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CHENNAI

## Final Assessment Test(FAT) - Apr/May 2025

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| Programme | **B.Tech.** | Semester | **Winter Semester 2024-25** |
| Course Code | **BCSE415L** | Faculty Name | **Prof. Praveen Joe I R** |
| Course Title | **Human Computer Interaction** | Slot | **C1+TC1** |
| | | Class Nbr | **CH2024250502026** |
| Time | **3 hours** | Max. Marks | **100** |

**Instructions To Candidates**

- Write only your registration number in the designated box on the question paper. Writing anything elsewhere on the question paper will be considered a violation.

**Course Outcomes**

CO1: To design and develop processes and life cycle of Human Computer Interaction
CO2: To analyze product usability evaluations and testing methods
CO3: To apply the interface design standards/guidelines for cross cultural and disabled users
CO4: To categorize, design and develop human computer interaction in proper architectural structures

### Section - I
### Answer all Questions (4 × 10 Marks)

01. In a graphic design studio, artists rely on a variety of input and output devices to create intricate digital artwork for a high-profile client. The team uses text entry devices like keyboards to input project specifications, while positioning and pointing devices such as mice and styluses help them navigate and select elements on the canvas. Drawing devices, including graphic tablets, allow for precise sketching and detailing, and large high-resolution display devices showcase the artwork in vivid clarity. During a tight deadline, the team faces issues with device compatibility and performance, pushing them to troubleshoot and adapt quickly.

a) Describe how the studio could optimize the use of positioning, pointing, and drawing devices to improve workflow efficiency and precision when selecting, adjusting, and sketching design elements under time constraints. (7 Marks)

b) Identify and explain one potential issue with text entry devices that might hinder the input of project specifications during a busy workday. (3 Marks)

**[10] (CO1/K3)**

02. In a smart home control center, users manage lighting, temperature, and security systems through a touchscreen interface. Task Modeling is used to map out the steps required to adjust settings, such as selecting a room, choosing a function, and confirming changes, while the Human Problem-Solving Model analyzes how users recognize issues , explore solutions, and implement adjustments. During a power outage, users struggle to prioritize and execute tasks efficiently due to an overly complex interface, leading to frustration and delays in restoring control.

a) Describe how Task Modeling could be applied to redesign the smart home interface, detailing specific improvements to the sequence and structure of tasks for adjusting lighting and temperature settings to enhance user efficiency and reduce confusion during an emergency like a power outage.(5 Marks)

b) Using the Human Problem-Solving Model, identify one cognitive difficulty users might encounter when deciding how to prioritize security settings after a power outage, and propose one interface feature to support their problem-solving process.(5 Marks)

**[10] (CO4/K4)**

03. In an online banking application, users manage transactions, transfer funds, and schedule payments through a mobile interface. The current design suffers from inconsistent icons across screens, unclear confirmation messages after actions, and a complex menu structure that overwhelms users, often resulting in errors like transferring money to the wrong account. During peak usage periods, such as tax season or holiday shopping, customers express frustration over their inability to quickly correct mistakes, a lack of intuitive guidance, and difficulty understanding how to interact with the interface effectively. These issues erode trust in the system, leading to abandoned transactions and customer complaints.

a) Identify four specific design flaws in the online banking interface that contribute to user errors , and for each flaw, redesign the solution to improve the interface by applying Norman's principles, ensuring users can manage transactions and transfers efficiently, intuitively, and with confidence during high-traffic periods. (8 marks)

b) Highlight one common error users might encounter when transferring funds due to the current interface and recommend a feature that applies one of Norman's principles to enable them to resolve this mistake swiftly and seamlessly without disrupting their banking tasks. (2 marks)

**[10] (CO3/K4)**

04. In the Press room, Journalists use a custom keyboard-based system to draft and edit articles under tight deadlines. The Keyboard Level Model (KLM) is employed to assess task efficiency. The system uses various encoding methods for shortcuts to perform tasks like inserting headlines and formatting quotes, while heuristics guide the placement of the M operator for complex editing sequences. During peak hours, journalists report slowdowns due to confusing shortcut designs and poorly timed mental pauses, disrupting their workflow.
a) Explain how the Keyboard Level Model could be applied to analyze and enhance the efficiency of drafting an article in the newsroom system, detailing the sequence of operators involved and proposing two specific improvements to the shortcut encoding methods to minimize task time for journalists. (7 marks)
b) Suggest one heuristic for positioning the M operator in the sequence of actions for a multi-step editing task, and explain how it would reduce cognitive effort for journalists during high-pressure editing sessions. (3 marks)

**[10] (CO1/K4)**

## Section - II
## Answer all Questions (4 × 15 Marks)

05. A software development team is creating a mobile application for a public library system, allowing users to search for books, reserve them, and manage their accounts. The team aims to embed HCI principles into the software process to ensure a user-friendly experience, applying design rules to standardize the interface. However, early feedback reveals that users with visual impairments struggle with unreadable text and poor color contrast, while users with motor disabilities find the interactive elements too small and difficult to tap accurately, risking the app's accessibility and adoption.
a) Design an improved user interface for the library app that prioritizes accessibility. Incorporate HCI principles into your design process and propose four specific design enhancements—two focused on improving usability for users with visual impairments and two for users with motor disabilities. Ensure that your design adheres to effective accessibility standards.(8 marks)
b) Design an additional feature that supports both visually and motor-impaired users, explaining how it enhances their interaction with the app. (7 marks)

**[15] (CO3/K6)**

06. A team is tasked with creating an interactive online learning platform where students and teachers collaborate in real-time to produce multimedia projects, such as video presentations. The platform needs a visual interface with intuitive navigation, effective screen layouts, and color schemes that inspire focus and creativity, tapping into emotional design. The design process involves wire-framing, iterating based on user feedback, and prototyping to perfect multi-user interactions. Initial user tests reveal confusing navigation, cluttered screens, and disjointed multimedia tools, hindering collaboration.
a) Design an improved interface for the online learning platform by proposing one specific enhancement each for navigation design, screen layout, color scheme, and multi-user interaction, ensuring the solution prioritizes user focus, supports emotional engagement, and facilitates efficient collaboration across different user scenarios. (8 marks)
b) Identify one usability challenge users might face when collaborating on video presentations due to the current interface and propose a feature that applies one of Nielsen's usability heuristics to address this challenge, enhancing the collaborative experience for students and teachers. (7 marks)

**[15] (CO2/K6)**

07. A design team is developing a mobile fitness app aimed at helping users track workouts, set goals, and stay motivated. To ensure the app meets diverse user needs, the team must create detailed user personas to represent their target audience and storyboards to visualize key interactions. The app targets both casual exercisers and dedicated athletes, but initial feedback suggests that the current design feels generic and fails to address specific user motivations or daily routines, leading to low engagement during early testing.

a) Create a detailed user persona for one target user of the fitness app, including their demographics, goals, frustrations, and typical daily context. (7 Marks)

b) Design a storyboard depicting their interaction with the app to achieve a specific fitness goal, ensuring the persona and storyboard reflect their unique needs and motivations. (8 marks)

**[15] (CO4/K6)**

08. A development team has created a VR training application for firefighters, simulating emergency scenarios where users navigate burning buildings, identify hazards, and practice rescue techniques. The interface uses head-mounted displays, hand controllers, and spatial audio, but during initial trials, some trainees report disorientation, difficulty interacting with virtual objects, and unclear feedback on actions, impacting their learning experience. The team plans to conduct usability testing to refine the AR/VR system before deployment in real training programs.

a) Design a usability testing plan for the VR firefighting training application, specifying any two distinct testing methods to evaluate navigation and interaction, and explain how each method would identify specific usability issues, ensuring the results improve the trainees' experience. (8 marks)

b) Propose one metric to measure the effectiveness of the VR system during usability testing, and describe how it would reveal a key usability problem faced by firefighters in the simulated environment. (7 marks)

**[15] (CO2/K5)**

**BL-Bloom's Taxonomy Levels - (K1-Remembering,K2-Understanding,K3-Applying,K4-Analysing,K5-Evaluating,K6-Creating)**