# National University of Computer and Emerging Sciences, Lahore Campus

| Course Name: | Human Computer Interaction | Course Code: | CS 422 |
|---|---|---|---|
| Program: | CS | Semester: | Spring 2018 |
| Duration: | 2 Hr 30 Minutes | Total Marks: | 80 |
| Paper Date: | 21-MAY-18 | Weight | 40 |
| Section: | A & B | Page(s): | 7 |
| Exam Type: | FINAL | | |

**Student : Name:**_____ **Roll No.**_____

**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

  Round buttons
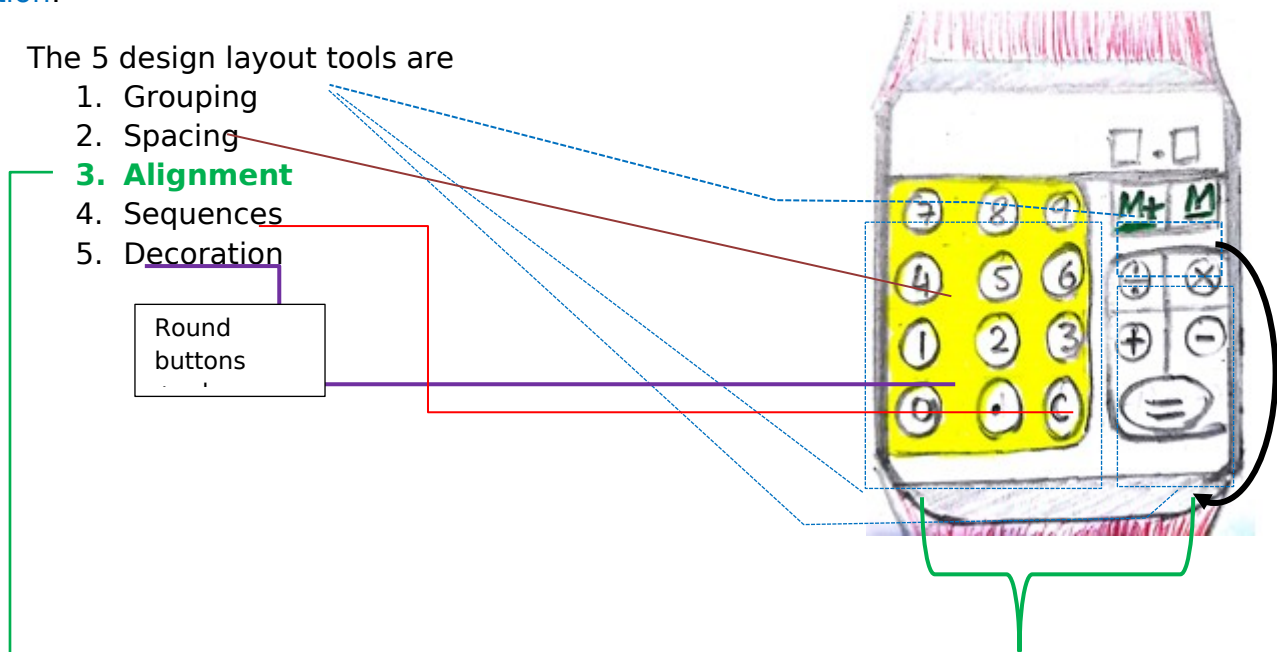


I think, in case of sequence, the M+, MR should be after =, because logically that is the order that they are used in.

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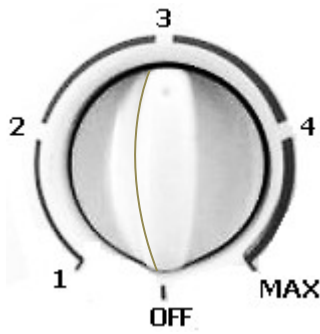
3. Why visual angle cannot be used to determine the size of an object? Explain with the help of a figure. [2 pts]

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.



**Department of Computer Science**

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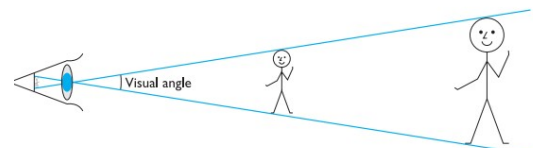
4. Consider the following physical control of a thermostat of a refrigerator. When you rotate it to the right cooling of refrigerator increases while to the left the cooling decreases. Your task is to draw an appropriate glass interface for it. [5 pts]
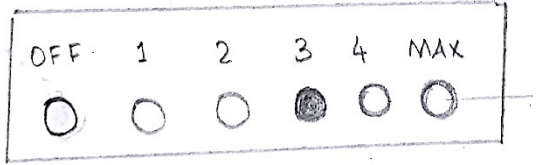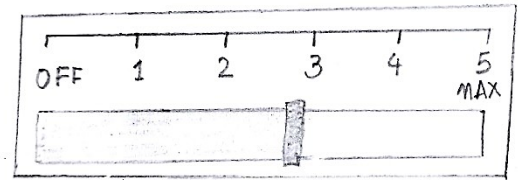


1. If students have perceived it as continuous thermostat

OR

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

Other solutions also possible

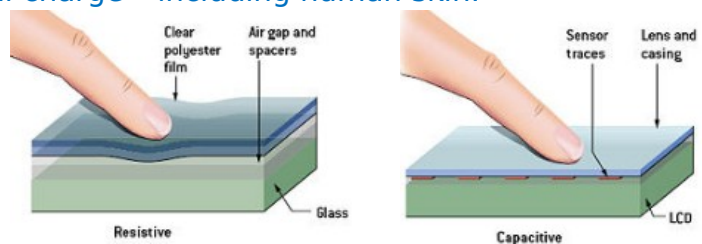OFF 1 2 3 4 5 MAX

OFF 1 2 3 4 MAX

5. How capacitive and resistive touch screens work? Give a brief explanation with figures. [6 pts]
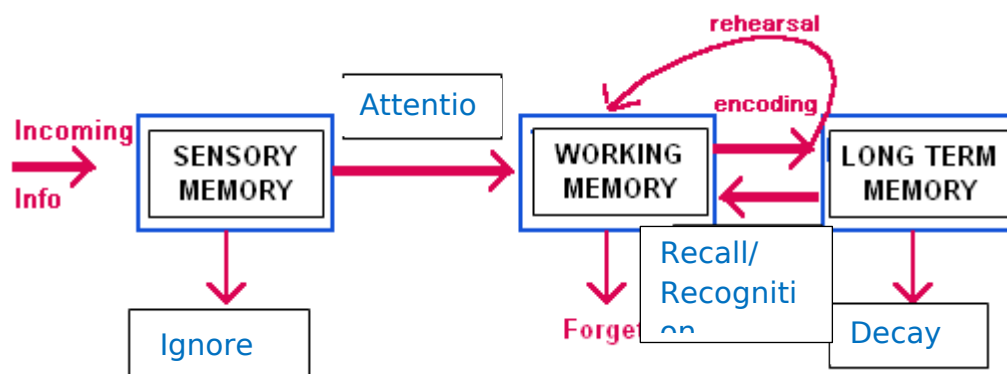
**Resistive:** These screens "resist" your touch; if you press hard enough you can feel the screen bend slightly. In this type of touch two electrically conductive layers bending to touch one another.
**Capacitive:** These screens are constructed from materials like copper or indium tin oxide that store 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 )



Clear polyester film | Air gap and spacers | Glass

Resistive

Sensor traces | Lens and casing | LCD

Capacitive

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]



rehearsal

Incoming Info → SENSORY MEMORY

Attentio

encoding

WORKING MEMORY

LONG TERM MEMORY

Ignore

Forget

Recall/ Recogniti on

Decay

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.<br>2. ARI shows a list of nearby restaurants using the specifications given.<br>3. Next to the restaurant, the approximate travel time, waiting time and each restaurant's official website address is shown.<br>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.<br>5. HOF can share his/her views on Facebook about the restaurant through ARI.<br>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]
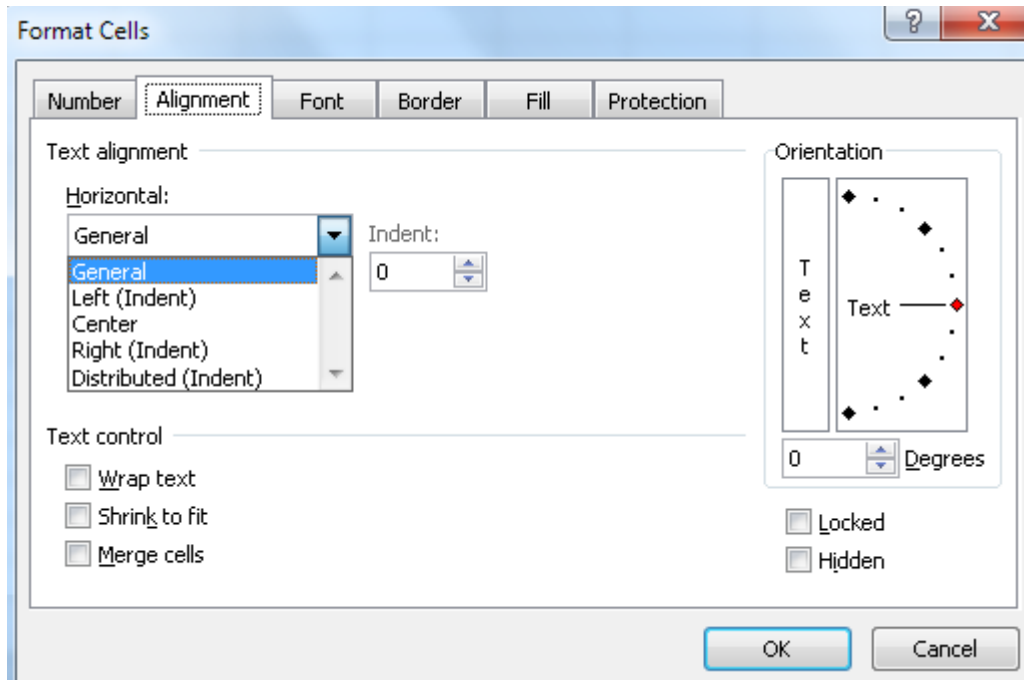


**Solution**

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**