International Institute of Information Technology, Hyderabad

(Deemed to be University)

Digital Image Processing: Quiz-2 [28th Oct 2025]. **[45min]**

Roll No: _____ *Programme:* _____ *Name:* _____

Answer all questions. Marks are given against each question **[Total: 45 *marks*]**

1. Consider a horizontal disc at a fixed height (intensity) in the HSI color space. The shape of these points in the RGB color space will be: [**5** *marks*]

2. Salt and pepper noise is added (independently) to each channel of an RGB image. Consider each of the following actions to restore the image. Briefly describe what will happen in each and which one would result in the best restoration. [**9** *marks*]
   a. Apply median filter to each channel independently
   b. Apply median filter to the intensity channel after converting to HSI space.
   c. Apply mean filter to pixels that are detected to have noise.

3. Using basic definitions of Dilation and Erosion, prove the following: [**10** *marks*]
$$(A \ominus B)^c = A^c \oplus \hat{B}$$

4. What does idempotence mean in the context of morphological image processing? Give examples of three operations that are idempotent. [**6** *marks*]

5. Consider the following document image for which you need to separate the foreground from background. In a few sentences each, describe the effect of each of the following segmentation algorithms on the document: [**15** *marks*]
   a. Automatic global thresholding
   b. Chow and Kaneko thresholding
   c. Otsu's thresholding.