Code No: CT3544   **SRGEC-R20**

III B.Tech II Semester Regular Examinations, May 2023
IMAGE PROCESSING
(Computer Science and Engineering, Artificial Intelligence and Data Science &

Information Technology)

Time: 3 Hours   **Max. Marks: 70**

Note: Answer one question from each unit.
All questions carry equal marks.

$5 \times 14 = 70M$

UNIT-I

1. a) Consider the image segment shown. Let V= {0,1} and compute the lengths of the shortest 4-, 8- or m-path between pixels *p* and *q*. If a particular path doesn't exist between these pixels, explain why? (7M)

```
3   1   2   1 (q)
2   2   0   2
1   2   1   1
(p)1   0   1   2
```

   b) Repeat for V = {1, 2}. (7M)

(OR)

2. a) Demonstrate the process of image sensing and acquisition.   .   (8M)

   b) Summarize the use of digital image processing for the following applications. (6M)

   (i) Medical imaging   (ii) Biometric

UNIT-II

3. a) Explain linear Spatial filtering in Image enhancement. (7M)

   b) Give the differences between image smoothening and image sharpening. (7M)

(OR)

4. a) Perform the histogram equalization on the following image. (8M)

$$\begin{matrix} 1 & 3 & 5 \\ 4 & 4 & 3 \\ 5 & 2 & 2 \end{matrix}$$

   b) Implement the second order derivative function for image enhancement. (6M)

UNIT-III

5. a) Discuss the procedure for conversion from RGB color model to HSI color model. (7M)

   b) Explain about full color image processing. (7M)

(OR)

6. a) Explain about CMY and CMYK colour models, and write their applications. (7M)

   b) What is intensity slicing and colour coding? Explain their use in image processing. (7M)

UNIT-IV

7. Suppose the alphabet is [A, B, C], and the known probability distribution is $P_A= 0.5$, $P_B= 0.4$, $P_C= 0.1$. For simplicity, let's also assume that both encoder and decoder know that the length of the messages is always 3, so there is no need for a terminator. Analyze the required number of bits are needed to encode the message BBB by Huffman coding? (14M)

(OR)

8. a) Explain the need for image compression. How variable length encoding approach is used for compression? Is it Lossy? Justify. (8M)

   b) Compare Lossy and Lossless Image Compression. (6M)

UNIT-V

9. a) Explain basic concepts from logical operations involving binary images in morphological image processing. (6M)

   b) Discuss dilation and erosion with appropriate diagrams. (8M)

(OR)

10. a) Discuss in detail about threshold selection based on boundary characteristics. (8M)

    b) Explain line and edge discontinues in image segmentation with relevant figures. (6M)

*****