CBCS SCHEME

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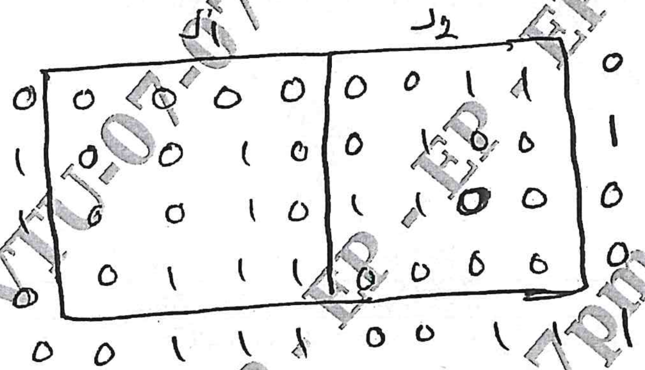
BEC/BTE/BVL613C

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Digital Image Processing

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2.. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the fundamental steps in Digital Image Processing.	10	L2	CO1
	b.	Consider the 2 image subsets, S_1 and S_2 shown below. For V = {1}, determine whether these subsets are 4 – adjacent, 8 - adjacent and m-adjacent. 	10	L3	CO1
		OR			
Q.2	a.	Explain the components of a general purpose image processing system.	10	L2	CO1
	b.	Consider the image segment shown below. Let V = {2, 3, 4}. Find the lengths of the shortest 4-, 8-, and m – paths between p and q. 3 4 1 2 0 0 1 0 4 2 (q) 2 2 3 1 4 (p) 3 0 4 2 1 1 2 0 3 4	10	L3	CO1
		Module – 2			
Q.3	a.	Justify that DCT is a fast transform.	10	L3	CO1
	b.	Find the 2D – DFT of the following image. Matrix $U = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$	10	L3	CO2
		OR			
Q.4	a.	Justify that Haar Transform can be implemented in O(N) operations.	10	L3	CO2
	b.	Find the - DCT of x(n) = { 1, 2, 1,4}	10	L3	CO2
		Module – 3			
Q.5	a.	Describe image negative and logarithmic transformations.	10	L1	CO3

	b.	Assuming continuous intensity values, an image has the intensity pdf, $P_r^{(r)} = \begin{cases} \frac{2r}{(L-1)^2}, & o \le r \le L-1 \\ 0 & \text{else where} \end{cases}$ Find the transformation function that would produce an image whose intensity pdf is, $P_z(z) = \begin{cases} \frac{3z^2}{(L-1)^3}, & o \le z \le L-1 \\ 0 & \text{else where} \end{cases}$	10	L3	CO3
		OR			
Q.6	a.	Explain piecewise – linear transformation functions used in image enhancement.	10	L2	CO3
	b.	Find histogram linearization of the following image segment. $\begin{bmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$	10	L3	CO3
		Module – 4			
Q.7	a.	Describe image smoothing filters in frequency – domain.	10	L1	CO4
	b.	Explain pseudo colour Image Processing.	10	L2	CO4
		OR			
Q.8	a.	Explain Image sharpening filters in frequency – domain.	10	L2	CO4
	b.	Describe homomorphic filtering in detail.	10	L1	CO4
		Module – 5			
Q.9	a.	Describe a model for image degradation /restoration process.	10	L1	CO5
	b.	Explain some important noise pdfs.	10	L2	CO5
		OR			
Q.10	a.	Explain 4 order – statistics filters used in image restoration.	10	L2	CO5
	b.	Describe 4 mean filters used in image restoration.	10	L1	CO5

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