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?/ Software Process 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:
    - Interface should use terms and concepts which are drawn from experienced users to amke system more usable.
    - Usability is often related with familiarity by users using interaction styles.
    - Example: if a user is used to a Windows OS, it would be a bit difficult for him to work on MacOs in first interaction.
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.

Q6. Differentiate between GUI and Web Interface

Ans:

Content	**Graphical User Interface**	**Web Page Design**
Devices	User Hardware variations are limited. Screens appear exactly as specified.	User hardware variations are enormous. Screen appearance influenced by hardware being used.
User Focus	Data and applications.	Information and navigation.
Data /Information	Typically created and used by known and trusted sources. Typically placed into system by users or known people and organizations.Typically organized in a meaningful fashion. A notion of private and shared data exists.	Full of unknown content. Source not always trusted. Often not placed onto the web by users or known people and organizations. Highly variable organization. Privacy often suspects.

User Tasks	Install, configure, personalize, start, use, and upgrade programs. Open, use and close data files.	Link to a site, browse or read pages, fill out forms,register for services, participate in transactions,download and save things. Movement between pages and sites very rapid.
Presentation Elements	Windows, menus,controls, data, toolbars, messages, and so on. Presented as specified by the designer.	Two components browse and page. Within page, any combination of text,images,audio,video and animation. May not be presented as specified by the designer dependent on browser,monitor, and user specifications. Little standardization.
Interaction	Interactions such as clicking menu choices, pressing buttons, selecting list choices, and cut/copy/paste occur within context of active program.	Basic interaction is a single click. This can cause extreme changes in context, which may not be noticed.
Response Time	Nearly instantaneous.	Quite variable depending on transmission speeds, page content. Long time can upset the user.

Visual Style	Typically prescribed and constrained by toolkit. Visual creativity allowed but difficult. Little significant personalization.	Is more artistic, individual and unrestricted presentation style. Complicated by differing browser and display capabilities and bandwidth limitations. Limited personalization available.
System Capability	Unlimited capability proportional to sophistication of hardware and software.	Limited by constraints imposed by the hardware, browser, software, client support.
Task Efficiency	Targeted to a specific audience with specific tasks.	Often intended for anyone and everyone.
Consistency	Major objective exists within and across applications. Universal consistency in GUI products generally created through toolkits and design guidelines.	Sites tend to establish their own identity. Frequently standards set within a site. Frequent ignoring of GUI guidelines for identical components especially controls.