HMI Module - 3

Q1. What are the characteristics of Graphical User Interface?

Ans:

- Graphical User Interface is a way where users can interact with computer systems using graphical symbols.
- The GUI prevents human error and contributes to ease of use.

1. Visual Presentation:
    - It is a visual feature where users can interact with the system by selecting and clicking on elements.
    - These interaction elements are windows, icons, menus and pointers.
    - Window is the area on the screen that contains text, graphics and actions to perform.
    - Icons are small clickable pictures to interact with the system.
    - Menus choices are available on the screen. There are various types of menus like pull down, drop down.
    - Pointers are used for pointing and selecting the actions available on screen.

2. Pick and Click Interaction:
    - To choose and perform the proposed action by clicking on the screen.
    - Action can be performed using mouse and keyboard.

3. Restricted set of Interface Options:
    - User follows the "What you see is what you get" mechanism.
    - What is presented on the screen or what may be retrieved through user actions.

4. Visualisation:
    - It is a cognitive process that allows the users to understand the information available on the screen.
    - It is not necessary to reproduce a realistic graphic image, but to produce, convey the most relevant information.
    - Effective visualisation can increase productivity.

5. Object Orientation:
    - Objects are what users see on the screen while interacting with the system.
    - Objects are divided into 3 classes.
        - A. Data Object is for information.
        - B. Container Objects to hold other objects.
        - C. Device Objects represent physical objects in the real world.
    - Objects are composed with sub objects.
    - Objects can contain other objects so if any changes in one object, it reflects in the other one.

6. Actions:
    - Users perform action on objects. They manipulate and modify the objects as per their needs.
    - Users can select an action to apply on an object.

Q2. What are the principles of User Interface Design?

Ans:

- User Interface provides communication between users and devices. It is not only about arranging buttons, picking colours, selecting menus but also choosing the right tool to provide effective interaction.
- The principles of User Interface Design are intended to improve the quality of user interface design.

1. Familiarity:
2. Consistency:
    - The interface should be consistent across the application.
    - Consistency allows users to recognize usage patterns.
    - Once a user learns about the certain parts of the interface working, the same knowledge can be applied to new areas and features.
3. Minimal Surprise:
    - Users should never be surprised while performing any action on the system.
    - The user should be able to predict the operation of the commands.
4. Recoverability:
    - The system should provide some resilience to use error and allow the user to recover from errors.
    - This might include an undo facility, confirmation of destructive actions.
    - The interface has to be able to help its users.
5. User Guidance:
    - The interface should not mislead users and must provide meaningful feedback.
    - Interface should provide guidance to users for full usage of applications.
    - Ensuring the user is aware of what's going on and there is a help option available if they need any help to perform any task.
6. User Diversity:
    - Interfaces should be designed in such a way that different types of users can use it.
    - Interface designing is not only for users of all ages, but all genders, levels of impairment and culture and ethnicity.

Q3. Explain the concept of direct manipulation.

Ans:

- The term direct manipulation is given by Shneiderman (1982) as they possess the following characteristics:
- The system is portrayed as an extension of the real world.
- Continuous visibility of objects and actions.
- Actions are rapid and incremental with visible display of results.

- Incremental actions are easily reversible.
- Example for direct manipulation: Driving an automobile
- The scene is directly visible through the front window and performance of actions such as braking or steering has become common knowledge in our culture.
- To turn left, the driver simply rotates the steering wheel to the left.
- The response is immediate and the scene changes, providing feedback to refine the turn.
- In the above example, a driver looking at an object directly manipulates the scenario by his sudden action, which can be referred as direct manipulation.

Q4. Explain the concept of indirect manipulation.
Ans:
- In practice, direct manipulation of all screen objects and actions may not be feasible because of the following:
- The operation may be difficult to conceptualise in the graphical system. The graphics capability of the system may be limited.
- The amount of space available for placing manipulation controls in the window border may be limited.
- When this occurs, indirect manipulation is provided.
- Indirect manipulation substitutes words and text, such as pull-down or pop-up menus, for symbols, and substitutes typing for pointing.
- Most window systems are a combination of both direct and indirect manipulation. A menu may be accessed by pointing at a menu icon and then selecting it (direct manipulation).
- The menu itself, however, is a textual list of operations (indirect manipulation). When an operation is selected from the list, by pointing or typing, the system executes it as a command.

Q5. Popularity of Graphics:
Ans:
- Information displays in terms of graphical images known as icons instead of set.
- These icons could symbolise objects or actions.
- Objects and actions are selected through pointing devices.
- User actions using graphics are fast, meaningful and dynamic.
- Graphic presentation is more effective than other presentation methods.
- Graphics should be properly used. It reduces memory loads and information could appear or disappear when needed.
- Graphics contains WIMP interface: windows, icons, menus, pointers for providing visual information.
- Selection and interactive fields such as buttons, drop down, checkboxes, list boxes, text entry fields are available.

- Graphics can add appeal to the interface and permit good customization to design an exclusive organisational style.