

**BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJASTHAN)**  
**Second Semester, 2022-2023**

**45 Marks (45% Weightage)**

**Comprehensive Examination**

**Closed Book**

**Course Number:** BITS F364

**Course Title:** Human Computer Interaction

**Date** : May 06, 2023

**Time** : 09:30 AM – 12:30 PM

**Note:** There are eight questions in all; Q1 to Q7 each question carries five marks, and Q8 carries ten marks. Please take care of your speed from the start itself and write your answers to the point. **All your answers to the questions, listing short-comings or goodness of features, suggested improvements, design decisions, test design for evaluation etc. must be supported by reason(s)/justifications(s) stated in technical/scientific terms.** All the best!

**Q1.** Let a GUI provide functionality to reset password as shown in *Fig. Q1*. On any unsuccessful effort to change the password, 1) the password entered against 'Reset Password' is made null, 2) the password entered against 'Confirm Password' is also made null, and 3) the position (on the display screen) of the GUI window also changes. If there are some errors in the composition of the passwords and/or violations of rules specified for it to be a valid password, those are displayed (for 10 seconds only) at the bottom against the label *Error* in purple color. Clicking *Reset* will reset the password if there are no errors in the format and passwords entered against two labels match. Clicking *Cancel* will cancel the request to change the password. Clicking *Generate* will generate a valid password with high strength and will be displayed below *Generate*. The generated password will be displayed only for the duration until the user enters the password against 'Reset Password' or 15 seconds whichever is earlier. After cursor moves away from the edit window against 'Reset Password', the strength of the password is calculated on the scale of 0 to 5 and displayed against 'Password Strength' (e.g. 2/5). From the human visual system point of view, list five shortcomings of the usability of this design.

<b>Reset Password:</b>	<input type="text"/>
<b>Confirm Password:</b>	<input type="text"/>
Generate	<input type="button" value="Reset"/> <input type="button" value="Cancel"/>
<b>Password Strength</b>	0/5
<b>Error:</b>	<input type="text"/>

**Fig. Q1**

**Q2.** The *Fig. Q2* depicts GUI to replace a text in a single window entered against 'From' with the text entered against 'To' in a text editor. Clicking 'Find' button positions the cursor at next occurrence (from the cursor's current position in the text in the editor window) of the matching-text entered against 'From', and if the user clicks 'Change' button, the occurrence of text changes to the text entered against 'To'. Clicking 'Change+Find' will make the change and moves the cursor to the next occurrence of the text in 'From'. Clicking 'Change All' will make the changes to all the remaining occurrences of the text in 'From' window and moves the cursor at the end of last change. Write operators, preconditions and results for this GUI.

**Fig. Q2**

**Q3.** With reference to the GUI given in *Question 2*, a better GUI is shown in the *Fig. Q3*. Referring to *Fig. Q3*, assuming that setting 'Preserve Case' will preserve the case while replacing the text, answer the following:

**Fig. Q3**

- 3.1** Write two shortcomings of this GUI one with respect to widgets and one with respect to fitt's law.
- 3.2** Write two good features of this GUI with respect to the child-windows and navigation design.
- 3.3** Write two problems associated with navigation within the application.
- 3.4** Write two problems with respect to the environment for this application.
- 3.5** List two problems with the layout of the structures with respect to this application.

**Q4.** For a thread manufacturing machine, the statuses of some of its parts are displayed on a screen mounted on the control panel of the machine. Usually, the parameters indicated are rotational speed, temperature of outlet, energy consumption, the diameter of the thread, how many meters thread-manufactured per second, oil-content in the thread etc. Write two problems likely to be faced while using Direct Manipulation and three problems likely to be faced while using Indirect Manipulation to provide this interaction. It is given that the user is allowed to select any of these statuses to be displayed on the screen by using the appropriate key, but only one key can be made active by the user at a time (i.e., only one status can be displayed at a point in time).

**Q5.** Write details of goals, constraints and trade-offs with respect to the GUI for the password reset as described in the Question 1.

**Q6.** The Fig. Q6 depicts updating the inventory on sale and/or wastage of goods (items). User enters 'Item Code' and 'Quantity Sold' and 'Quantity Waste', while the 'Item Name', 'Item Photo', and 'Opening Balance' are retrieved from database and displayed in the corresponding boxes. The 'Opening balance' is the quantity in the stock before sale and/or wastage of some quantity of the item. The 'Stock now' is updated as 'Opening Balance' - 'Quantity Sold' - 'Quantity Waste'. In case of errors like 'Item Code' not found, 'Quantity Sold' is negative or Quantity Wastage is negative or sum of sale and wastage is more than 'Opening Balance', etc., the error is displayed against 'Error'. It has been observed that most of the errors are due to wrong entry of the 'Item Code' and it is decided to display the 'Item Code' (and hence, 'Item Name') in different fonts depending on the first six characters of the 'Item Code'. In addition to the display using various fronts the 'Item Code' entered by the user is spoken (only once) by the system and this speaking of the 'Item Code' starts immediately after the user leaves the 'Item Code'. Clicking 'Save' button saves the record related to item sale and/or wastage and updates the stock in the database. Clicking 'Cancel' cancels the current incomplete attempt to update the stock. Design an experiment to test whether this addition of font based coding can increase the productivity of the data-entry operators.

**Item Code:**  
**Item Name:**  
**Opening Balance:**  
**Quantity Sold:**  
**Quantity Waste:**  
**Stock now:**  
  
**Error:**

	<b>Item photo</b>
Save	Cancel

**Fig. Q6**

**Q7.** The matrix shown in Fig. Q7 is the time/space matrix under the condition when we consider computers and computer networks (including internet and World Wide Web) for interaction and can provide augmented and virtual reality based user experience. Write the purpose (one sentences for each component) of each of the six components shown in the Figure to achieve this type of user experience. How ubiquitous computing can improve user experience in this context?

	<b>Co-located</b>	<b>Remote</b>
<b>Same Time (Synchronous)</b>	Meeting Rooms	Video conferences, video wall etc.
	Shared work surfaces and editors Shared PCs and windows	
<b>Different Time (Asynchronous)</b>	Argumentation tools	Email and electronic conferences
	Co-authoring systems, shared calendars	

**Fig. Q7**

**Q8.** In a question answering contest multiple teams (at least three teams of exactly two persons per team) participate and each participates remotely. For each team there are separate virtual chat-rooms. Each participant will be proctored using three cameras in his/her room. For each question five options are displayed for a maximum of two minutes time and exactly two have to be selected by a team. If a member of a team has selected a choice then the remaining one choice has to be selected by other member of the same team. An answer is considered correct when both choices are correct. Once any team answers correctly then each of the other teams (except the team which answered correctly) receives a message that question has been answered without stating which team answered it. The team which answers most questions correctly and earliest is declared as winner. Write and explain steps to implement this synchronous groupware.