National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	Human Computer Interaction	Course Code:	CS422
	Degree Program:	BS-CS	Semester:	Fall 2019
	Exam Duration:	180 Minutes	Total Marks:	75
	Paper Date:	19th December 2019	Weight	40%
	Section:	C and D	Page(s):	10
	Exam Type:	Final Exam		

Student : Name:_____ Roll No._____ Section:_____

Instruction/ Notes: Attempt all questions. Before starting the paper, make sure you have the exam of your section, as different sections have different exams. Use the given space only. Extra sheets are not allowed. Your answers should be precise and to the point. Avoid cutting or overwriting. Use blue pens to attempt the paper.

Q1. You have to design a simple notepad for the visually impaired. For this purpose you need to provide an appropriate auditory icon (natural sounds) for each of the following events. Note that operations 2 & 3 are opposites and therefore must have appropriately opposite sounds. (6 marks)

1. New Open door sound
2. Open Pop sound
3. Save Water pouring in jug sound
4. Print Dot matrix printer sound
5. Find Papers rustling sound
6. Exit Close door sound

Q2. If a software is launched: (4 marks)

a) without interviews of the users, what kind of problems will it have? List down only two.

1. The user characteristics may not be recorded
2. The requirements of the user will not be recorded

b) without contextual observations, what kind of problems will it have? List down only two.

1. The real work environment will not be recorded, so the eventual software will lack required features

2. The tacit knowledge of the user will not be recorded

Q3. a) List down the five tools for layout in the table given below: (2.5 marks)

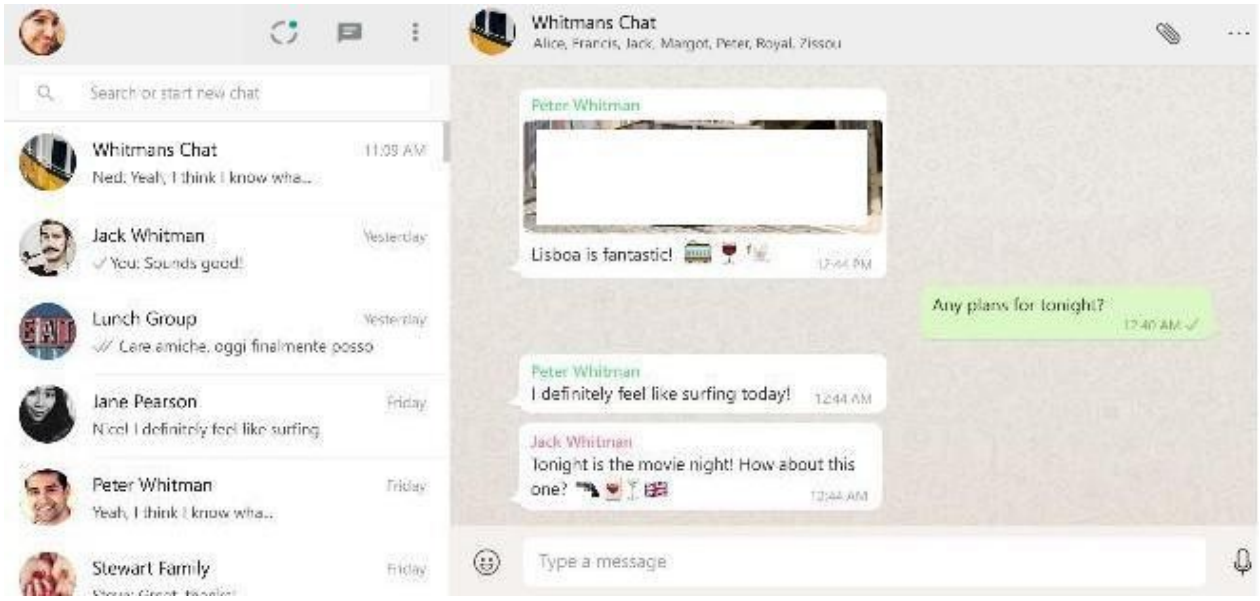
Label Name	Tools for layout
T1	Grouping of items
T2	Ordering of items
T3	Alignment
T4	Decoration (color, font, etc.)
T5	White space

Q3. b) Label the image below by precisely identifying where and how the designer has applied T1, T2, T3, T4 and T5 (be neat in labeling). The image is of WhatsApp Web interface, the web version of WhatsApp messenger service. (7.5 marks)

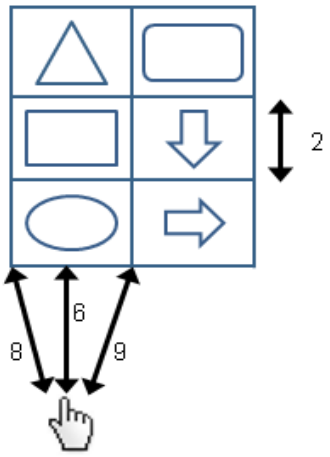
* Use arrows to connect the appropriate portion of the image with the respective Label name

** Identify at least 3 examples in the image corresponding to each tool.

Different answers were accepted.



Q4. Consider the image below. It has six buttons of equal size. Using Fitts' law, calculate the time it will take to acquire the button with triangle on it. Various measurements (in pixels) are given in the figure. Use the appropriate ones to calculate the time. Assume that the value of all coefficients used in Fitts' law is 1. **There is no partial credit for this question. Show all intermediate steps.** (10 marks)



Formula:

Working & Answer:

MT = a + b*Log base 2 (2D/W)

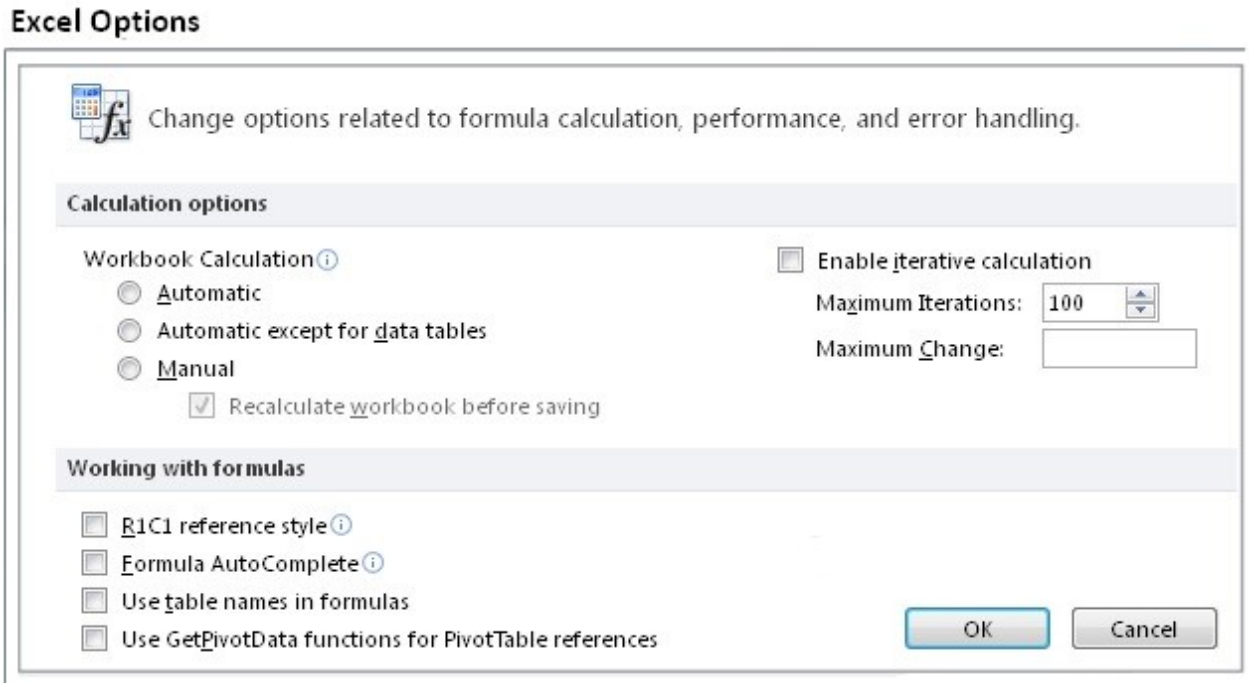
D = 11 (Till the center of target)
W = 2
Answer: 4.459 seconds

Q5. Your goal is to **save an unnamed PowerPoint slideshow as "File.ppt"**. Explain this process using seven stages of Norman's model of interaction. List all 7 stages in the right order, along with what happens in each stage. (7 marks)

1. user establishes the goal
2. formulates intention
3. specifies actions at interface
4. executes action
5. perceives system state
6. interprets system state

7. evaluates system state with respect to goal

Q6. Consider the MS Excel Options Dialog box in the figure below. You want to set *workbook calculation* to manual. You also want to enable *Formula AutoComplete* and *Use table name* fields. Next you need to change *Maximum Iterations* to 102 by clicking the up arrow twice. Finally, set *maximum Change* to 0.1 by typing '0.1' in the field. As a user, you always move from field to field using a mouse. Assume your hand is initially on the mouse and currently "OK" button is selected. Also assume that this dialog box is dismissed by clicking the "OK" button at the end. Using KLM-GOMS, determine the minimum time needed to perform this exact task in seconds. Note K = 0.2s, P = 1.1s, H = 0.4s and M=1.35s. **There is no partial credit for this question. Show all intermediate steps.** (10 marks)



Main string: PKPKPK PKK PKHKKK HPK

Rule 0: MPMKMPMKMPMK MPMKMK MPMKHMKMKMK HMPMK

Rule 1: MPK MPK MPK MPKMK MPK HMKMKMK HMPK

Rule 2: MPKMPKMPK MPKMK MPK HMKKK HMPK

OR

MPKMPKMPK MPKK MPK HMKKK HMPK

Sum 20.2 Seconds or 18.85 seconds (both answers accepted)

Q7. Multiple Choice Questions: Encircle only ONE of the given options in the following questions. (15 marks)

"The app designed for two different user categories will not be the same." This statement is:

a) Always true
b) Sometimes true, but not always
c) Always false
d) Can't be determined

Which of the following statement is true:

a) Both preference and satisfaction goals are quantifiable
b) Neither preference nor satisfaction goals are quantifiable
c) Preference goals are quantifiable, but satisfaction goals are not
d) Satisfaction goals are quantifiable, but preference goals are not

"An educated user has to enter his name in a text box. He puts in 5 in the text box erroneously. The system gives an error to enter only alphabets." How could you improve the design of this interface:

a) Giving him choices of names to choose from
b) Restrict entering numbers in the name text field.
c) Giving him a default name in the text field before he starts entering
d) Allow him to give input in the name field using voice

The eye has _____ for low light vision, _____ for color vision and _____ for pattern/movement.

a) cones; rods; ganglion cells
b) rods; ganglion cells; cones
c) rods; cones; ganglion cells
d) ganglion cells; cones; rods

Which of the following sensory memory is used to store stimuli received through the skin:

a) iconic memory
b) echoic memory
c) haptic memory
d) feel memory

Over a short period of time, we find it easier to remember the string of numbers “404 894 6743″ because:

a) Numbers are easier to remember than arbitrary characters.
b) The grouping of the numbers is significant
c) Ten numbers are not that many to have to remember from working memory.
d) None of these

_____ involves watching and listening to users.

a) Observation
b) Evaluation
c) Qualitative research
d) Interaction

Frequent users of an interface require:

a) step-by-step (prompted)
b) short cuts
c) menu paths
d) Both a and c

A pair of scissors icon cannot be replaced with knife because it would violate.

a) Attention
b) Perception
c) Consistency
d) Affordance

_____ is the process by which we use the knowledge we have to draw conclusions or infer something new about the domain of interest.

a) Rehearsing
b) Reasoning
c) Problem Solving
d) Skill acquisition

When we input text to the computer via on-screen keyboard on a monitor, the input device is:

a) the keyboard
b) the mouse
c) the hand
d) the screen

Text to speech synthesizer would take which one of the following as input:

a) A handwritten image
b) A picture of text
c) A Word document
d) An A4 sized printout

Optical character recognition converts:

a) texts into speech
b) images into text
c) virtual reality into text
d) documents into text

The standard sound of signing into Windows is an example of:

a) auditory icons
b) earcons
c) metacons
d) wincons

Which of the following statement is correct:

a) Work reengineering is done before making the conceptual model.
b) Work reengineering is done after making the conceptual model.
c) The usability engineering lifecycle does not allow work reengineering
d) None of the above

Q8. Maria is a fresh freelancer, who has got a project to design the website interface for a university. Being an HCI student, guide Maria on how to take up the designing project, stepwise. Make a 13 point plan, **in order of execution**. Your approach should encompass all important aspects of usability and designing. Hint: Your hands-on experience of your HCI course project will help you in making her plan. (13 marks)

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

Q8. Maria is a fresh freelancer, who has got a project to design the website interface for a
university. Being an HCI student, guide Maria on how to take up the designing project,
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important aspects of usability and designing. Hint: Your hands-on experience of your HCI
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① Questionnaire

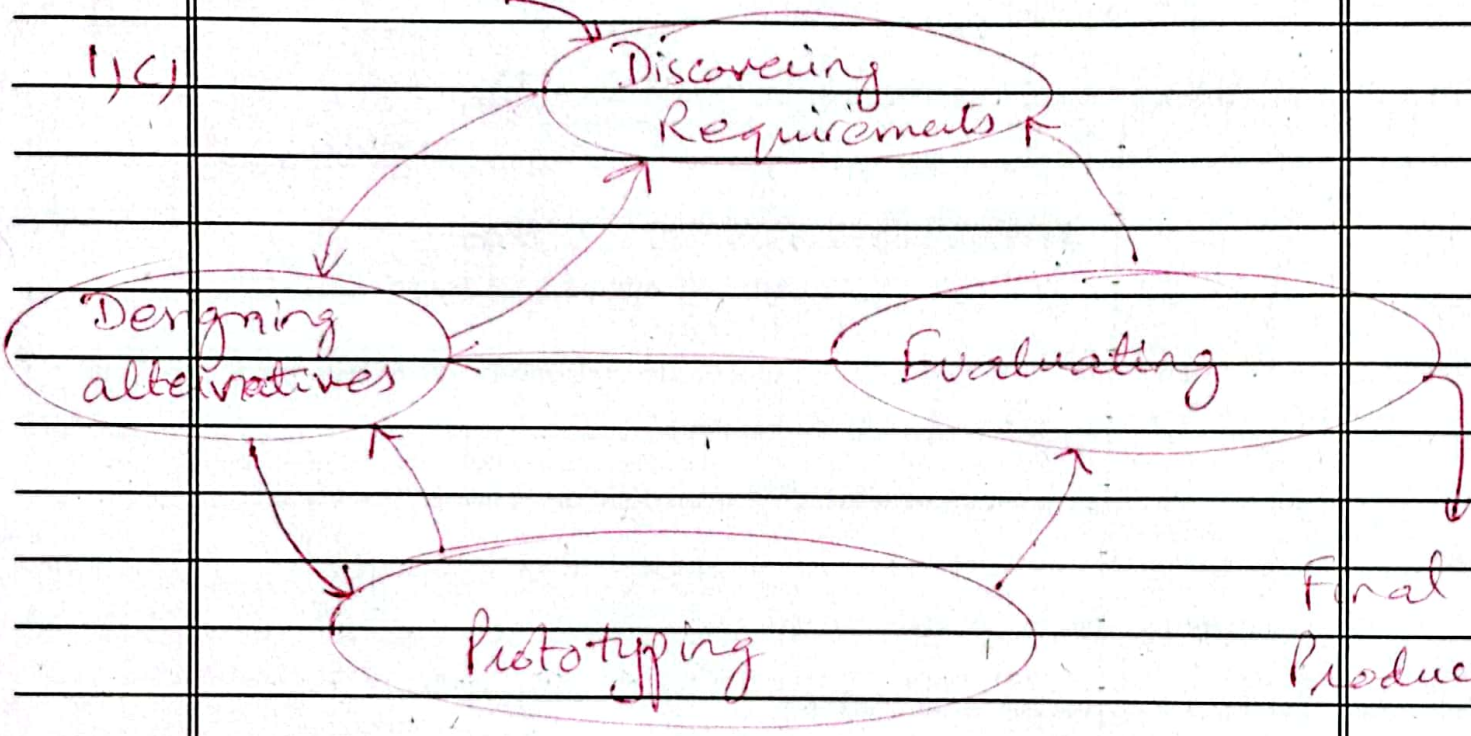
1. UP's User description, characteristics, ...
2. ② Usability requirements
3. Data collection, work-environment analysis ...
4. Task scenario, use cases, action ⑤
5. ⑦ Usability goals Quantitative - Qualitative
6. Conceptual Model, Golden rules of ... structure.
7. Tools for layout, only grouping, ...
8. Navigational Pathway - compliance with ...
9. Uniformity - Affordance
10. Detailed design: All 5 tools of layout
11. Use of Ben and Norman rules
12. Design of all messages ...
13. Compliance with all previous phases ...

In order of execution

1) a) students, teachers, parents.

1) b) School administration, NGO, villagers, EduConnect team (Designers and developers)

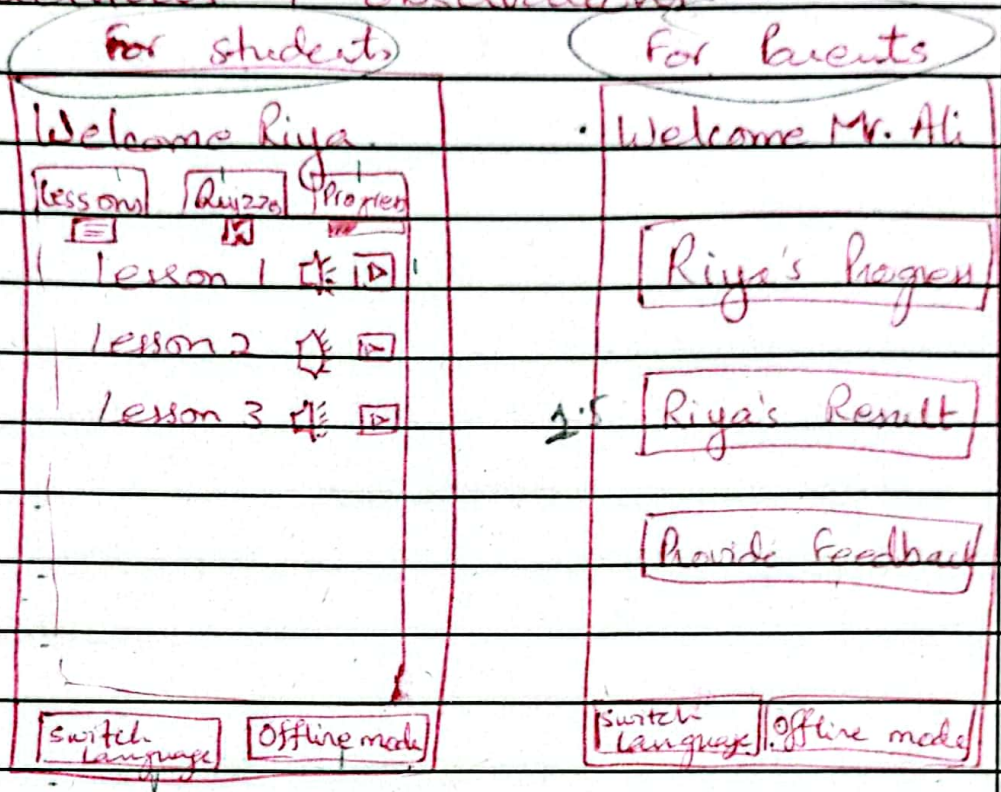
1) c)



1) d) This main character has attributes, motivations, goals and pain points, etc.
- Goals define what the persona wants or needs to fulfil. (Motivation why persona is taking action)
- Age:
- Education:
- Comfort with technology:
- Gadgets she owns/has access to.

1(e) Interviews + observations

1)-f)



6

2.5

2.5

2.5

1 mark for sketches as part of prototyping

1)g) "Audio and video lessons in regional languages" focused on accessibility.

1)h) Empathize → Define → Ideate → Prototype → Test

1)i) Empathize : Second paragraph, second sentence.
Define : " " , "noting" / "found out" sentence.
Ideate : Third paragraph, "brainstorming" "
Prototype : "The team created wireframes"
Test : "The team returned to the village" ...

1)j) Desirability : Yes
Feasibility : Yes
Viability : Yes & No

can be justified by saying no profit in monetary terms.

Can be justified by saying that not-for-profit in monetary terms but added value which was to be sustained by NGOs.

Q.2. 3 formulas of Fitts' Law All were accepted.

Method 1: $MT = a + b\left(\log_{\frac{1}{2}}\left(\frac{2A}{W}\right)\right)$

$= 1 + 1(3.17) = 4.17$ ms.

$D^{os}A = 12 + 1.5$
$= 13.5$

$W^{ons} = 3.$

OR

Method 2: $MT = a + b\left(\log_2\left(\left(\frac{2A}{W}\right) + C\right)\right)$

$= 1 + 1(3.32) = 4.32$ ms.

OR

Method 3. $MT = k \log_2\left(\frac{D}{S} + 1.0\right)$

$= 2.46$ ms.

Rubric: Formula — 3 marks
Calculate D — 1 mark
" S — 1 "
Answer — 2 marks
Unit — 1 mark

Q. 4)
- Attention
- Perception
- Memory
- Learning
- Reading, Speaking, and Listening.
- Problem-solving, planning, reasoning and decision-making.

(See slides) for design implications.

Q.3)

	There is			
(1)	no indication of where we currently are in the system	Visibility of System Status	3	The icon of the current page should be highlighted or made bold to show where we are
(2)	Not all icons make intuitive sense (on top)	Match b/w the system and the real world	4	Replace these icons from real world examples, or label them.
(3)	Inconsistent gap between icons on top	Consistency and standards.	1	Make the gap consistant.
(4) 2	Icons too closely placed on top can cause slip	Error prevention	3	Increase the gap.
(5)	Page seems cluttered with too much info.	Aesthetic and minimalist design	3	Remove irrelevant info (e.g. email, etc.) from the home page

National University
of Computer & Emerging Sciences

Serial No. 181432

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SESSIONAL EXAM ANSWER BOOK

Course Code & Title: HCI (Solution) Final Exam

Roll No: _____ Section: _____ Student's Signature: _____ Date: 1-1-25

Serial No. of continuation sheet if attached: _____ Total No. of Extra Sheets Used: _____ Invigilator's Signature: _____

(THIS ANSWER BOOK CONTAINS PAGE 1-8)

DO NOT OPEN THE ANSWER BOOKLET OR START UNTIL INSTRUCTED

Instructions:

1. Please ensure that the area in your threshold is free of any material classified as 'useful in the paper' or else there may a charge of cheating.
2. Read the question carefully to ensure clarity of context and understanding of meaning. Make assumptions whatever necessary, as neither the invigilator nor the teacher/examinar will address your queries or provide assistance in the examination hall.
3. Fit in all your answers in the answer booklet. You may use an extra sheet if required. If you do so, clearly mark question/part number on that page to avoid confusion.
4. Use only your own stationery and calculator. (If permitted by your teacher/examiner). If you do not have your own calculator, perform manual calculations.
5. Use only permanent ink pens. Only the questions attempted with permanent ink pen will be considered. Any part of paper done in lead pencil cannot be claimed for rechecking.
6. Ensure that you do not have any electronic gadget (like mobile phone, smart watch, ear buds etc.) with you.
7. Return your Question Paper along with the answer booklet (including extra sheets, if used) to the invigilator before leaving the exam venue.

Q./Part No.	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
Total Marks										
Obtained Marks										
CLO NO.										

Total Marks
Total Marks Obtained

Examiner/Course Teacher

Date

National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Human Computer Interaction	Course Code:	CS 422
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Section:	C and F	Page(s):	7
Exam Type:	FINAL		

Student : Name:_____ Roll No._____ Section:_____

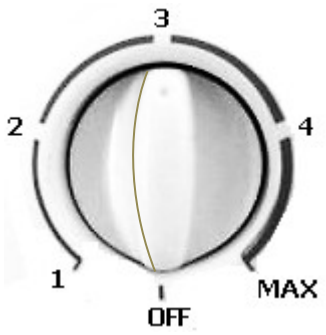
Instruction/Notes: No rough sheets!

1. [10] A development team has created a new version of an existing smart watch user interface. Two important requirements that the new interface should be both efficient and intuitive. How would you asses the efficiency and intuitiveness in light of your knowledge from the chapter navigation and screen design (Basic principles of proper UI) chapter 05 Alan Dix.

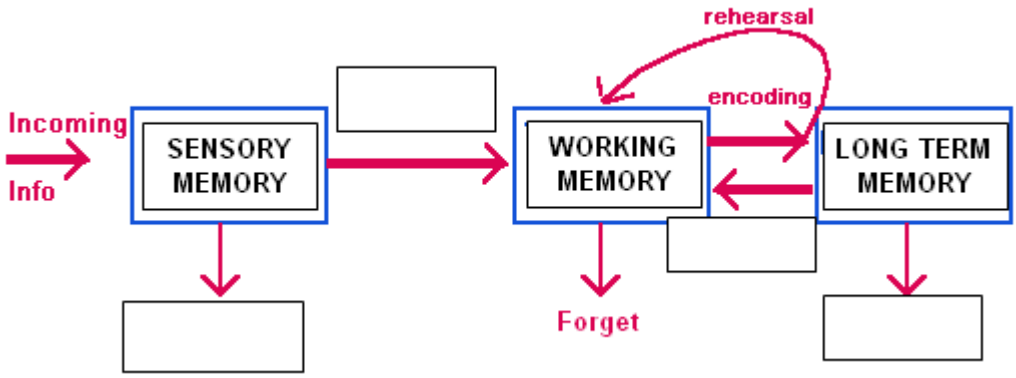
2. [2] What is affordances in UI design? Give an example from daily life.

3. [2] Why visual angle cannot be used to determine the size of an object? Explain with the help of a figure.

4. [5] Consider the following physical control of a thermostat of a refrigerator. When you rotate it to the right cooling of refrigerator increases while to the left the cooling decreases. Your task is to draw an appropriate glass interface for it.



5. [4] Consider the interaction of 3 different types of human memory shown below. Provide appropriate labels (4) for the unlabeled arrows coming out of sensory, working and long term memory in the space provided.

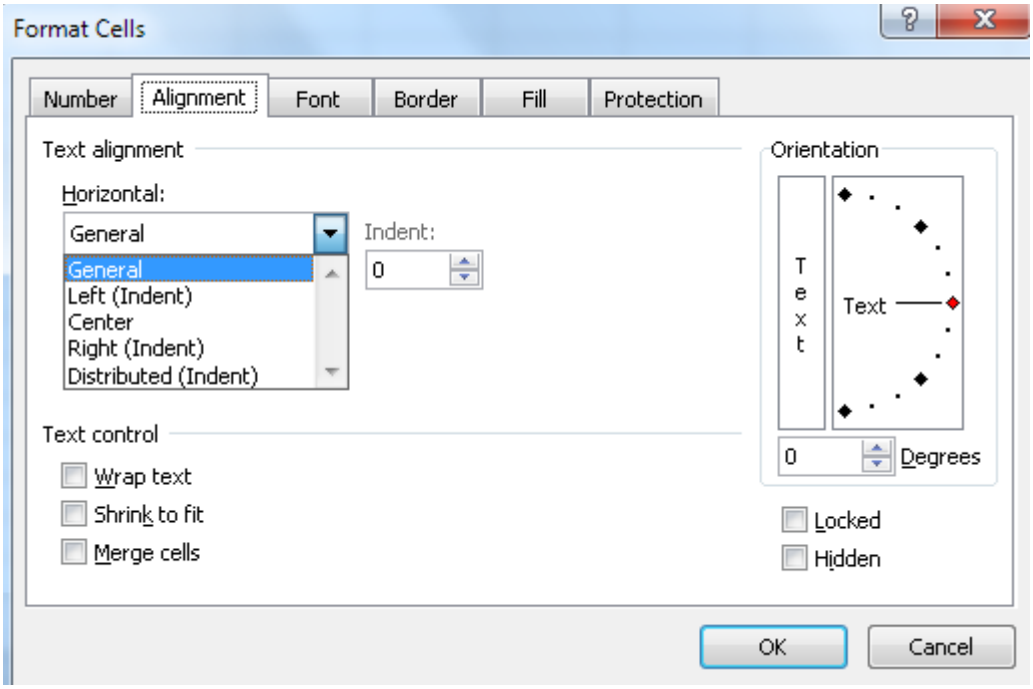


6. [10] A mobile application named Amazing Restaurant Indicator (ARI) is being developed for the user category “Head of family”. ARI is a GPS-based mobile application which helps people to find the closest restaurants based on the user’s current position and other specifications. A head of the family will have a profile on it and when the family decides to go to a restaurant he/she finds the restaurant on it. You are given **the Task Analysis** for **“Find a restaurant”** task and the results of **user profiling**.

Actor (User)	Task	Scenario
Head of the family (HOF)	Find a restaurant	1. HOF enters the specifications like price, restaurant type, dish, seating capacity and ratings. 2. ARI shows a list of nearby restaurants using the specifications given. 3. Next to the restaurant, the approximate travel time, waiting time and each restaurant’s official website address is shown. 4. HOF can also view the history of their visits to a restaurant visible in search results. History includes the date of visit and their own comments on that visit. 5. HOF can share his/her views on Facebook about the restaurant through ARI. 6. HOF can get recommendations regarding the restaurant from his/her family members connected with him/her on ARI.

Using the information given above, develop a **Conceptual Model Design (full sketch)** for the task “**Find a restaurant**” of ARI. You need to make ONE model only.

7. [10] Consider the MS Excel Format Cell Dialog box in the figure. You want to select the horizontal text alignment as Center. You want to wrap text, keep it locked. As a user, you always move from field to field using a mouse. You want to set the degree to 145 by typing in the Degrees field. Assume your hand is initially on the mouse and currently "General" option is selected. Also assume that this dialog box is dismissed by clicking the "OK" button at the end using a mouse. Using KLM-GOMS, determine the minimum time needed to perform this task in seconds. Note K = 0.2s, P = 1.1s, H = 0.4s and M=1.35s. **Show all intermediate steps.**



8. [4] Explain with reference to a law discussed in class why it is faster to execute a command to warm an item in the microwave for 33 seconds, than it is to execute a command for 30 seconds, for the given microwave touch keypad shown below. Make sure to name the law and describe the law in plain language.

7	8	9
4	5	6
1	2	3
0	START	

   a. [1] State the relevant Law:

   b. [1] Describe the law in plain language in 2-3 sentences ONLY

   c. [2] Explain why it is faster to use 33 seconds instead of 30 seconds. Your explanation should not be more than 3-4 sentences. If longer, the answer might not be checked.

9. [12] Indicate which input and output device (or mechanism) should be used for each of the following systems. Justify your answers.
   a. A mobile application for kids 3-4 years of age
      Input Device:

      Justification:

      Output Device:

      Justification:

   b. A watch like device that counts exercise minutes
      Input Device:

      Justification:

      Output Device:

      Justification:

   c. In-car audio entertainment system
      Input device:

      Justification:

      Output device:

      Justification:

10. [6] Suggest how each of the following issues can be accounted for in the light of The Abowd-Beale's Interaction Framework. Specify which translation discussed in this theory best explains the behavior of the system and why.
    a. The user sees a bank of unlabeled switches. The user has no idea which switch controls the lights at the far end of the room.

       Translation:
       Why?

    b. Consider a remote control for a television without a button for turning off the television. The user must go directly to the device and turn it off on the control panel.

       Translation:
       Why?

    c. A graph shows the count of grades given in a particular course. The components in the graph are not labeled.

       Translation:
       Why?

11. [10]
    a. [1] Briefly discuss one architectural design flaw in FAST University, Lahore. How can we resolve that design flaw?

    b. [4] You are working on improving the usability of a horizontal toolbar in a word processing application. The toolbar consists of a single row of twelve 16x16-pixel icons. Using Fitts' Law, answer the following question:
    i. In 2-3 sentences, list two ways to make the toolbar faster and easier to use and use Fitts' Law to explain why these will make the toolbar more usable.

    ii. Are circular menu popups better compared to linear popup menus? Explain in 2-3 sentences.

c [3] Using the Fitt's law, calculate the time it will take to hit the target (i.e. rectangle) shown in the figure below. Various measurements (in pixels) are given in the figure. Use the appropriate ones to calculate the time. Assume that the value of all coefficients used in Fitt's law is 1. **There is no partial credit for this question. Show all intermediate steps.**

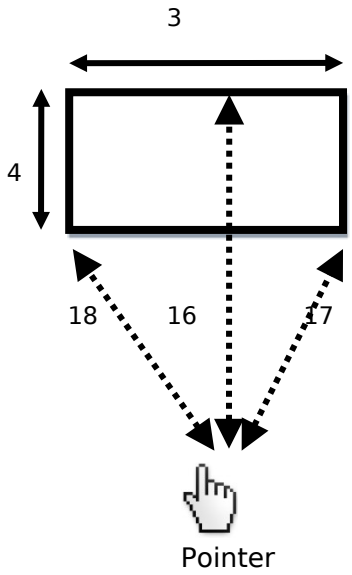


Image is NOT drawn to scale.

d. [2]
A user is playing a memory game that is designed as follows: it first asks the user to memorize a set of names and then, without any delay, it asks the user to memorize another set of names. At the end the user is asked to remember all names from both sets. The user does not perform well in either set. Which memory is this game testing and why doesn't the user perform well. Explain in 1 sentence ONLY.
Memory:
Explanation:

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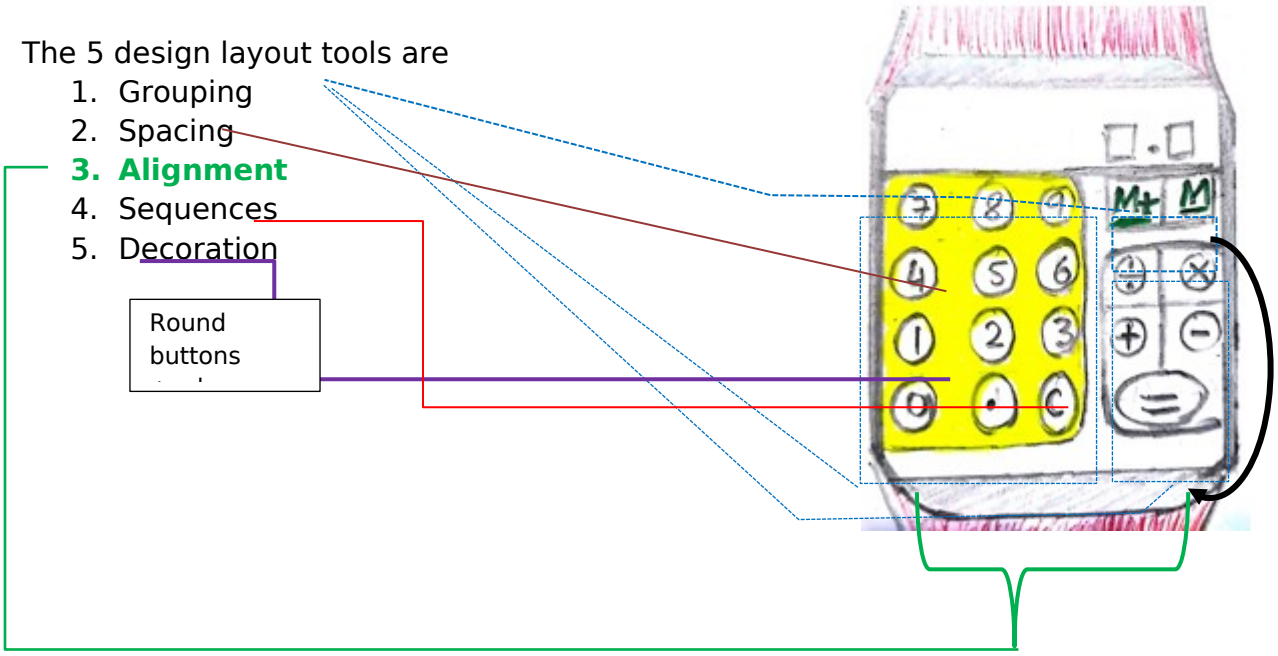
Section:_____

Instruction/Notes: No rough sheets!

1. A development team has decided to develop calculator for a smart watch. Calculator has basic components like the numpad, arithmetic operators, memory read and memory store buttons and a small screen where result to be displayed. Design a **smart watch** interface for this calculator using the 5 design layout tools. List each of these tools and specify using arrows where each of these tools have been applied in the interface. [10 pts]

Solution:

- The 5 design layout tools are
  1. Grouping
  2. Spacing
  3. **Alignment**
  4. Sequences
  5. Decoration



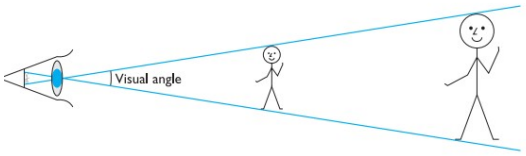
I think, in case of sequence, the M+, MR should be after =, because logically that is the order that they are used in.

2. What is affordances in UI design? Give an example from daily life. [2 pts]

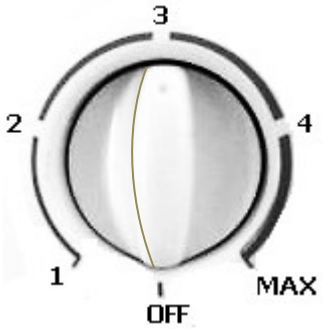
Affordances is one of the Norman's design rule. It refers to an attribute of an object that allows people to know how to use it or give a clue about its usage. For example the physical button on a mouse gives a clue that it can be clicked to perform an action.

3. Why visual angle cannot be used to determine the size of an object? Explain with the help of a figure. [2 pts]

The visual angle cannot be used to determine the size of an object. The size of an object depends on other factors rather than visual angle i.e. the distance of the object etc.
For example look at the figure, the visual angle of both object is same but their sizes and distances are different.



4. Consider the following physical control of a thermostat of a refrigerator. When you rotate it to the right cooling of refrigerator increases while to the left the cooling decreases. Your task is to draw an appropriate glass interface for it. [5 pts]

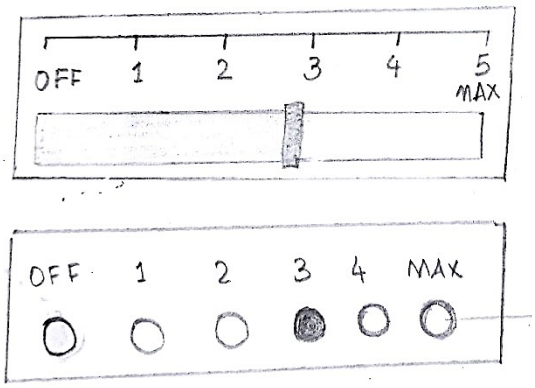


Other solutions also possible

1. If students have perceived it as continuous thermostat

OR

2. If perceived as discrete. But this one is suitable as it

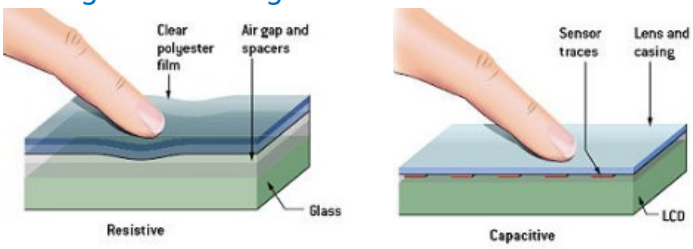


5. How capacitive and resistive touch screens work? Give a brief explanation with figures. [6 pts]

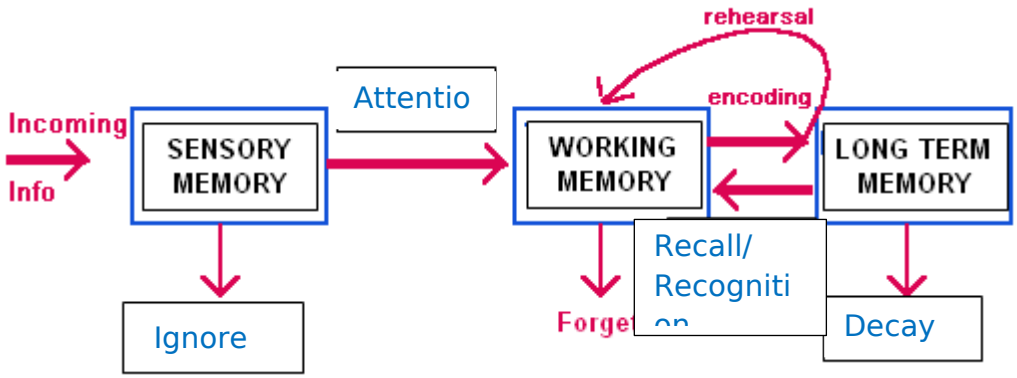
Resistive: These screens "resist" your touch; if you press hard enough you can feel the screen bend slightly. In this type of touch two electrically conductive layers bending to touch one another.

Capacitive: These screens are constructed from materials like copper or indium tin oxide that store electrical charges in an electrostatic grid of tiny wires. Therefore, these screens work with anything that holds an electrical charge – including human skin.

(Figure are somewhat similar to the given figures)



6. Consider the interaction of 3 different types of human memory shown below. Provide appropriate labels (4) for the unlabeled arrows coming out of sensory, working and long term memory in the space provided. [4 pts]



7. A mobile application named Amazing Restaurant Indicator (ARI) is being developed for the user category “Head of family”. ARI is a GPS-based mobile application which helps people to find the closest restaurants based on the user’s current position and other specifications. A head of the family will have a profile on it and when the family decides to go to a restaurant he/she finds the restaurant on it. You are given **the Task Analysis** for **“Find a restaurant”** task and the results of **user profiling**.

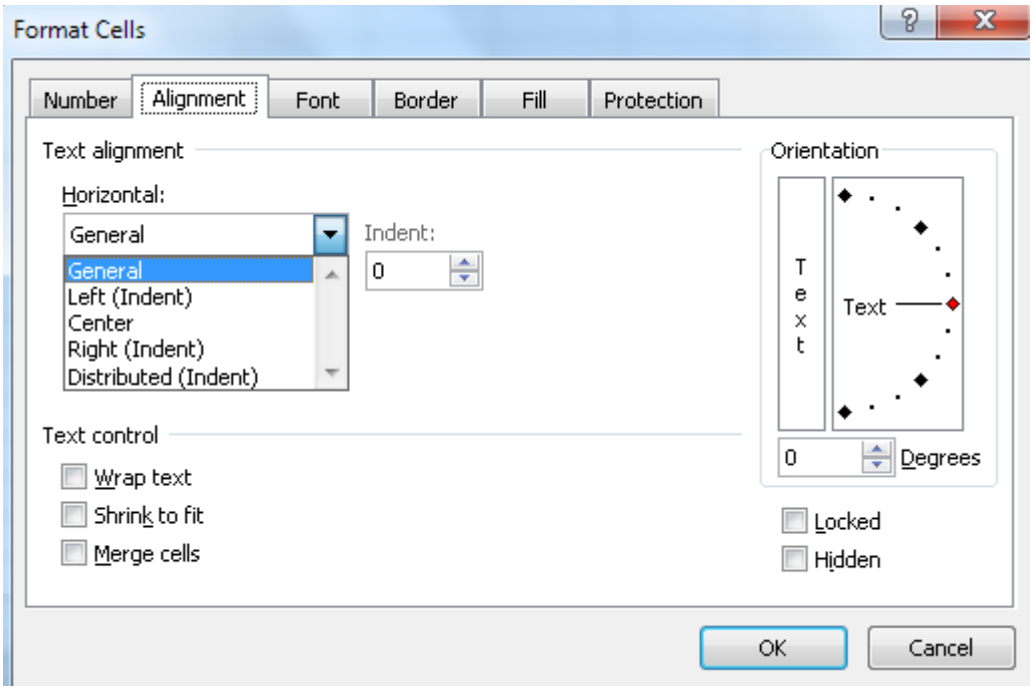
Actor (User)	Task	Scenario
Head of the family (HOF)	Find a restaurant	1. HOF enters the specifications like price, restaurant type, dish, seating capacity and ratings. 2. ARI shows a list of nearby restaurants using the specifications given. 3. Next to the restaurant, the approximate travel time, waiting time and each restaurant’s official website address is shown. 4. HOF can also view the history of their visits to a restaurant visible in search results. History includes the date of visit and their own comments on that visit. 5. HOF can share his/her views on Facebook about the restaurant through ARI. 6. HOF can get recommendations regarding the restaurant from his/her family members connected with him/her on ARI.

a) Using the information given above, develop a **Conceptual Model Design (full sketch)** for the task “**Find a restaurant**” of ARI. You need to make ONE model only. [10 pts]

Solution:

1. **Any good sketches of all pages/windows of mobile app**
2. **All Navigations, Pathways and connectivity**
3. **Fine details not just boxes with rough work**
4. **All requirements should satisfy in sketches**

8. Consider the MS Excel Format Cell Dialog box in the figure. You want to select the horizontal text alignment as Center. You want to wrap text, keep it locked. As a user, you always move from field to field using a mouse. You want to set the degree to 145 by typing in the Degrees field. Assume your hand is initially on the mouse and currently "General" option is selected. Also assume that this dialog box is dismissed by clicking the "OK" button at the end using a mouse. Using KLM-GOMS, determine the minimum time needed to perform this task in seconds. Note K = 0.2s, P = 1.1s, H = 0.4s and M=1.35s. **Show all intermediate steps.** [10 pts]



Solution

pk pk pk pk h kkk h pk

mpk mpk mpk mpk h mkkk h mpk

mpk = 2.65

5*mpk + 2*H + 1*m +3*k

13.25 + 0.8 + 1.35 + 0.6

=16s

or pk pk pk pk h kkk k(delete 0 in degrees) h pk

mpk mpk mpk mpk h mkkk k(delete 0 in degrees) h mpk

mpk = 2.65

5*mpk + 2*H + 1*m +4*k

13.25 + 0.8 + 1.35 + 0.8

=16.2 sec

9. Explain with reference to a law discussed in class why it is faster to execute a command to warm an item in the microwave for 33 seconds, than it is to execute a command for 30 seconds, for the given microwave touch keypad shown below. Make sure to name the law and describe the law in plain language.

7	8	9
4	5	6
1	2	3
0	START	

a. State the relevant Law: [1]
Fitts' Law

b. Describe the law in plain language? [1]
Fitts' law states that the amount of time required for a person to move a pointer (e.g., mouse cursor) to a target area is a function of the distance to the target divided by the size of the target. Thus, the longer the distance and the smaller the target's size, the longer it takes

c. Explain why it is faster to use 33 seconds instead of 30 seconds. Your explanation should not be more than 3-4 sentences. [2]
Pressing the same button twice takes less time than pressing two different buttons located some distance apart. As stated by the Fitts' Law.
Or
NO movement required to move from 3 to 3. Sometime will be taken to move from 3 to 0.

10. Indicate which input and output device (or mechanism) should be used for each of the following systems. Justify your answers. [12 pts]
    a. A mobile application for kids 3-4 years of age
    Input Device: Touch screen with stylus
    Justification: Any valid reason
    Output Device: touch screen
    Justification: Any valid reason

    b. A watch like device that counts exercise minutes
    Input Device: buttons to start/stop
    Justification: Any valid reason
    Output Device: LCD
    Justification: Any valid reason

    c. In-car audio entertainment system
    Input device: speech recognition //if some song is being played, how will the speech recognition system work! Maybe a touch screen panel or something
    Justification: any valid reason
    Output device: two speakers
    Justification: any valid reason

11. Suggest how each of the following issues can be accounted for in the light of The Abowd-Beale's Interaction Framework. Specify which translation discussed in this theory best explains the behavior of the system and why. [6 pts]
    a. The user sees a bank of unlabeled switches. The user has no idea which switch controls the lights at the far end of the room.

    b. Translation: Articulation
    Why? language provided (the unlabeled switches) does not allow the user to articulate the goal (turn on the lights at the far end of the room).

    c. Consider a remote control for a television without a button for turning off the television. The user must go directly to the device and turn it off on the control panel.

    Translation: Performance
    Why? The controller does not have a button to select an option.

    d. A graph shows the count of grades given in a particular course. The components in the graph are not labeled.

    e. Translation: Observation
    Why: The system is giving an output that a user cannot understand

12. How cognitive biases can be used to influence decision making and projects planning? Give one example from each of the following: (pts: 1+2+2+2)
    a. Anchoring bias
    b. Planning fallacy
    c. Gambler's fallacy.

Any good explanation and related examples on decision making and projects planning

13. In what ways is a form filling dialogue box (e.g. the Macintosh Print... dialogue) similar and dissimilar to issuing a command through a pulldown menu system? (2 pts)

    Similarity and dissimilarity of both

Course Name:	Human Computer Interaction	Course Code:	CS 422
Program:	CS	Semester:	Spring 2020
Duration:	3 Hr + 30 Minutes for paper submission	Total Marks:	60
Paper Date:	10 July 2020	Weight	45
Section:	ALL	Page(s):	
Exam Type:	FINAL		

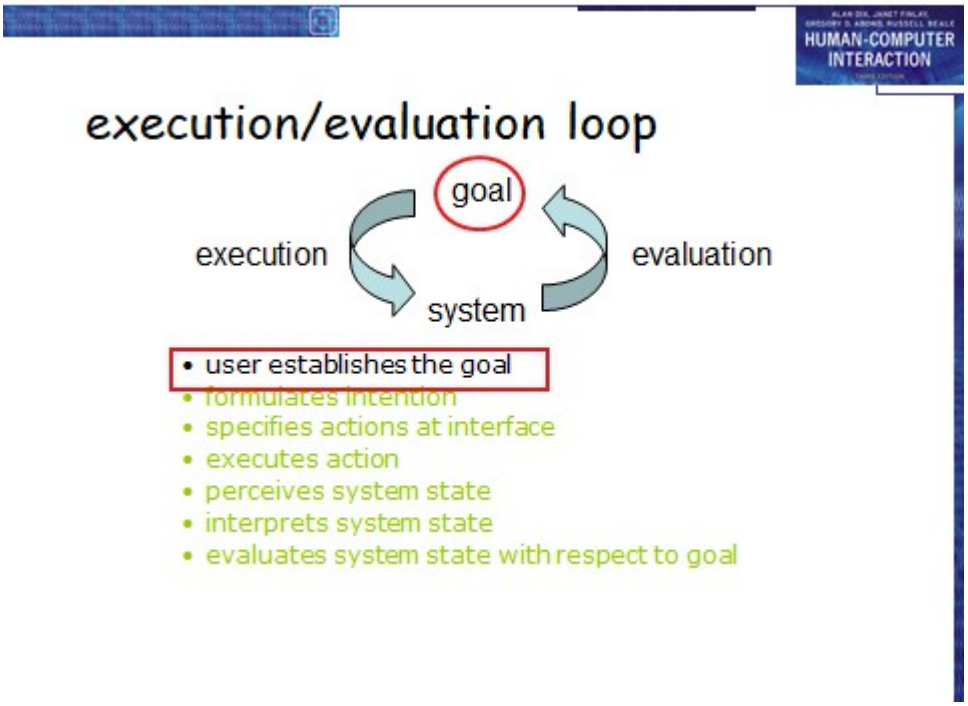
Student : Name:_____ Roll No._____
Section:_____

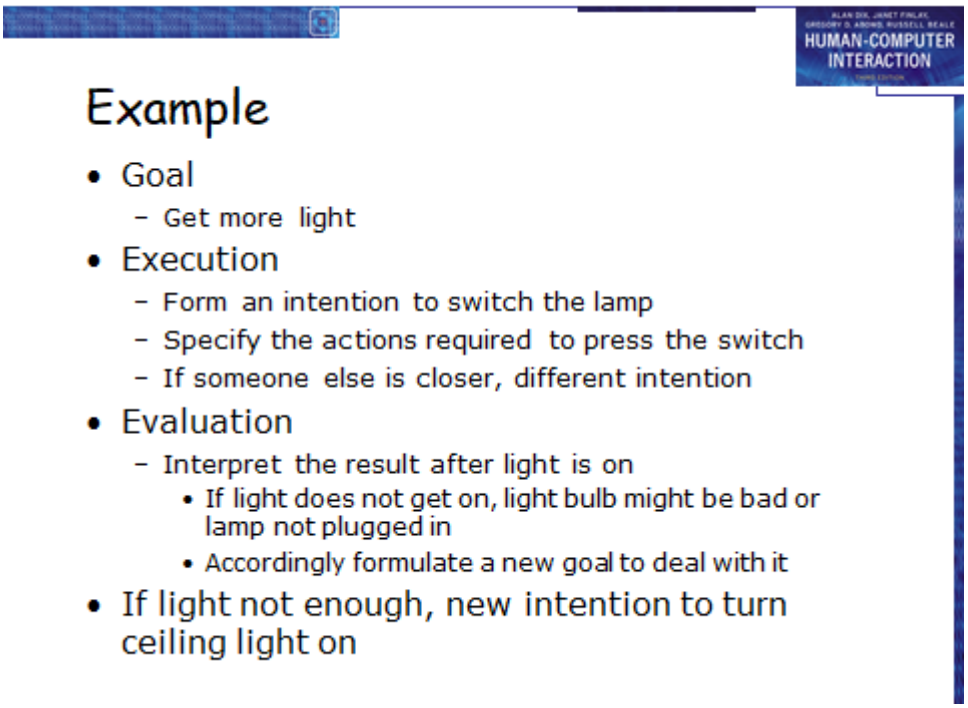
Instruction/Notes: **Do not exceed the line limit for your answers.**
All answers must be handwritten.

Question 01
[10+10 Points]

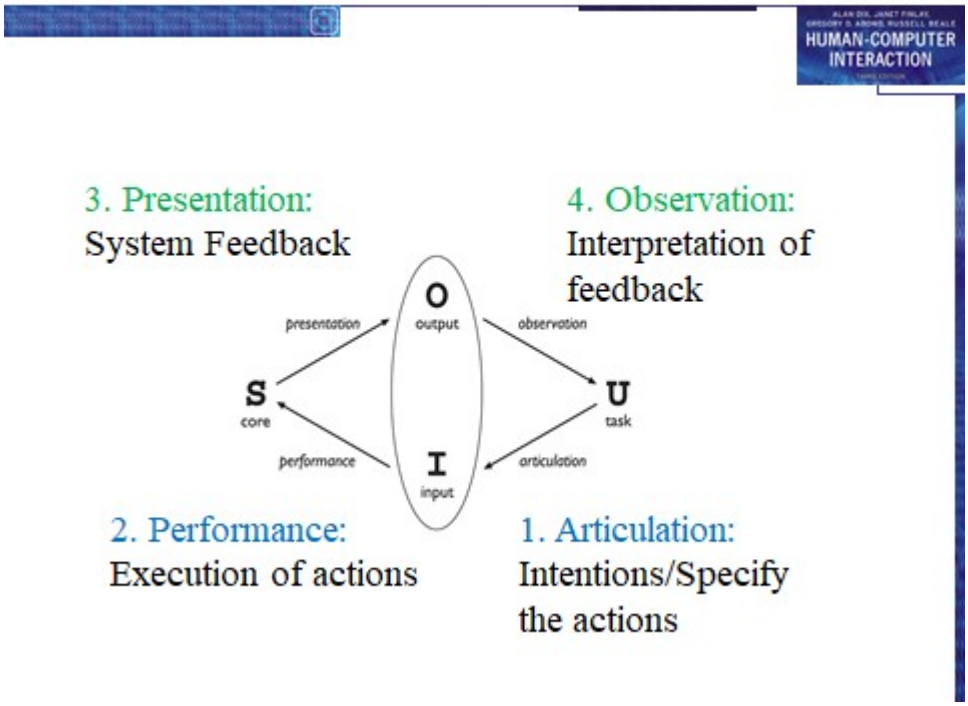
Establish a Goal for “Flex Student” Application and apply the following on that goal

- Norman’s Model of Interaction





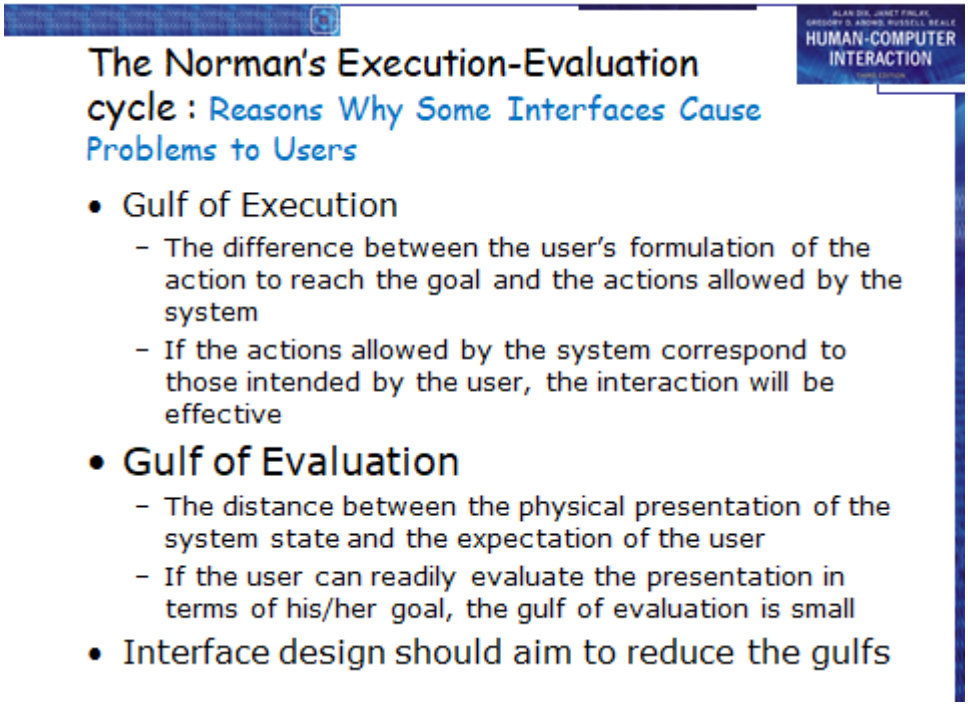
- Abowd and Beale Framework to that Goal.



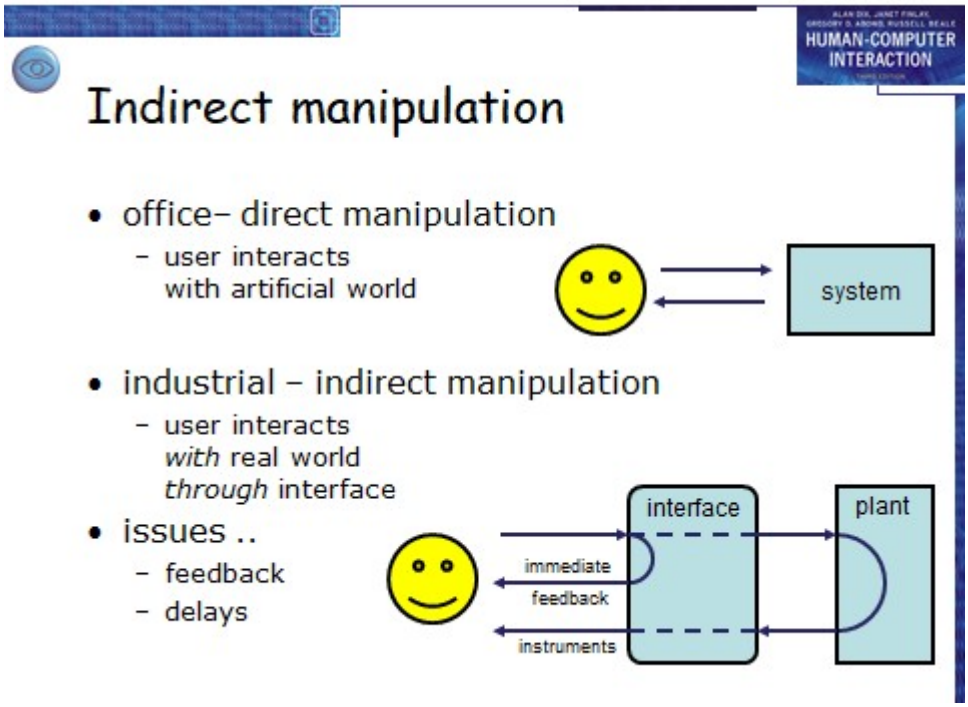
Establish any goal and task for flex application and apply this framework.

(Note: Make clear diagram and mention steps in points.)

a) Elaborate Gulf of Execution and Gulf of evaluation with 2 examples.

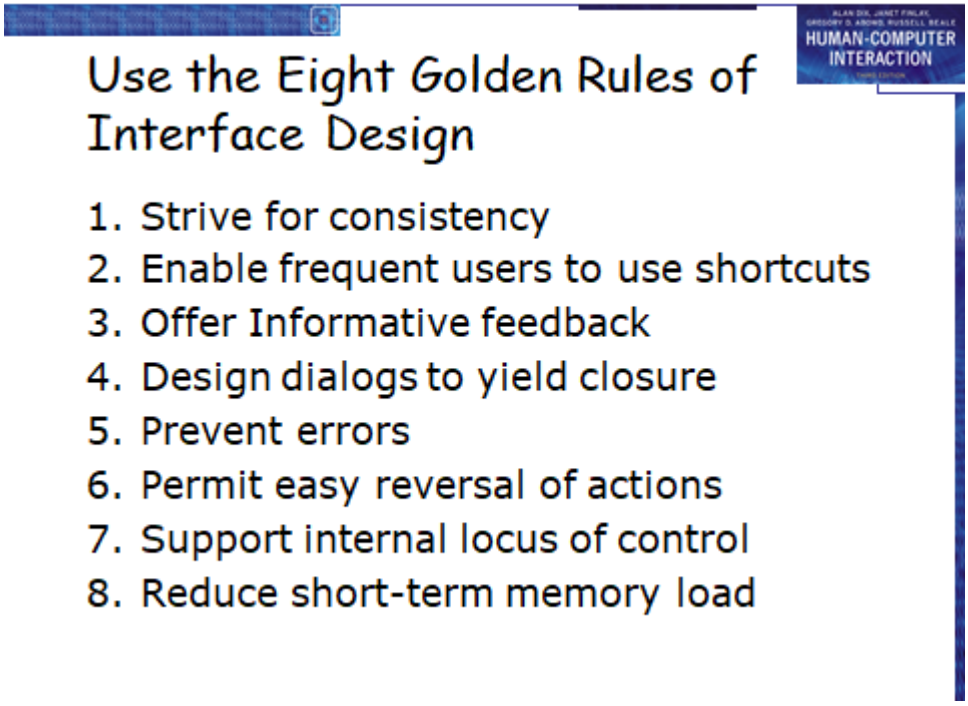


b) Give one example each for direct and indirect manipulation Interaction of HCI
(Line limit : 3 lines per example.)



Question 03
[12 Points]

Ben Shneiderman’s design rules and give one example from each rule for Flex Student Application. (Screenshots can be used for elaboration)



(Line limit : 3 lines per example. One screenshot per example.)

Question 04
[14 Points]

Flex student and Slate application, take one goal from each application and apply KLM GOMS model to calculate time or performance (apply heuristics if applicable).

a. p=1.1 sec point to an area on the screen
b. b=0.2 sec press a button
c. h=0.4 sec home the hand to and from keyboard
d. k=0.2 sec key press
e. m =1.3 sec mentally preparing

Answer depends on the example/task taken by the students for flex and slate applications.

Question 05
[6 Points]

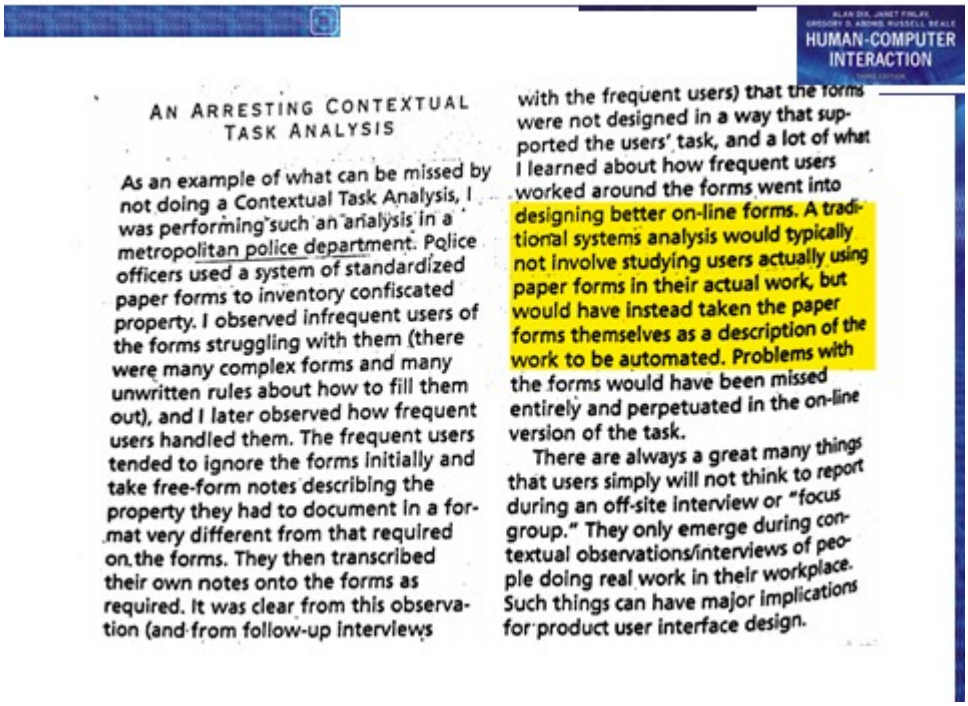
State how each of the interaction styles is appropriate for applications/interactions. Give one application example for each

- Natural Language
  - Common **examples** are real-time production scheduling, robot motion planning and decision making, most game playing situations, and speech recognition for **natural language interfaces**.
- Three–dimensional interfaces
  - For **example**, the Microsoft Kinect tracks the 3D positions of multiple body parts to enable 3D UIs, while the Apple iPhone tracks its own 3D orientation, allowing 3D interaction. There are many different technologies used for spatial tracking; we describe some of these in a later section.
- Touch
  - Smartphone, Touch screen laptops, Touch screen ATM

(Line limit : 4 lines for each style + example)

Question 06
[5 Points]

What is the importance of Contextual task analysis and what could be missed if we do not perform Contextual Task Analysis for any application design. Explain with one example that is not already discussed in class or book.
(Line limit : 5 lines)



HUMAN-COMPUTER INTERACTION

AN ARRESTING CONTEXTUAL TASK ANALYSIS

As an example of what can be missed by not doing a Contextual Task Analysis, I was performing such an analysis in a metropolitan police department. Police officers used a system of standardized paper forms to inventory confiscated property. I observed infrequent users of the forms struggling with them (there were many complex forms and many unwritten rules about how to fill them out), and I later observed how frequent users handled them. The frequent users tended to ignore the forms initially and take free-form notes describing the property they had to document in a format very different from that required on the forms. They then transcribed their own notes onto the forms as required. It was clear from this observation (and from follow-up interviews with the frequent users) that the forms were not designed in a way that supported the users' task, and a lot of what I learned about how frequent users worked around the forms went into designing better on-line forms. A traditional systems analysis would typically not involve studying users actually using paper forms in their actual work, but would have instead taken the paper forms themselves as a description of the work to be automated. Problems with the forms would have been missed entirely and perpetuated in the on-line version of the task.

There are always a great many things that users simply will not think to report during an off-site interview or "focus group." They only emerge during contextual observations/interviews of people doing real work in their workplace. Such things can have major implications for product user interface design.