

**2ND SEMESTER 2021/2022 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATION ANSWER BOOKLET**

THE FOLLOWING DETAILS MUST BE COMPLETED BY THE STUDENT

400

ADS19A00110Y

STUDENT’S ID NUMBER­­­­­­­­­­: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ LEVEL:\_\_\_\_\_\_\_\_\_\_

IT403/CS408

Human Computer Interaction

COURSE COD**E: \_\_\_\_\_\_\_\_\_** COURSE TITLE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

EMMANUEL ADOTEY PAPPOE

LECTURER’S NAME: (Refer to the Question Paper) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**QUESTION NUMBER: (e.g., Q1) \_\_2\_\_SUB-QUESTION (e.g., 1(a)) \_2A, B, C\_\_**

1. The two radiate electrons on to cathode ray tube are;

Raster scan technique:

* In this technique the electron ray is read from top to bottom, left to right, before moving on to the following row.
* To maintain the stability of the image on the screen, the same procedure must be repeated. This is due to the fact that phosphor ray gradually loses its brightness over time.
* The image is updated exactly 30-70 times per second (30-70 Hz).

On the screen, there are some blinking lights as a result of this refreshing procedure. There are three strategies for preventing these negative effects:

* Boost refresh rates.
* Scanning should be done alternately. The even-numbered lines, for instance, are scanned before all the odd-numbered lines.
* Use phosphor that can radiate for a longer time. However, because this method can result in the smear effect, it is inappropriate for animation.

Random scan technique:

In the random scan technique, the electron ray is pointed straight at the area of the screen that contains the image. As a result, the area of the screen that is blank from images does not require the electron ray to be pointed at it. By refreshing the screen at a moderate rate, a crisper image can be achieved. However, this scan is only capable of producing line-based images and is inappropriate for producing complicated images, such as 3D objects.

1. Differentiating between the primacy, recency and closure effects of how information is memorized;

Primacy

* This is the result of the information being at the start of the list.
* Humans often begin the process of remembering from the beginning of a list, thus information that is put near the beginning of the list is simpler to recall.

Recency:

* This is the result of having information near the bottom of a list.
* Due to its presence in the short-term memory, the information near the end of the list is much simpler to remember.

Closure:

* the process of letting go of our focus after finishing a task.
* Reducing the strain on human memory is crucial.
* One may stop remembering all the knowledge required to finish the previous task and begin concentrating and remembering the new work, which is the secondary task.

1. Two types of mental models;

Structured type:

* It explains the structural operation of a system or device.
* It is employed to forecast system responses brought on by user behavior.
* It is challenging to use, yet simple to expand.
* When employing toolkits that are often used, it is typically not necessary.
* For instance, a user is unaware of the code's structure, whereas a coder must.

Functional type:

* It explains how to utilize a system or toolset.
* based on similar systems domain expertise when developing.
* It depends on context, is simple to use, but difficult to expand.
* A simple calculator, is an illustration.
* It does not address unforeseen questions and solely concentrates on a single task.

**QUESTION NUMBER: (e.g., Q1) \_\_3\_\_SUB-QUESTION (e.g., 1(a)) \_3A, B, C\_\_**

1. The two general conceptual model categories are;

Activity-Based Conceptual Model:

This paradigm is focused on the interaction between users and computers during communication. The aforementioned communication activity can be divided into four categories:

* Instruction-giving: When users input instructions, a system that adheres to the "Giving Instructions" conceptual model will only act. The UNIX and DOS operating systems and software, as well as systems that use selection menus, are examples of products that make use of the conceptual paradigm outlined above. Although the aforementioned examples employ various methods for imparting instructions, the basic idea is still the same: people tell computers to carry out certain duties, and the systems carry out these tasks in response.
* Conversation: All systems that make use of the conceptual models are created to operate in a way that is comparable to how people converse with one another. As a result, the systems would act as users' conversation partners by responding to all their queries and posing a few necessary follow-up inquiries to help them learn more from their first inquiries.
* Manipulation and navigation: Using the users' knowledge to carry out these activities in the actual world, the manipulation and navigation oriented conceptual model elaborates on object manipulation and virtual space exploration. One way to manipulate virtual items is by moving, selecting, opening, and shutting them. An example of a system that makes use of this conceptual model is the Windows Operating System. The direct manipulation approach is one of this strategy's key branches.
* Exploration: The foundation of the exploration-oriented conceptual model is the ability for users to explore and seek for information utilizing their familiarity with existing media, including books, magazines, TV, radio, libraries, and pamphlets. An individual can look for important information or booklets when going to the dentist, bookstore, or tourism office. These people would only keep reading if they came across any material that piqued their curiosity. CD-ROMs, web pages, portals, and e-commerce pages are a few examples of applications that make use of this conceptual model.

This indicates that while dealing with people, the system or product may combine a variety of communication techniques.

Object Oriented Model: This model uses a unique item to highlight the features and operating procedures of the system. The spreadsheet is an illustration of the object-oriented conceptual model. Ledger paper is used by spreadsheets to demonstrate its traits and operations. As a result, individuals who are accustomed to using ledger books may use the spreadsheet.

1. The two methods are;

Concatenation:

* Alphabets, words, and phrases that have been digitally recorded together, which is then played back via computer controls.
* To create new sentences, rearrange previously recorded words or phrases according to the prescribed patterns.
* Examples include automatic telephone operators.

This methodology has two drawbacks:

* The sentence or word created lacks a seamless flow and may occasionally be incorrect; and
* There is a limit to the number of words that may be produced using this method. The normal output of each application is less than 200 words, which limits the use of this technology.

Synthesis by Rule:

* Use fully synthesized words and sentences that follow both phonemic and context-based rules for a sentence or phrase.
* The smallest unit of sound is called a phoneme. The sound made by the letters "sh" and "m" is an example.
* The meaning of a word may vary if one of its phonemes is altered. Take the words "line" and "fine," for instance. The first phoneme in these words is what sets them apart.
* Compared to the concatenation method, produces more words and conversational sounds. On cameras, vending machines, and children's toys, for instance.

1. Four factors that affect keyboard usability;
2. The physiological and psychological characteristics of Users – A person with visual impairment cannot use a standard keyboard or mouse.
3. Training and skills of users – The joystick may be difficult for someone to use if they have no prior experience with it.
4. Implementation of tasks – Using a mouse to draw cartoon figures is not as effective as using a stylus pen.
5. Work and its environment – A noisy setting prevents a mobile phone user from making a voice recognition call to a friend.

Therefore, it is crucial to take into account all four of the aforementioned characteristics before choosing a suitable gadget. Each input device that is now used in computer systems has unique requirements that differ from one another. One requirement could be appropriate in one set of circumstances but not in another. This topic will analyze the advantages and disadvantages of the aforementioned input devices in order to address this issue. You need should be able to select an appropriate device for the system you intend to create after reading this topic.

**QUESTION NUMBER: (e.g., Q1) \_\_4\_\_SUB-QUESTION (e.g., 1(a)) \_4A, B, C\_\_**

1. Difference between a simple model and usability engineering model:

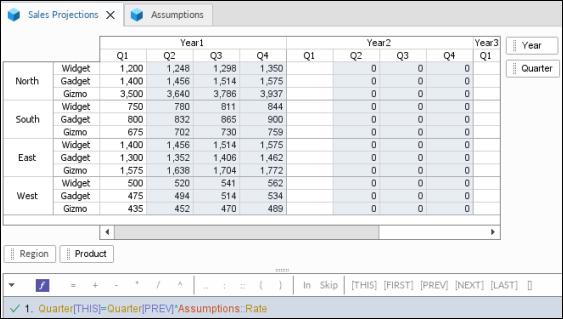
Simple Model:

The Simple model emphasizes the users while enforcing the idea of recurrence. Identifying user needs is the first step in the majority of initiatives. To guarantee that the identified requirements are met, a number of design alternatives are then developed. The interactive version is subsequently created and assessed. The developers may need to re-identify the system requirements or proceed to the design phase depending on the outcome of the review. After this process, a variety of alternate designs might be expanded.

Example:

You need to enter data for the most recent quarter and make a projection for the following few years. You should:

* Add a category for the year
* To create items for each subsequent year, label the initial item 2012, and then press ENTER more than once.
* Include a category for quarters
* After labelling the first item Q1, create items for each subsequent quarter by pressing ENTER three times.
* Include a model to predict the upcoming quarter using data from the current quarter and a growth assumption.



**Usability Engineering Model:**

The three primary tasks in the usability-engineering approach are requirement analysis, design development and testing, and installation. Deborah Mayhew put up this concept in 1999, and it offers the area and justification for carrying out usability testing. This activity is a part of the standard SDLC, which makes it extremely helpful for inexperienced developers to pass the usability test. Object-oriented software engineering and rapid prototyping are also combined in this strategy.

Example:

1. Usability goals;

Usefulness is discussed in terms of effectiveness and utility. The system's total performance is gauged by its **effectiveness**. Can users use the system to carry out the tasks they have to complete? **Efficiency** is more akin to usability and might refer to how long it takes to utilize the interface and how likely it is that you would use the system incorrectly. One example of efficient design is Amazon's single-button shopping. "Can experienced users use the system productively?" **Utility** is a metric for both accurate functionality and functional breadth. The majority of useful software is designed with this in mind; for instance, word processors include almost all the functions needed to create and format text documents. Does the system offer every feature that users require?

**The learnability** of the computer has been a worry for UI designers because it is a novel cognitive tool. The need to create "familiar and natural interfaces" that can be understood without consulting a manual has tormented designers for years. However, functionality is also important because not all interfaces must be immediately useful. How long did it take you to learn your programming language? A question that designers can ask, “Can users figure out what to do by browsing the interface?”

When a person has some experience with a system, a user interface is considered memorable if it is simple for them to recall how to use it. In order for GUIs with menus and icons to be **memorable**, they must have acceptable menu names and icon pictures, which is connected to learnability. "What kind of assistance does the system provide for remembering how to perform jobs, particularly those that are uncommon?"

**Safety** involves defending users against potentially harmful mistakes, such as losing all of the user's data or preserving the user's private information. Safety can also relate to a user's ability to correct mistakes. A little-considered usability aim is safety. Not placing the delete button close to the save button is an illustration of designing with safety in mind. Another illustration is offering consumers different means of error recovery, such as retreating to a priority state or advancing the system to the proper state. For instance, with a word processor, the writer can rectify errors by using the Control-Z key, using the Back button, or by retyping. What types of mistakes can users make, and how can they fix them?

1. They are;

* Applications that require monitoring and observation outside of their display, such as industrial machinery;
* Applications involving process controls where continuous observation is necessary;
* Applications for users who are visually handicapped;
* Applications where sound is required as data;
* Applications that incorporate audio as a supplementary element to the standardized visual user interface;

**QUESTION NUMBER: (e.g., Q1) \_\_5\_\_SUB-QUESTION (e.g., 1(a)) \_5A, B, C\_\_**

1. For Object Oriented Model:

This model uses a unique item to highlight the features and operating procedures of the system. The spreadsheet is an illustration of the object-oriented conceptual model. Ledger paper is used by spreadsheets to demonstrate its traits and operations. As a result, individuals who are accustomed to using ledger books may use the spreadsheet.

Interface Model:

An interface metaphor, which specifically depicts each interface component in the system, typically shows users' interactions with the system in a simpler fashion. Although the consumers may be unfamiliar with these interface elements, they have some features in common with other actual physical objects. The users may be more accustomed to these actual objects. The recycling bin in the Windows environment serves as a prime illustration of a strong interface metaphor. The dustbin is a real object on which the metaphor of the recycle bin is built.

1. Learning is a difficult process; hence a good system should aid users in their learning. Typically, it is considered that consumers can learn everything via manuals and instruction booklets. However, in the actual world, few consumers consult these manuals or documents.

Problems faced;

* Users take a long time to learn, are frequently dissatisfied, and always blame themselves for their poor learning abilities since learning is a difficult process.
* Users make use of their prior learning.
* Users lack the necessary fundamental knowledge and do not comprehend the jargon being utilized.
* Users form their own subjective interpretations and assumptions. Typically, they are mistaken in their assumptions.

1. The five issues are;

* identifying the users and those who gain from the technology that has been established. The advantages might not be reaching the users. For instance, the company head profits more from using the Personal Organizer system than the company secretary.
* Are they employed effectively? The use of a video conference is one illustration. The utilization is not cost-worthy if a large number of users are silent. Therefore, all users are encouraged to express their views.
* employees who do not hold a permanent position within an organization.
* Establishing how an organization's employees interact with one another.
* the difficulties encountered during use in the beginning. The hardest part of the process is the introduction because most individuals would prefer to watch the system's implementation rather than utilize it. When the system is stable, they won't begin using it.

**QUESTION NUMBER: (e.g., Q1) \_\_6\_\_SUB-QUESTION (e.g., 1(a)) \_6A, B, C\_\_**

1. Three distinct elements of participatory design include:

* This design aims to adapt tasks and work places by offering a recommended design. As a result, the design is more work-oriented than system-oriented.
* The iterative technique enables the design to be assessed and improved at each level,
* The collaboration or active cooperation supplied by users enables them to continue engage towards the design throughout the process of the system's development.

A variety of strategies and procedures are used in participatory design to facilitate the communication of information among users and designers. The table below summaries of the techniques that were employed:

|  |  |
| --- | --- |
| Techniques | Characteristics |
| Brainstorming | * Includes every user. It is informal and not overly formal, and all information is recorded without bias. * This session can generate a lot of ideas, and choosing one involves using a different method of filtering. |
| Storyboard | * Probable layouts and outcomes that might affect this design. * User daily activities |
| Workshops | * Presents a focused vision of design and receives more precise information. * Users and designers continue to cross-examine one another to comprehend the context of the design from many angles. * Users inquire about the potential design's working environment while designers inquire about the capabilities of the current technology. |
| Paper and pencil exercise | * Allows for the analysis and testing of designs through paper sketches of the model. * Simple and affordable; appropriate for usage in the early phases of system development. |

1. The memory space used to keep information for a longer time is known as long-term memory. It does not have any storage load restrictions. This implies that we will have a long-term memory for a large amount of knowledge. The "forgetfulness" phenomena, however, is a result of the disruption brought on by the act of obtaining the knowledge that has been stored. Human psychology can occasionally have an impact on this phenomenon, leading to purposeful forgetting. The knowledge that is kept in the long-term memory is typically dormant. As a result, activation is required for simple and quick access. There are numerous ideas in existence on how data is kept in the human memory. These theories will be covered in the parts that follow.
2. The computing display's interface serves as the conduit for communication between a computer and a person. The characteristics of effective interface design;

* The interface is in the user's hands.
* Every action needs a reaction or feedback.
* The user interface has the capacity to correct itself.
* Different levels of maintenance are performed on the same things.

**QUESTION NUMBER: (e.g. Q2) \_\_\_\_\_\_\_\_SUB-QUESTION (e.g. 2(a))\_\_\_\_\_\_\_\_\_\_\_\_\_**