Internal Assessment Test 1 –October 2022 Scheme and Solutions

Sub: User Interface Design Sub Code: 18CS734 Branch: ISE
Date: 20/10/2022 Duration: 90 min's Max Marks: 50 Sem/Sec: VII A, B &C

Answer any FIVE FULL Questions MARKS CO RBT

1a) Define User interface Design. Explain the importance and benefits of good. 5 CO1 L2

Definition:

User interface design is a subset of a field of study called human-computer interaction (HCI). Human-computer interaction is the study, planning, and design of how people and computers work together so that a person's needs are satisfied in the most effective way.

Importance:

A well-designed interface and screen is terribly important to our users. It is their window to view the capabilities of the system and it is also the vehicle through which complex tasks can be performed.

A screen's layout and appearance affect a person in a variety of ways. If they are confusing and inefficient, people will have greater difficulty in doing their jobs and will make more mistakes.

Benefits

The benefits of a well-designed screen have also been under experimental scrutiny for many years. One researcher, for example, attempted to improve screen clarity and readability by making screens less crowded.

Another benefit is, ultimately, that an organization's customers benefit because of the improved service they receive.

Identifying and resolving problems during the design and development process also has significant economic benefits.

1b) Explain the concept of direct manipulation for graphical system.. 5 CO1 L1

Any Five

The term used to describe this style of interaction for graphical systems was first used by Shneiderman (1982). He called them "direct manipulation" systems, suggesting that they possess the following characteristics:

- **The system is portrayed as an extension of the real world**: A person is allowed to work in a familiar environment and in a familiar way, focusing on the data, not the application and tools. The physical organization of the system, which most often is unfamiliar, is hidden from view and is not a distraction.
- **Continuous visibility of objects and actions**: objects are continuously visible. Reminders of actions to be performed are also obvious. Nelson (1980) described this concept as "virtual reality," a representation of reality that can be manipulated. Hatfield (1981) is credited with calling it "WYSIWYG" (what you see is what you get) and Rutkowski (1982) described it as "transparency,"
- **Actions are rapid and incremental with visible display of results** : the results of actions are immediately displayed visually on the screen in their new and current form. Auditory feedback may also be provided. The impact of a previous action is quickly seen, and the evolution of tasks is continuous and effortless.
- **Incremental actions are easily reversible**: Finally, actions, if discovered to be incorrect or not desired, can be easily undone.

2 Explain the brief history of the screen design with their advantages and disadvantages. 10 CO1 L2

While developers have been designing screens since a cathode ray tube display was first attached to a computer, more widespread interest in the application of good design principles to screens did not begin to emerge until the early 1970s, when IBM introduced its 3270 cathode ray tube text-based terminal.

A 1970s screen often resembled the one pictured in Figure 1.1. It usually consisted of many fields (more than are illustrated here) with very cryptic and often unintelligible captions.

- **It was visually cluttered, and often possessed a command field that challenged the user to remember what had to be keyed into it.**
- **Ambiguous messages often required referral to a manual to interpret.**
- **Effectively using this kind of screen required a great deal of practice and patience.**
- **Most early screens were monochromatic, typically presenting green text on black backgrounds.**

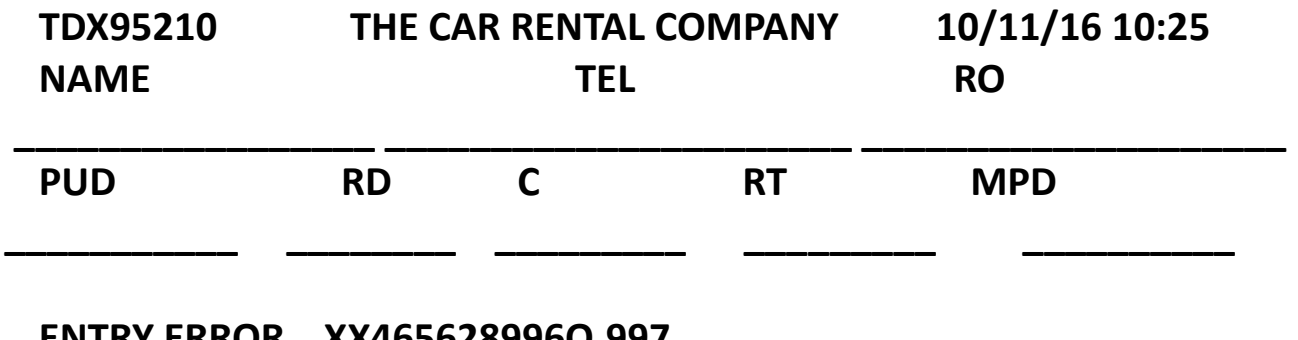


Figure 1.1 A 1970s screen.

- **At the turn of the decade guidelines for text-based screen design were finally made widely available and many screens began to take on a much less cluttered look through concepts such as grouping and alignment of elements, as illustrated in Figure 1.2.**
- **User memory was supported by providing clear and meaningful field captions and by listing commands on the screen, and enabling them to be applied, through function keys. Messages also became clearer.**
- **These screens were not entirely clutter-free, however. Instructions and reminders to the user had to be inscribed on the screen in the form of prompts or completion aids such as the codes PR and Sc.**
- **Not all 1980s screens looked like this, however. In the 1980s, 1970s-type screens were still being designed, and many still reside in systems today.**

THE CAR RENTAL COMPANY

RENTER»

Name: _____

Telephone: _____

LOCATION»

Office: _____

Pick-up Date:_____

Return Date: _____

AUTOMOBIL»

Class: _____(PR. ST. FU. MD. CO. SC)

Rate: _____

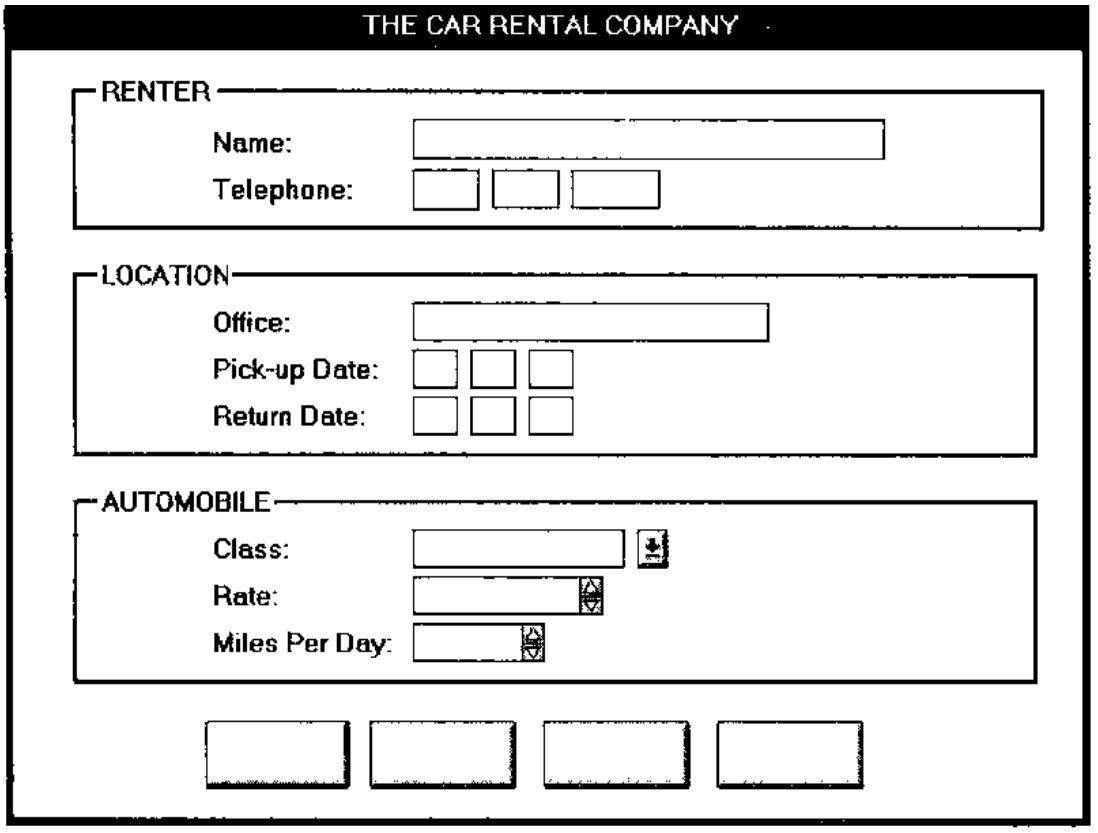
Miles per Day:_____

The maximum allowed miles per day is 150.

Enter Fl-Help F3-Exit F12=Cancel

Figure 1.2 A 1980s screen.

- **The advent of graphics yielded another milestone in the evolution of screen design, as illustrated in Figure 1.3. While some basic "design principles did not change, groupings and alignment, for example, borders were made available to visually enhance groupings, and buttons and menus for implementing commands replaced function keys.**


THE CAR RENTAL COMPANY
RENTER
Name:
Telephone:
LOCATION
Office:
Pick-up Date:
Return Date:
AUTOMOBILE
Class:
Rate:
Miles Per Day:

3. Explain the advantages and disadvantages of Graphical systems. 10 CO1 L2

Advantages

- **Symbols recognized faster than text**: symbols can be recognized faster and more accurately than text. An example of a good classification scheme that speeds up recognition is the icons. These icons allow speedy recognition of the type of message being presented.
- **Faster learning**: a graphical, pictorial representation aids learning, and symbols can also be easily learned.
- **Faster use and problem solving**: Visual or spatial representation of information has been found to be easier to retain and manipulate and leads to faster and more successful problem solving.
- **Easier remembering**: Because of greater simplicity, it is easier for casual users to retain operational concepts. **More natural**: symbolic displays are more natural and advantageous because the human mind has a powerful image memory.
- **Fewer errors**: Reversibility of actions reduces error rates because it is always possible to undo the last step. Error messages are less frequently needed.
- **Increased feeling of control**: The user initiates actions and feels in control. This increases user confidence
- **Immediate feedback**: The results of actions furthering user goals can be seen immediately. If the response is not in the desired direction, the direction can be changed quickly.
- **Predictable system responses**: Predictable system responses also speed learning.
- Easily reversible actions: This ability to reverse unwanted actions also increases user confidence
- **More attractive**: Direct-manipulation systems are more entertaining, cleverer, and more appealing.
- **May consume less space**: Icons may take up less space than the equivalent in words but this is not the case always.
- **Replaces national languages**: Icons possess much more universality than text and are much more easily comprehended worldwide.
- **Easily augmented with text displays**: Where graphical design limitations exist, direct-manipulation systems can easily be augmented with text displays. The reverse is not true.
- **Low typing requirements**: Pointing and selection controls, such as the mouse or trackball, eliminate the need for typing skills.

Disadvantages

- **Greater design complexity**: Controls and basic alternatives must be chosen from a pile of choices numbering in excess of 50. This design potential may not necessarily result in better design unless proper controls and windows are selected. Poor design can undermine acceptance.
- **Learning still necessary**: The first time one encounters many graphical systems, what to do is not immediately obvious. A severe learning and remembering requirement is imposed on many users because meanings of icons or using pointing device have to be learned.
- **Lack of experimentally-derived design guidelines:** today there is a lack of widely available experimentally-derived design guidelines. Earlier only few studies to aid in making design decisions were performed and available for today now.

Inconsistencies in technique and terminology: Many differences in technique, terminology, and look and feel exist among various graphical system providers, and even among successive versions of the same system. So the user has to learn or relearn again while shifting to next terminology.

- **Not always familiar**: Symbolic representations may not be as familiar as words or numbers. Numeric symbols elicit faster responses than graphic symbols in a visual search task.
- **Window manipulation requirements**: Window handling and manipulation times are still excessive and repetitive. This wastes time
- **Production limitations**: The number of symbols that can be clearly produced using today's technology is still limited. A body of recognizable symbols must be produced that are equally legible and equally recognizable using differing technologies. This is extremely difficult today.
- **Few tested icons exist**: Icons must be researched, designed, tested, and then introduced into the marketplace. The consequences of poor or improper design will be confusion and lower productivity for users.
- **Inefficient for touch typists**: For an experienced touch typist, the keyboard is a very fast and powerful device.
- **Not always the preferred style of interaction**: Not all users prefer a pure iconic interface. User will also prefer alternatives with textual captions.
- **Not always fastest style of interaction:** graphic instructions on an automated bank teller machine were inferior to textual instructions.
- **May consume more screen space**: Not all applications will consume less screen space. A listing of names and telephone numbers in a textual format will be more efficient to scan than a card file.
- **Hardware limitations**: Good design also requires hardware of adequate power, processing speed, screen resolution, and graphic capability.

4 Illustrate the five design commandments that designer should keep in mind to eliminate pitfalls during development of a system? 10 CO1 L3

Designing for People: The Five Commandments

- The complexity of a graphical or Web interface will always magnify any problems that do occur. Pitfalls can be eliminated if the following design commandments remain foremost in the designer's mind.
    - Gain a complete understanding of users and their tasks: The users are the customers. Today, people expect a level of design sophistication from all interfaces, including Web sites. The product, system or Web site must be geared to people's needs, not those of the developers.

Solicit early and ongoing user involvement: Involving the users in design from the beginning provides a direct conduit to the knowledge they possess about jobs, tasks, and needs. Involvement also allows the developer to confront a person's resistance to change, a common human trait. People dislike change for a variety of reasons, among them fear of the unknown and lack of identification with the system.

Perform rapid prototyping and testing: Prototyping and testing the product will quickly identify problems and allow you to develop solutions. Prototyping and testing must be continually performed during all stages of development to uncover all potential defects. If thorough testing is not performed before product release, the testing will occur in the user's office. Encountering a series of problems early in system use will create a negative first impression in the customer's mind, and this may harden quickly, creating attitudes that may be difficult to change. It is also much harder and more costly to fix a product after its release.

Modify and iterate the design as much as necessary: While design will proceed through a series of stages, problems detected in one stage may force the developer to revisit a previous stage.. Establish user performance and acceptance criteria and continue testing and modifying until all design goals are met.

Integrate the design of all the system components: The software, the documentation, the help function, and training needs are all important elements of a graphical system or Web site and all should be developed concurrently. Time will also exist for design trade-offs to be thought out more carefully.

- if the following design commandments remain foremost in the designer's mind.
    - **Gain a complete understanding of users and their tasks.**
    - **Solicit early and ongoing user involvement.**
    - **Perform rapid prototyping and testing.**
    - **Modify and iterate the design as much as necessary.**
    - **Integrate the design of *all the system components.***

5 Explain the ten most common usability problems in graphical systems reported by IBM usability specialist. 10 CO1 L2

Common Usability Problems

- Mandel (1994) lists the 10 most common usability problems in graphical systems as reported by IBM usability specialists. They are:
    1. Ambiguous menus and icons.
    2. Languages that permit only single-direction movement through a system.
    3. Input and direct manipulation limits.
    4. Highlighting and selection limitations.
    5. Unclear step sequences.
    6. More steps to manage the interface than to perform tasks.
    7. Complex linkage between and within applications.
    8. Inadequate feedback and confirmation.
    9. Lack of system anticipation and intelligence.
    10. Inadequate error messages, help, tutorials, and documentation.

6 Explain the guidelines to be followed for designing Conceptual model. 10 CO1 L2

Guidelines for Designing Conceptual Models

- **Reflect the user's mental model not the designer's:** A user will have different expectations and levels of knowledge than the designer. So, the mental models of the user and designer will be different. The user is concerned with the task to be performed, the business objectives that must be fulfilled.

- **Draw physical analogies or present metaphors:** Replicate what is familiar and well known. Duplicate actions that are already well learned. A metaphor, to be effective, must be widely applicable within an interface.

- **Comply with expectancies, habits, routines, and stereotypes:** Use familiar associations, avoiding the new and unfamiliar. With color, for example, accepted meanings for red, yellow, and green are already well established. Use words and symbols in their customary ways.

- **Provide action-response compatibility:** All system responses should be compatible with the actions that elicit them. Names of commands, for example, should reflect the actions that will occur.

- **Make invisible parts and process of a system visible:** New users of a system often make erroneous or incomplete assumptions about what is invisible and develop a faulty mental model. As more experience is gained, their mental models evolve to become more accurate and complete. Making invisible parts of a system visible will speed up the process of developing correct mental models.

- **Provide proper and correct feedback:** Be generous in providing feedback. Keep a person informed of what is happening, and what has happened, at all times, including:

    - Provide visible results of actions.
    - Display actions in progress.
    - Provide a continuous indication of status.
    - Present as much context information as possible.
    - Provide clear, constructive, and correct error messages.

- **Avoid anything unnecessary or irrelevant:** Never display irrelevant information on the screen. People may try to interpret it and integrate it into their mental models, thereby creating a false one.

- **Provide design consistency:** Design consistency reduces the number of concepts to be learned. Inconsistency requires the mastery of multiple models. If an occasional inconsistency cannot be avoided, explain it to the user.
- **Provide documentation and a help system that will reinforce the conceptual model:** Do not rely on the people to uncover consistencies and metaphors themselves. The help system should offer advice aimed at improving mental models.

- **Promote the development of both novice and expert mental models :** Novices and experts are likely to bring to bear different mental models when using a system.