ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION

DURATION: 1 HOUR 30 MINUTES

SUMMER SEMESTER, 2021-2022

FULL MARKS: 75

CSE 4849: Human Computer Interaction

Programmable calculators are not allowed. Do not write anything on the question paper.
Answer **all 3 (three)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

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1. a) Bionic Reading (BR) is an application designed to aid its users to improve focus and increase speed while reading texts by highlighting pieces of words based on certain algorithms. Among the many settings available in the app, one modifies the portion of the words that is highlighted (let it be Stn_A), whereas another increases the amount of unhighlighted text between two consecutive highlights (let it be Stn_B). Examples are demonstrated in Table 1.

    8
    (CO2)
    (PO2)

    Table 1: Example of Bionic Reading for Question 1.a)

Type	Sample (part of a review taken from BR's website)
Raw	I learned about Bionic Reading through the Reeders news app. As soon as I toggled the bionic reading function, I was stunned by how quickly I could read. Jaw-dropping.
Default BR	**I lear**ned **abo**ut **Bionic Read**ing **thro**ugh the **Reed**ers **news** app. **As soo**n as **I togg**led the **bio**nic **read**ing **func**tion, **I wa**s **stun**ned **by h**ow **quick**ly **I coul**d **rea**d. Jaw-**drop**ping.
Tweaked Stn_A	I **lear**ned **abo**ut **Bionic Rea**ding **th**rough the **Reed**ers news app. As **soo**n as **I** toggled the **bio**nic **read**ing function, **I wa**s **stu**nned **by** how **qui**ckly **I** could read. Jaw-**dr**opping.
Tweaked Stn_{A+B}	I **lear**ned about **Bio**nic Reading **th**rough the **Reed**ers news **app**. As **soo**n as I toggled the bionic **read**ing function, I was **stun**ned by **h**ow quickly I could **rea**d. Jaw-**dr**opping.

    Now, considering that the app does what it claims, based on your knowledge about human reading and the examples provided, speculate and explain with supporting arguments, how BR is helping its users to read texts easily.

    b) Suppose you are asked to digitize a fill in the blank task (with options) for an online English language test. In the task, an examinee will be presented with a paragraph of information where a certain number of words are left as blank. There will be a pool of words, with more words than necessary and the examinee needs to fill in the blanks with those words. While designing the digitized version, certain requirements need to be taken into account:

    - A word from the pool cannot be used more than once
    - User should be able to swap the words chosen between two blanks in case of a mistake
    - User should always be able to see an updated pool after changing the word in any blank
    - User should be able to clear a blank in the case of a mistake

    Based on the aforementioned requirements, answer the following questions:

    i. Design an interaction method for the fill in the blank task to facilitate the aforementioned requirements and make it easy, effective and efficient for the examinee. Highlight in your answer how each of the requirements are being met.

    8
    (CO4)
    (PO3)

    ii. Correlate how different higher-level design principles (visibility, feedback, constraint, mapping, consistency, and affordance) can be taken into account while proposing the design.

    9
    (CO2)
    (PO2)

2. a) Given you are tasked with the design of a context menu for an application, you have come up with two different implementations, a vertical one and a radial one. Both the menus have 5 items in total. In case of the vertical menu, each item is rectangular in shape, with a height of $50px$ and width of $210px$. In case of the radial menu, the items are circular with $60px$ diameter each and every item is located $100px$ away from the tip of the cursor. Drawings for the two menus are depicted in Figure 1.
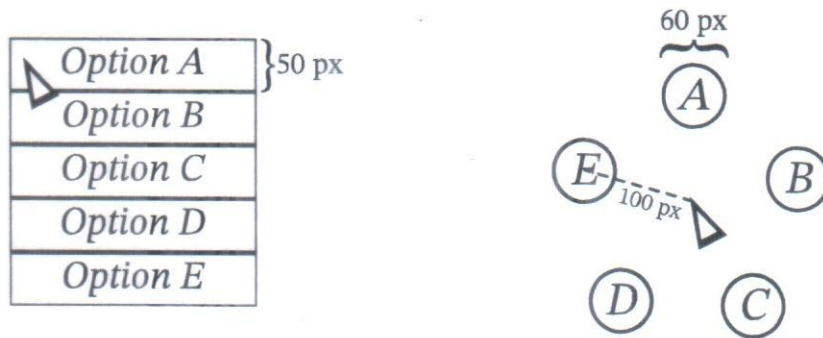

Figure 1: From left to right: vertical and radial menu samples respectively for Question 2.a)

Now, based on the aforementioned information, answer the following questions:

   i. Given you have a monitor of $146DPI$ (Dots Per Inch) and you are sitting 2 $feet$ away from it, calculate the vertical visual angles (in degrees) for a single button in both the vertical and the radial menus.

   6
   (CO1)
   (PO1)

   ii. With adequate mathematical reasoning, identify which of the aforementioned context menu would prove to be more difficult to operate on an average in terms of time taken to press a button. Consider that shortest path will be taken in each case.

   8
   (CO2)
   (PO2)

   iii. Can the initial position of the cursor be changed in the case of the vertical menu to decrease the average difficulty? Justify with appropriate mathematical reasoning.

   6
   (CO2)
   (PO2)

   b) Why are very large desktop monitors generally curved? Explain with appropriate reasoning.

   5
   (CO2)
   (PO2)

3. In the context of unplanned cities, suppose you want to design a Virtual Reality (VR) Yoga Trainer app for the elderly people. Not only the elders can meet and greet each other and practice yoga with peers in a serene, calm, and aesthetic environment, but also there will be support from professional yoga instructors to correct the postures of the trainee and provide advice. The overall result might be achieved with the help of VR headsets, controllers and full body motion tracking cameras, which has recently been introduced to the commercially available home VR setups. Now based on the aforementioned information, answer the following questions:

   a) How can the interrelated aspects of HCI aid in the overall development process of the afore-mentioned app? Explain briefly with appropriate reasoning.

   12
   (CO2)
   (PO2)

   b) "While designing such an app for the elders, proper ergonomics should be considered as a crucial factor" - Do you agree with this statement? Provide proper justification behind your decision.

   7
   (CO2)
   (PO2)

   c) Write down three cases where you think use of haptics can make the overall experience of the given app more immersive and appealing. For each one, provide a brief explanation.

   6
   (CO2)
   (PO2)