

(3 Hours)

[Total Marks:75]

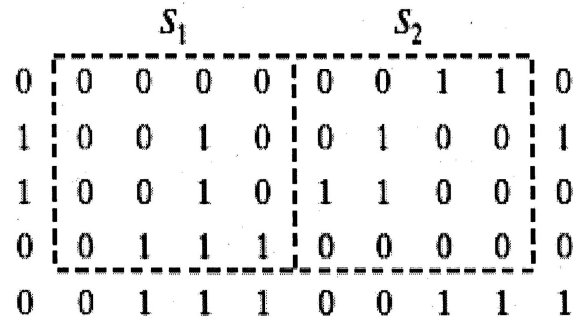
- N.B: (1) All questions are compulsory.
 (2) Answers to the two sections must be written in same answer book and should be submitted together
 (3) Write answers to same questions together
 (4) Mixing of sub-questions is not allowed.

SECTION - I

- Q.1** (A) With the help of a neat block diagram, explain the components of a general purpose image processing system. 6
 (B) With the help of a neat figure, explain the main elements of the human eye. 7

OR

- Q.1** (A) Explain the basic steps of filtering in the frequency domain. 6
 (B) Consider the two image subsets, S1 and S2, shown in the following figure. For $V=\{1\}$, determine whether these two subsets are (a) 4-adjacent, (b) 8-adjacent, or (c) m-adjacent. 7



- Q.2** (A) Explain the Illumination & reflectance model of the image. 6
 (B) A particular digital image with eight quantization levels has the following histogram . Perform histogram equalization and derive transformation function. Give new equalized histogram. 7

Gray level r	0	1	2	3	4	5	6
No. of pixels with gray level nr	200	170	130	60	60	80	140

OR

- Q.2** (A) Explain image negative. Obtain the digital negative image of the 3 Bit image 6

7	2	1	4
7	0	7	0
5	4	6	2
4	4	3	1

- (B) Define segmentation. Explain point and edge detection. 7

- Q.3** (A) Explain High Boost Filtering. 6
 (B) Explain Discrete Cosine Transform. 6
- OR
- Q.3** (A) Discuss the effects of opening and closing on the gray level image. 6
 (B) Write short note on region descriptors. 6
- SECTION - II**
- Q.4** (A) Describe voice repertory dialer and automated call type recognition application of speech recognition. 6
 (B) Explain the importance of speech endpoint detection. List the reasons for the errors in end point detection. 7
- OR
- Q.4** (A) Explain the interdisciplinary nature of Speech recognition science. 6
 (B) Describe the process of speech production in human being 7
- Q.5** (A) Draw and explain the block diagram of acoustic phonetic speech recognition system. 6
 (B) Explain the applications of speech recognition. 6
- OR
- Q.5** (A) Draw the diagram of complete bank of filter analysis model. Describe the effect of each block on speech signal. 6
 (B) Write a short note on vector quantization. 6
- Q.6** (A) Explain the general notation for the connected word -recognition problem. 6
 (B) Explain the following speech classes: Vowels, Nasal consonants, Fricatives. 6
- OR
- Q.6** (A) Explain the differences in narrowband and wideband spectrogram of speech signal. 6
 (B) Describe the k-means clustering algorithm. 6
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