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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR
THIRD YEAR, SECOND SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE
KCS 402 – HUMAN COMPUTER INTERFACE

Date: 17TH April 2024
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) A company is developing a virtual reality (VR) training program for medical students to simulate surgical procedures.
- Using two relevant examples discuss the challenges involved in designing interaction systems for VR environments to ensure realistic and intuitive user interactions. (6 Marks)
 - Using three relevant examples discuss the benefits of designing interaction systems for VR environments to ensure realistic and intuitive user interactions. (6 Marks)
- b) A software development company is tasked with designing a human-computer interface (HCI) for blind users to navigate and interact with a new mobile application independently. The interface should enable users to access various features, including reading text, navigating menus, and interacting with multimedia content.
- Discuss two challenges the developer is likely to encounter in designing an HCI for blind users? (4 Marks)
 - Using two examples discuss how the development team can ensure that the interface is accessible and user-friendly for individuals with visual impairments? (4 Marks)
 - List and explain three assistive technologies that can be incorporated into the HCI to enhance usability and functionality for blind users? (6 Marks)
 - Using two examples discuss how the user testing and feedback can be used to iteratively improve the accessibility and usability of the HCI for blind users? (4 Marks)

QUESTION TWO (20 MARKS)

- a) A car manufacturer is incorporating voice-activated controls and gesture recognition technology into its vehicles' infotainment systems. Using 3 relevant examples, discuss the human factors and ergonomic considerations that should be considered to ensure safe and distraction-free interactions for drivers and passengers? (6 Marks)
- b) You are a healthcare IT consultant tasked with designing HCI solutions for electronic health record (EHR) systems.
- Discuss two specific uses of HCI in healthcare settings. (4 Marks)
 - Using three relevant examples discuss how HCI can improve healthcare workflows, streamline information retrieval, and enhance communication between healthcare providers and patients. (6 Marks)
 - Discuss four relevant impacts of HCI on patient safety, medical error reduction, and healthcare outcomes. (4 Marks)

QUESTION THREE (20 MARKS)

A technology company is developing a specialized HCI for individuals with motor impairments to interact with computers and assistive devices. The interface should accommodate a range of input methods, including touchscreens, voice commands, and alternative input devices.

- i) Discuss any two challenges faced by individuals with motor impairments in using traditional computer interfaces? (4 Marks)
- ii) Using three examples, discuss how the HCI can be designed to accommodate different levels of motor function and accessibility needs? (6 Marks)
- iii) Explain two features and customization options that should be incorporated into the interface to support users with diverse abilities and preferences? (4 Marks)
- iv) Using three relevant examples, discuss how usability testing and user feedback be used to evaluate and improve the effectiveness of the HCI for people with special needs? (6 Marks)

QUESTION FOUR (20 MARKS)

A toy company is developing a child-friendly HCI for a new interactive learning device aimed at preschool-aged children. The interface should be engaging, intuitive, and easy for young children to understand and navigate independently.

- i) Using two examples, discuss 5 factors that should be considered when designing a human-computer interface for young children? (4 Marks)
- ii) Using three examples, explain how can HCI incorporate age-appropriate visual and auditory cues to guide children's interactions and learning experiences? (6 Marks)
- iii) Using three examples, explain usability principles and design guidelines that should be applied to ensure that the interface is accessible and engaging for children of different ages and abilities?(6 Marks)
- iv) Using two examples discuss how the HCI can be iteratively tested and refined to address usability issues and meet the developmental needs of young users? (4 Marks)

QUESTION FIVE (20 MARKS)

- a) A government agency is redesigning its website to improve accessibility for users with disabilities.
 - i) Discuss two principles of inclusive design that should be incorporated into the interaction systems to ensure equitable access and usability for all users? (4 Marks)
 - ii) Using three examples, explain the concept of human perception and cognition and its significance in user interface design. (6 Marks)
- b) List two examples of how knowledge of human perception can influence the design of visual elements in user interfaces. (4 Marks)
- c) Discuss three roles of mental models and conceptual frameworks in user interface design. Illustrate using example how designers can leverage users' mental models to create intuitive and easy-to-use interfaces? (6 Marks)