

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJASTHAN)

First Semester, 2022-2023

40 Marks (40% Weightage)

Comprehensive Examination

Closed Book

Course Number: BITS F364

Course Title: Human Computer Interaction

Date : December 24, 2022

Time : 09:00 AM – 12:00 Noon

Note: There are eight questions in all; each question carries five 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 merits of the features, suggested improvements, design decisions, test design for evaluation, etc. must be supported with reason(s) or appropriate justification.** 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, the passwords entered against 'Old Password', 'Reset Password' and 'Confirm Password' are all made null. If there are some errors in the format(s) of the password(s) and/or violation(s) of rules specified for it to be a valid password, those are displayed at the bottom against the label *Error* in same color as that of the 'Error' label. Clicking *Reset* will reset the password if there are no errors in the format and

Old Password:	
Reset Password:	
Confirm Password:	
	Reset Cancel
Password Strength	0/10
Error:	
Attempts Allowed:	3

Fig. Q1

the passwords entered against two labels ('Reset Password' and 'Confirm Password') match, and the password entered against the 'Old Password' matches with the previous password stored in an encrypted and secured database. Clicking *Cancel* will cancel the request. After cursor moves away from the edit window against 'Reset Password', the strength of the password is calculated on the scale of 0 to 10, and displayed against 'Password Strength' (e.g. 7/10). From the human visual system point of view, list five shortcomings of the usability of this design.

Q2. For a car, the health (statuses) of some parts are displayed on a screen mounted on the control panel of the car. Usually, the parameters indicated are speed, temperature of engine, fuel level, current gear position, passenger safety belt status, windows closed or not, 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 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).

Q3. Assume that a virtual reality system provides interface to human user to an adventure to (i) *climb*, (ii) *trek through a trail* or (iii) *trek through stairs* on a mountain. However, depending on one (or more) safety reason(s) arising out of the human user's not wearing/using appropriate sensors, the system may not allow the user to choose among all the three options and it may so happen that only one (or two) option(s) are furnished. Answer the following:

3.1 Assuming that all the virtual environments are being synthesized in 3D using weak laser lights, what all sensors are needed for each kind (i, ii and iii) of the adventure to be realized/permitted?

3.2 Briefly specify how a view of such a mountain can be modeled?

Q4. Write details of goals, constraints and trade-offs with respect to the GUI for the password reset as described in the *Question 1*.

Q5. An interaction design allows selection of currency name from a menu layout of 9 x 3 sized table instead of selection from a single list box. The 9 x 3 sized table has 3 columns and 9 rows. The first column lists currency names starting from A to I, second column lists currency names starting from J to R, and the third column lists the remaining currency names. A vertical scroll bar is attached to each column. Write three advantages of this design over a single list box design. Also, write two disadvantage (other than the requirement of more space) of this tabular design.

Q6. The Fig. Q6 depicts GUI to replace a text entered against 'From' with the text entered against 'To' in a text-editor. Clicking 'Find' button positions the cursor at the next occurrence (from the cursor's current position in the text present in the text-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 move 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 move the cursor at the end of the last change. Write operators, preconditions, and results for this GUI.

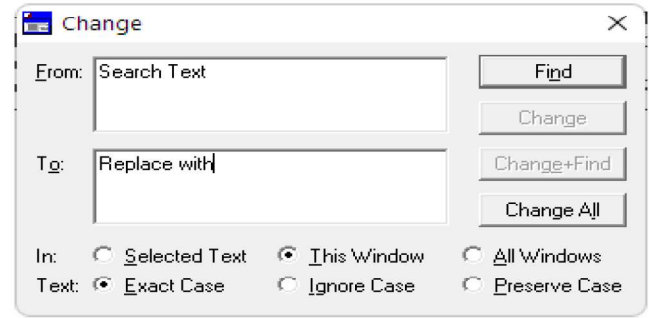


Fig. Q6

Q7. Compared to the GUI given in Question 6, a better GUI is shown in the Fig. Q7a. Refer to Fig. Q7b for the function of the icons in Fig. 7a. In the beginning, in Fig. Q7a only the first row (i.e. Search only feature) is enabled and clicking at '+' will enable the second row also. In the context of navigation design, write:

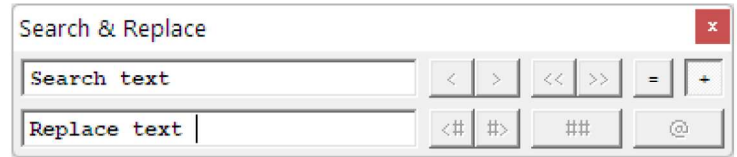


Fig. Q7a

- 7.1 One shortcoming of this GUI with respect to widgets.
- 7.2 One good feature of this GUI with respect to the child-windows.
- 7.3 One problem associated with navigation within the application.
- 7.4 One problem with respect to the environment for this application.
- 7.5 One problem with the layout of the structures with respect to this application.

Icon	Function
<	search backward within the current window
>	search forward within the current window
<<	search the previous window
>>	search the next window
=	case sensitivity (up = non-case sensitive, down = case sensitive)
+	dialog mode (up = Search, down = Search & Replace)
<#	replace and search backward within the current window
#>	replace and search forward within the current window
##	replace all within the current window
@	undo replacement

Fig. Q7b

User #	Order	Q6 GUI (s)	Q7 GUI (s)
01.	Q6 GUI	70.2	65.6
02.	Q6 GUI	33.9	25.9
03.	Q6 GUI	65.8	61.2
04.	Q6 GUI	64.5	60.9
05.	Q6 GUI	112.9	104.9
06.	Q7 GUI	117.9	113.5
07.	Q7 GUI	60.4	54.2
08.	Q7 GUI	55.1	49.5
09.	Q7 GUI	89.3	90.5
10.	Q7 GUI	80.3	71.5

Fig. Q8

Q8. For the GUIs given in Q6 and Q7, Fig. Q8 lists time taken in seconds to perform a task for within group evaluation by ten users. Is the GUI given in Q7 indeed better? Show all the steps involved in arriving at your conclusion.

One Tail	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005
Two Tails	0.1	0.05	0.02	0.01	0.005	0.002	0.001
DegOfFree↓	Critical values of Student's t distribution						
1	6.3138	12.7065	31.8193	63.6551	127.3447	318.4930	636.0450
2	2.9200	4.3026	6.9646	9.9247	14.0887	22.3276	31.5989
3	2.3534	3.1824	4.5407	5.8408	7.4534	10.2145	12.9242
4	2.1319	2.7764	3.7470	4.6041	5.5976	7.1732	8.6103
5	2.0150	2.5706	3.3650	4.0322	4.7734	5.8934	6.8688
6	1.9432	2.4469	3.1426	3.7074	4.3168	5.2076	5.9589

One Tail	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005
Two Tails	0.1	0.05	0.02	0.01	0.005	0.002	0.001
DegOfFree↓	Critical values of Student's t distribution						
7	1.8946	2.3646	2.9980	3.4995	4.0294	4.7852	5.4079
8	1.8595	2.3060	2.8965	3.3554	3.8325	4.5008	5.0414
9	1.8331	2.2621	2.8214	3.2498	3.6896	4.2969	4.7809
10	1.8124	2.2282	2.7638	3.1693	3.5814	4.1437	4.5869
11	1.7959	2.2010	2.7181	3.1058	3.4966	4.0247	4.4369