Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination November 2025

Roll no. 2218293

Name of the Course and semester: B.Tech.(CSE), AI/ML and VII
Name of the Paper: Human Computer Interaction
Paper Code: TCS 756
Time: 3 hour

Maximum Marks: 100

Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks) CO1

a. Define User Interface (UI). Explain in detail the importance of good interface design. Discuss the benefits of a well-designed user interface with suitable examples.

b. What do you understand by Direct Manipulation in HCI? Explain its features, advantages, and impact on user experience with real-world examples (e.g., file handling, drawing tools).

c. Analyze how graphical design principles such as color, contrast, typography, and layout affect interface performance metrics such as *error rate*, *response time*, and *learning speed*. Use examples to illustrate your points.

Q2. (2X10=20 Marks) CO2

a. Write a detailed note on Human Interaction Speeds. Discuss perceptual, cognitive, and motor speeds, and explain their importance in designing responsive interfaces.

b. What are business junctions in HCI? Explain how understanding business junctions helps in aligning interface design with user goals and organizational objectives. Give suitable examples.

c. A user moves a mouse pointer to select a button on the screen. The distance (D) between the start point and the button is 25 cm, and the width (W) of the button is 5 cm.

Using Fitts's Law, calculate the movement time (T) given:

$T=a+b\times\log(\text{base2})\,(1+D/W)$

where a=0.15s and b=0.10 s

Also, explain how button size and distance affect human interaction speed.

Q3. (2X10=20 Marks) CO3

a. Discuss the technological considerations in interface design. Explain how screen resolution, platform compatibility, input devices, and display technologies influence screen layout and usability.

End Term (Odd) Semester Examination November 2025

b. A designer creates three charts for user dashboards: bar chart, pie chart, and line graph. Evaluate these visualizations based on clarity, readability, information density, and user interpretation speed. Suggest how the design could be improved for better information retrieval and decision support.

c. Explain how screen data and content should be ordered and grouped for better user understanding. Discuss different layout strategies used in designing complex information screens.

Q4. CO4, CO5 (2X10=20 Marks)

a. Describe the selection of devices-based and screen-based controls in Human–Computer Interaction. Compare input devices such as keyboard, mouse, touch screen, and voice commands with respect to usability and application area.

b. Design a window layout for a student management system (showing icons, text, and control buttons). Label all interface elements and justify your design based on usability principles and aesthetic guidelines.

c. A designer uses 20 icons, but users report confusion identifying half of them. Analyze possible design flaws related to icon shape, metaphor, color coding, and consistency. Propose two concrete design improvements to enhance recognition and usability.

Q5. (2X10=20 Marks) CO6

a. Write detailed notes on pointing devices used in HCI. Compare devices such as mouse, touchpad, joystick, and stylus in terms of speed, accuracy, and user comfort.

b. Explain how software tools and interaction devices together enhance user experience and accessibility. Illustrate your answer with real-world applications such as voice assistants, AR/VR interfaces, or touchscreen kiosks.

c. A developer uses three UI-building tools with the following metrics:

Tool	Prototype Time (hrs)	Error Rate (%)	User Satisfaction (1–10)
A	20	10	7
B	15	12	6
C	18	8	8

Evaluate which tool offers the best trade-off among efficiency, reliability, and user satisfaction. Justify your answer with proper reasoning.