# BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJASTHAN)
## Second Semester, 2022-2023

**30 Marks (30% Weightage)**     **Mid-Semester Test**     **Closed Book**

| **Course Number:** BITS F364 | **Course Title:** Human Computer Interaction |
|---|---|
| **Date**      : March 13, 2023 | **Time**        : 09.00 AM – 10.30 AM |

**Note:** There are five questions in all. Please answer all parts of a question in sequence and in continuation.

**Q1.** In the top and bottom rows of the figure *Intensity Variation*, the boxes are shaded with gray level values as given in the table *Intensity Values*. The gray level value for black is zero and that for white is 255. The narrow middle row in this figure is shaded white. The figure *No Gap* is obtained from the Fig. *Intensity Variation* by removing middle white bar from it. Explain the reason for the pertaining phenomenon as specified below:

**1.1** In the bottommost part of the *Fig. Intensity Variation*, shaded portions are not easily distinguishable though we can easily distinguish those in the top parts of the figure.

**1.2** While looking the bottom-bar in the *Fig. Intensity Variation* why eyes feel discomfort in recognizing the variations in the intensities while looking slowly from rightmost portion of the bar towards the leftmost portion.

**1.3** In figure *No Gap* why the two shades, which are same in the alternate columns, are perceived as it.



**Figure: *Intensity Variation* ↑**

| 0 | 250 | **60** | 250 | **120** | 250 | **180** | 250 | **240** | 250 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 15 | **60** | 75 | **120** | 135 | **180** | 195 | **240** | 250 |

**Table: *Intensity Values* ↑**



**Figure: *No Gap* ↑**

**Marks Q1 [2 x 3 = 6]**

**Q2.** Write two contrasting differences between the following:

**2.1** Incremental prototyping and Evolutionary prototyping.

**2.2** Check-box control and radio-button control (in the context of GUI).

**2.3** Parametric Independent Variable and Non-parametric Independent Variable.

**2.4** Semantic Network Representation and Frame-based Representation (in the context of Knowledge)

**Marks Q2 [1.5 x 4 = 6]**

**Q3.** Assume that a user interface accepts two values x and y where the x values are at linear scale but y values are at exponential scale. A designer designs this input using a control similar to a spiral as shown in Fig. Q3. The values for x are mapped zero at inner tip and increases w.r.t. radius as mouse pointer is moved anticlockwise along the spiral. The values for y (zero at inner tip) are mapped as (an adjustable weight to incorporate exponential scale)*(total area swept under the spiral curve up to the corresponding x-vale). Answer the following:
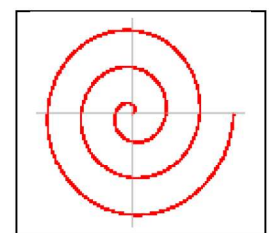


**Figure: Q3**

**3.1** In which aspects is this design better than using two linear scrollbars perpendicular to each other?

**3.2** List three major difficulties to implement this type of interaction design.

**Marks Q3 [3 + 3 = 6]**

**Q4.** Answer the following (word limit to answer each part is 50 words):

**4.1** Why user interface design has to be an integral part of the software (or system) development process?

**4.2** How the visualizations provided by Direct Manipulation can be better in some sense as compared to WYSIWYG paradigm?

**4.3** What is the two main purposes of Design Rationale?

**4.4** Name three evaluation tasks to be done w.r.t. evaluating a design for functional aspects.

**Marks Q4 [1.5 x 4 = 6]**

**Q5.** Identify and explain three key problems with respect to the Graphical User Interface (GUI) shown in the figure *Given GUI*. The GUI allows selecting a type of 3D object (here a pyramid, as shown in *Fig. Given GUI (a)*) to be modeled and once drawn, after selecting the 3D model, the selected object is displayed with a thick boundary around it and a rectangular region with 12 buttons is displayed and by using these buttons the 3D object can be transformed (*Fig. Given GUI (b)*) surrounding the 3D model. Further description of the GUI is as follows:

- The button shown as rounded arrows has the functionality related to rotation as specified near the corresponding buttons.
- The button shown as down arrows has the functionality related to translation along z-axis as specified near the corresponding button.
- Selecting a small rectangular shaped button (along the rectangle there are eight buttons like this) user can increase (by stretching the rectangle outwards) or decrease (by shrinking the rectangle inwards) the size of the 3D object.
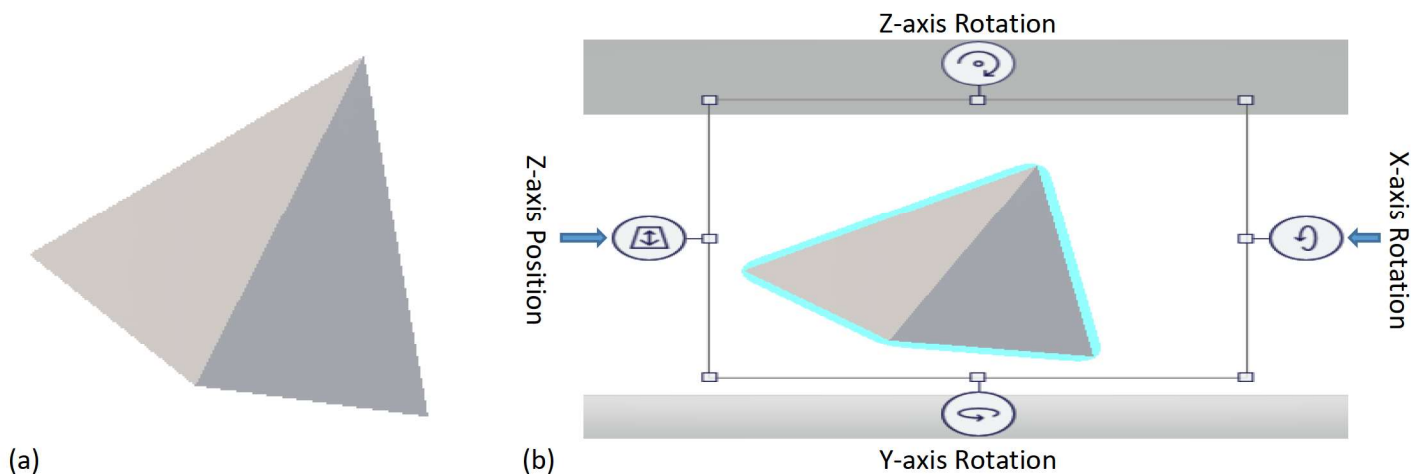- Clicking at the rectangle followed by moving (dragging) it the user can change the location of the 3D object.



Figure: *Given GUI*

**Marks Q5 [2 + 2 + 2 = 6]**