Solution:

National University of Computer and Emerging Sciences

Lahore Campus

0027

Human Computer Interaction (CS2007, CS4060)

Sessional-I Exam

Total Time (Hrs): 1
Total Marks: 70
Total Questions: 7

Date: September 24th 2024

Course Instructor(s)

Ms. Kiran Khurshid

Roll No _____ Section _____ Student Signature _____

Q. No.	Marks obtained	Q. No.	Marks obtained	Q. No.	Marks obtained
1 a		3 a		5	
1 b		3 b		6	
2		4		7 a + b	

Attempt all questions on the question paper. Answer sheets are not required.

CLO #1: Explain the difference between good and bad design

Q1) a): Match the option in the left column with the most suitable option in the right most column. Write down your chosen option in the center. [10 marks]

Scenario	Ans.	Concept
Prolonged usage of a keyboard causes the wrist of the user to ache	d	a) The gulf of evaluation
Systems in which haptic feedback helps in enhancing user experience	f/i	b) Memory
The gap between the user and the system when the user decides how to use the system	j	c) Listening
Distractions caused by using mobile phone while driving	g	d) Ergonomics
Accentuate the intonation of artificially generated speech voices	c	e) Haptic Perception
Using biometric verification instead of passwords for logging in to banking app	b	f) Virtual reality
The gap between the user and the system when the user checks the current state of the system	a	g) Attention
The sense which tells us information on how to distinguish hot from cold objects	e	h) Kinesthetic
Awareness of the surroundings through body movements	h	i) Pervasive computing
Technology where users can seamlessly communicate with computers	i/f	j) The gulf of execution

Q1 b): Specify three main ingredients of a usable design: Preece:- [3 marks]

1) Effectiveness / Easy-to-learn
2) Efficiency / Effective to use
3) Satisfaction. / Provides enjoyable UX

CLO #2: Analyze and critique interfaces

Q2: Specify which *translation* of The Abowd-Beale's Interaction Framework best explains the behavior of the following systems and explain why that translation applies. [6 marks]

a) A graph shows the count of grades given in a particular course. The components in the graph are not labeled.
Translation: Observation (output to task/user)
Why: User does not interpret the presented output properly.

b) A user presses START button to turn off the television
Translation: Articulation (user to input language)
Why: User does not know how to give input to the system.

c) A user may not interpret the play station icon on the controller correctly.
Translation: Articulation (task/user to input lang.)
Why: Same as b.

CLO #2: Analyze and critique interfaces

Q3) a): Specify the Human Error Type and recommend solution to avoid that specific error. [4 marks]

i) While cleaning a hand blender, user presses the start button of the blender, accidentally.
Error type: Slip
Recommended solution: Button placement / confirmation.

ii) User long presses the filename in a list of files, in a mobile app, thinking he will see further options, but instead long press does nothing.
Error type: Mistake
Recommended solution: Better understanding of the system.

Q3) b): The acuity of which color is low and why? [2 marks]

Blue, 3-4% of the fovea is occupied by cones which are sensitive to blue light.
Acuity is the ability to perceive fine detail

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CLO #3: Evaluate the usability and effectiveness of various software products

Q4) Write down the three types of users with their definition. Give one example of each.[9 marks]

Type of user	Definition	Example
Primary	Work regularly / directly with product	
Secondary	Infrequently or through an intermediary	
Tertiary	Affected by the system or purchasing decision-makers.	

Novice, expert, casual or frequent user.

CLO #4: Design and develop user interfaces providing effective usability and user experience

Q5) What input and output devices would you use for the following systems? If appropriate, indicate why the conventional keyboard, mouse and CRT screen may be less suitable. [9 marks]

a) Tourist information system installed at an airport
Input: Touchscreen / QR-query / QR or barcode scanner / RFID Readers / Camera motion/ Sensor
Output: " / high res display / speakers / headphone jack / bluetooth / printers / Visual haptic feedback / LED indic
Why? Easy and direct interaction. No mouse/keyboard as it is a public place.

b) Tractor-mounted crop-spraying controller
Input: Touch-sensitive keypad (Numerical input / no text)
Output: LCD display
Why? A hostile environment with mud and chemicals. Ordinary keypads would get clogged.

c) Air traffic control system
Input: Several specialized displays, light pen/styluses, (folding) keyboard
Output:
Why? Immediately available info + rapid interaction.

CLO #4: Design and develop user interfaces providing effective usability and user experience

Q6: a) How is Command Line better for expert users than for novices? [2 marks]
Commands must be remembered with no cues to indicate which command is needed.

b) Write down one advantage and one disadvantage of Natural Language Interaction Style. [2 marks]
Does not need to remember commands in computer language or lose in a hierarchy of menus. Disadvantage: Ambiguity

c) How can a person without limbs (quadriplegic) give input to the computer? What are such systems called? [2 marks]
Voice / eyegaze. speech recognition systems.
Voice-controlled systems / voice UI / voice activated.

d) Briefly explain the concept of trade-off in design. [3 marks]
Achieving goals within constraints is design. Trade-off is choosing between preferences of goals or constraints.

5) b) I/P: Touchscreen with (Rugged Design)

Also accepted ans:- Prototype Evaluation Reqs — Analysis — Design — Implement

CLO #4: Design and develop user interfaces providing effective usability and user experience

Q7) a) What are the four main activities of a simple interaction design lifecycle model? Explain each of them in one sentence. [8 marks]

Activity 1: Discovering Reqs.
Explain: Discovering something new about the world and defining what will be developed. (Understanding the target users and support/use & product can provide)

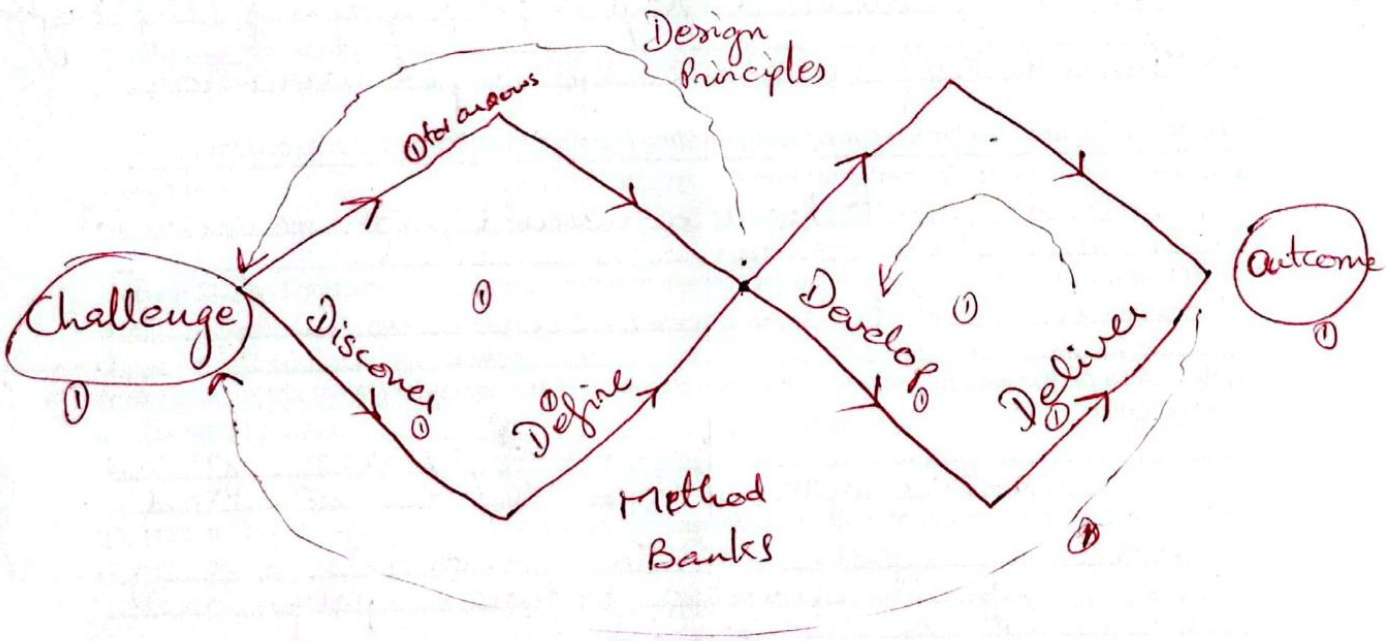
Activity 2: Designing alternatives
Explain: Develop phase: Conceptual Design and Concrete design.

Activity 3: Prototyping
Explain: Develop phase: A sample product to evaluate the behavior and appearance of it.

Activity 4: Evaluating
Explain: Deliver phase: Testing solutions at a small scale. Determining the usability and acceptability.

Q7) b) Draw the double diamond of design. [10 marks]

Engagement



Leadership

1 mark bonus for eng/method/Principles/ Method banks/ Divergent/ Convergent thinking

Deliver/Deploy both accepted.

Q.5

a) Tourist information system

Input Devices:

1. Touchscreen Interface / kiosk
2. Voice Recognition (Microphone)
3. On-Screen Keyboard
4. QR Code or Barcode Scanner
5. NFC/RFID Reader
6. Gesture-Based Input (Camera or Motion Sensor)
7. Multilingual Interface Selector

8.

Output Devices:

1. High-Resolution Display Screens / LED / LCD / Touch Screen Monitor / kiosk
2. Speakers/Audio Output
3. Headphone Jack or Bluetooth Audio Output
4. Printers (for maps, directions, or tickets)
5. Visual or Haptic Feedback on Touchscreen
6. Digital Signage for Visual Notifications
7. Multilingual Audio Output
8. LED or Lighting Indicators

Why? Keyboard and mice are not suitable in public places, due to high risk of loss and/or damage (hence costly and would require regular maintenance)

b) Tractor-mounted crop-spraying controller

Input Devices:

1. Touchscreen Interface (Rugged)
2. Physical Buttons/Dials/Knobs
3. Voice Input (Microphone)
4. Joystick or Lever Controls
5. GPS Sensors
6. Proximity or Distance Sensors
7. NFC/RFID Reader

8) haptic

Output Devices:

1. Display Screen (Rugged, High-Contrast)
2. Audible Alerts (Speakers/Buzzer)
3. Haptic Feedback (Vibration)
4. LED Indicators
5. Real-Time Mapping Output (GPS Integration)
6. Speakers/Audio Output (Multilingual)

7. Heads-Up Display (HUD) or AR Glasses

Why? Keyboards and mice are not suitable in dirty, muddy and rough conditions. Farmers may also find difficult to operate them (difficult to learn, or to use while driving)

c) Air traffic control system

Input Devices:

1. Radar Interface
2. Keyboard and Mouse
3. Joystick or Trackball
4. Touchscreen Interface
5. Voice Recognition (Microphone)
6. Flight Strip Printers/Scanners
7. Specialized Control Panels (e.g., buttons, dials)

Output Devices:

1. High-Resolution Multi-Display Monitors
2. Radar Display Screens
3. Audio Alerts (Speakers)
4. Headset for Voice Communication
5. LED Indicators
6. Flight Strip Displays
7. Haptic Feedback Devices

Why? Immediately available info and rapid interaction