of applying this would be to indicate to the user where they are at in the process when working through a multi-page

questionnaire. A bad example we often see is when an error message shows an error-code instead of a human-readable and meaningful message.

ii) Novice user:

- Feedback is **descriptive** and uses restricted vocabulary.
- It may provide help with instructions, dialog boxes, who to turn to for help, multiple languages and consistent terms.

Knowledgeable/intermittent user:

- Feedback may not be as descriptive but still **meaningful**.
- It may guide to frequent patterns of usage and provide context-dependent help

Expert user:

- Feedback is **brief** and concise.
- It may not provide much guidance on what to do thereafter.

2) a) i) Usability laboratory testing can be administered to assess the gaming application. The specific technique that would be most effective is the Usability - Think Aloud lab test. This is because the target users are children, and it is important to observe how they navigate the UI. Children have a fundamentally different thought process from that of adults, and so it is critical for the designers to have an insight into it. The inputs obtained from the study (in the form of reactions, comments or difficulties faced) will all help improve the UI to better suit the target user base.

Editor's note: It may be worthwhile to discuss why this is suitable **despite the application being not fully functional** as stipulated by the question. I would think that a heuristic review would have worked too with the application being not fully functional.

ii)

- **Time to learn.** The users can be observed to determine how long it takes for them to learn a specific task (such as changing the character's outfit for the game). This will provide the designers with a better intuition of how easy or difficult the application is to navigate.
- **Rate of errors.** During the usability test, the designers can note the errors made by the children. Information regarding the number and kinds of errors are made during benchmark tasks can help re-design the application in a way that allows for lesser errors.
- **Retention over time.** The users can be re-invited for another user study after a week to observe how well they retain their knowledge over time. This can aid the improvement of frequency of use and ease of learning, as it helps make for better user retention.

Editor's note: As stipulated by the lecturer, it is mandatory to **contextualise** and provide a **specific use case** to illustrate how the measures are obtained. It is

insufficient to say like "measure time required to use the software". What kind of use case? How is the time measured?

iii) Steps for continuous user-performance data logging

- The software architecture should be designed in such a way where it collects data about the patterns of system usage, speed of user performance, rate of errors, and frequency of request for online assistance.
- Consent must be obtained from the users before such data logging can be done.
- The data is then used as a guidance to system maintainers in optimizing performance and reducing costs (in terms of effort, time to learn and use) for all participants.

b) A) Heuristic evaluation - 4) Expert reviewers critique on the UI
B) Guidelines review - 5) Inspects UI to see if it adheres to the guidelines
C) Consistency inspection - 1) May use software tools to help automate the process
D) Cognitive walkthrough - 2) Simulates how users go through the UI
E) Formal usability inspection - 3) Court room style setting

c) Cognitive walkthrough aims to identify user patterns and difficulties navigating UI. A computer engineer may not have the same thought process as to how to use the user interface given the technical background of the engineer. A computer engineer may not face any major difficulties in using the application and navigating it due to his/her skills and may already be familiar with it. This is not representative of the actual user base, who do not possess the same knowledge or experience. Hence, the cognitive walkthrough will fail to accurately capture the drawbacks of the application with respect to its true users.

3 a) i) 1) Touch
2) Balance
3) Hearing
4) Proprioception
5) Smell
6) Temperature

ii) Proprioception is the perception or awareness of the **position** and **movement** of the body. This is achieved through various combinations of sensory input: balance and muscle stretch.

b) i) The McGurk effect is a phenomenon that demonstrates that **visual cues** can change our perception of speech. Animated virtual characters may significantly help a user identify the speech being conveyed by the kiosk. This is due to the additional aid of being able to lipread the characters' speech. Hence, effective employment of the

McGurk effect helps overcomes the limitations of a noisy environment where it may be difficult to hear clearly what is being said without visual information.

ii) The Big Five OCEAN Model aims to determine the **personas** of target users, as an important aspect of UI design. It aims to quantify users' personality. Understanding the mental model and personality traits of the user can also prove to be very useful in the design of virtual characters. The reason is because this helps create virtual characters that embody the characteristics of the users themselves. Hence, the users resonate with the virtual characters better, and this leads to a more gratifying user experience.

Editor's note: It would be good to give an example.

4) a)

	Scenario A	**Scenario B**
Physical Size	Large - cater for many viewers	Small - to fit inside headset, 1 for each eye
Pixel Density	Lower- screen is further from eyes, less pixels needed per inch	Higher - screen is closer to eyes, more pixels needed per inch to prevent eyes from differentiating pixels
Viewing Angle	Larger - screen viewed by many viewers, each seated at different positions; viewing angle has to be larger so each person can see the screen with reasonable quality	Smaller - VR headset used by only one person
Brightness	High peak luminance - the brightness of natural daylight necessitates that the screen is bright enough to see it	Lower peak luminance - the VR headset encloses vision in a dimly lit space, so less brightness is required
Black Level	Higher black level - due to brightness of surroundings	Lower black level - in a dimly lit space, lower luminance of black pixels will make the viewing a more pleasant one

b) Text-to-Speech (TTS) can prove to be critically useful for users with perfect eyesight as well. Some examples are as follows:

- For those users whose visual attention is focused elsewhere. For example, road names read out in a **GPS navigator** for users unable to read while driving.
- Also useful to users with **speech disabilities** who want to communicate verbally, such as Stephen Hawking.
- Additionally, very useful for users **learning a new language**. This is as the TTS feature will facilitate correct development of pronunciation skills and provide comprehensive practice.

c)
- Sovereign posture means that it monopolizes the user's attention for an extended duration. Most major applications are sovereign posture.
- Transient posture means that the software briefly captures the user's attention from time to time. Examples of this are sidebar gadgets and chat notifications.
- Daemonic posture means that the software is mostly silent and very rarely captures the user's attention. Examples of this would be the network and volume icons in the system tray.

--End of Answers--