Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
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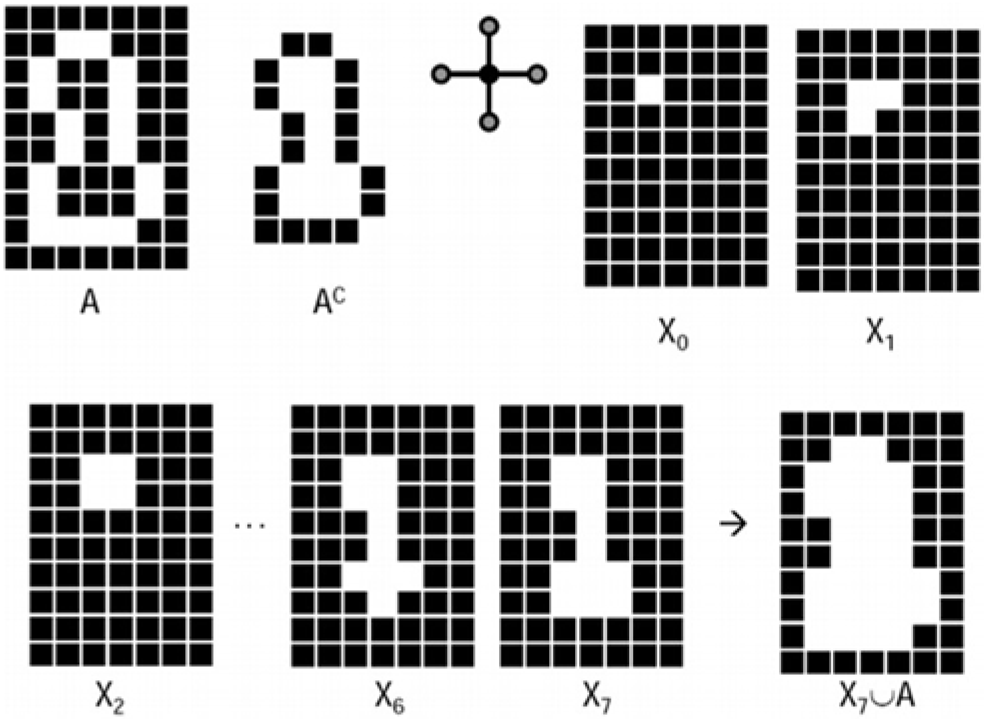
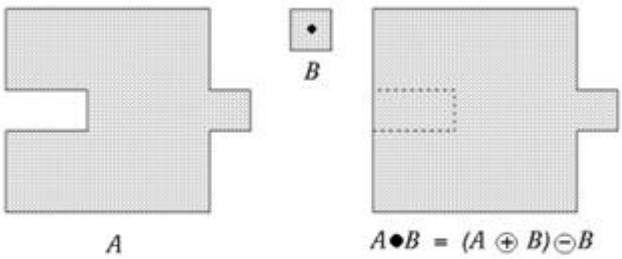
Programme Name:	**B.Tech. (CSE), CCVT**	**Semester : VI**
Course Name :	**Digital Image Processing**	**Time : 02 hrs**
Course Code :	**CSEG3001**	**Max. Marks : 100**
Nos. of page(s) :	**9**	

Instructions: Attempt all the questions.

Q1.	The domain that refers to image plane itself and the domain that refers to Fourier transform of an image is/are : 1. Spatial domain in both 2. Frequency domain in both **3. Spatial domain and Frequency domain respectively** 4. Frequency domain and Spatial domain respectively	[1.5] [CO1]
Q2.	If r for be the gray-level of image before processing the gray-level in the range [0, L-1]? and s after processing then which expression defines the negative transformation, 1. s = L – 1 – r 2. s = cr^{γ}, c and γ are positive constants **3. s = c log (1 + r), c is a constant and r ≥ 0** 4. none of the mentioned	[2] [CO1]
Q3.	The process of extracting information from the image is called as 1. Image enhancement 2. Image restoration **3. Image Analysis** 4. Image compression	[1.5] [CO1]
Q4.	Consider a 4 bit gray scale image of 1024x1024. If this image is transmitted across a channel of 2 Mbps, what transmission time? 1. 1 SEC **2. 2 SEC** 3. 3 SEC 4. 4 SEC	[2] [CO1]
Q5.	What is the storage requirement of 1024 X 1024, 8 level gray level image? 1. 1024X1024X1 bits 2. 1024X1024X2 bits **3. 1024X1024X3 bits** 4. 1024X1024X4 bits	[2] [CO1]
Q6.	Intensity range of 8-bit pixel image is: 1. 0 to 15 2. 0 to 127 **3. 0 to 255** 4. 0 to 256	[1.5] [CO1]
Q7.	What is the method that is used to generate a processed image that have a specified histogram? 1. Histogram linearization 2. Histogram equalization **3. Histogram matching** 4. Histogram processing	[1.5] [CO1]

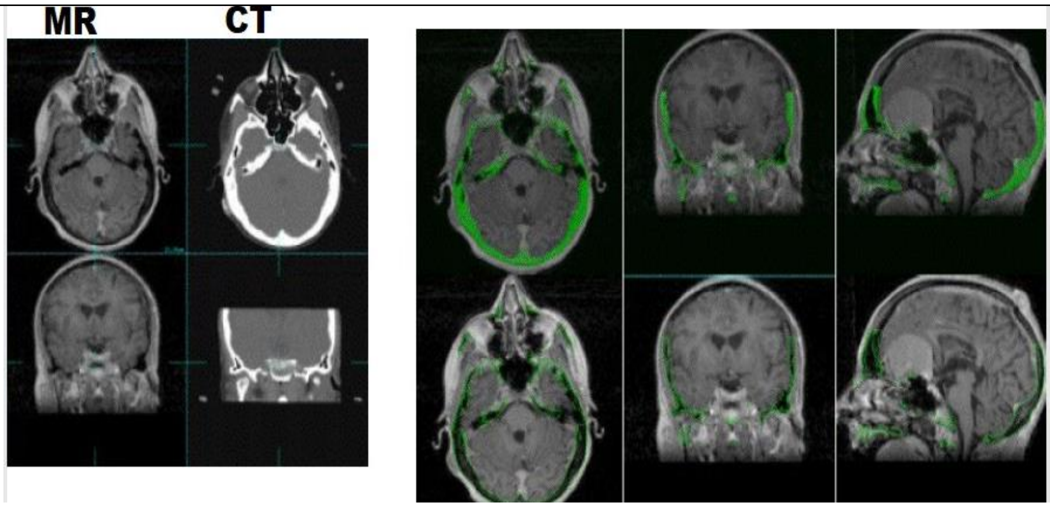
Q8.	What is the output of a smoothing, linear spatial filter? 1. Median of pixels 2. Maximum of pixels 3. Minimum of pixels **4. Average of pixels**	[1.5] [CO2]
Q9.	Given an image with only 2 pixels and 3 possible values for each pixel, what is the number of possible image histograms that can be formed? 1. 3 2. 6 **3. 9** 4. 12	[2] [CO2]
Q10.	To convert a continuous image f(x, y) to digital form, we have to sample the function in 1. Coordinates 2. Amplitude **3. All of the mentioned** 4. None of the mentioned	[1.5] [CO2]
Q11.	Image processing approaches operating directly on pixels of input image work directly in 1. Transform domain **2. Spatial domain** 3. Inverse transformation 4. None of the Mentioned	[1.5] [CO1]
Q12.	A pixel p at coordinates (x, y) has neighbors whose coordinates are given by: (x+1, y), (x-1, y), (x, y+1), (x, y-1) This set of pixels is called **1. 4-neighbors of p** 2. Diagonal neighbors 3. 8-neighbors 4. None of the mentioned	[1.5] [CO1]
Q13.	1 0 1 0 1 1 1 1 1 0 2 2 2 6 5 5 6 1 2 5 7 5 6 2 1 6 5 6 5 1 1 5 7 7 5 1 1 0 0 0 1 2 1 0 0 0 0 1 0 0 0 0 0 1 For segmenting the above gray scale image, the possible threshold values is/are 1. 1 2. 3 3. 4 4. **Both 3 and 4**	[2] [CO4]
Q14.	Thinning is an image-processing operation in which binary valued image regions are reduced to lines. **True** False	[1.5] [CO3]
Q15.	(f O M O s) O s) = f O s Above property is called as where f is image, s is structuring element and is O opening operation. 1. idempotent operation 2. associative operation 3. Commutative operation 4. Filter operation	[1.5] [CO3]

<table>
<tr>
<td>Q16.</td>
<td>


Above diagram represents the
1. Region Filling
2. Thinning
3. Connected Components
4. Filtering
</td>
<td>[1.5]
[CO3]</td>
</tr>
<tr>
<td>Q17.</td>
<td>


Above is an
1. Opening
2. Closing
3. Filtering
4. Thinning
</td>
<td>[1.5]
[CO3]</td>
</tr>
</table>

Q18.



This is an example of.......................

1. Multi-modality registration

2. Multi-view registration

3. Multi-temporal registration

[1.5] [CO5]

Q19.

$$H_1 = \frac{1}{12}\begin{bmatrix} -1 & -2 & -1 \\ -2 & 12 & -2 \\ -1 & -2 & -1 \end{bmatrix}, \quad H_2 = \frac{1}{16}\begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$$

separable filter is/are

1. H1

2. H2

3. Both

4. None

[2] [CO2]

Q20.

The difference between the original image and the eroded is creates

1. higher level gray levels

2. low lever gray level

3. boundary

4. unfilled regions

[1.5] [CO4]

Q21.

−1	−1	2
−1	2	−1
2	−1	−1

the this mask is convolved around an image it would respond more strongly to line

1. oriented horizontally

2. oriented vertically

3. lines oriented at 45^0

4. lines oriented at -45^0

[1.5] [CO4]

Q22.

A binary image consists of disks of sizes 3,7,9,15,17 pixels. We want to remove all the disks of size less than 13 pixels. Which morphological opeartion perform the task?

1. Erosion with structuring element(disk) of size 15

2. Dilation with structuring element(disk) of size 15

3. Erosion with structuring element(disk) of size 13

4. Dilation with structuring element(disk) of size 13

[2] [CO3]

Q23.

Morphology has been used in a wide range of applications. some of these are

1. Image enhancement, Image restoration

[1.5] [CO3]

	2. Edge detection, Texture analysis 3. Only I **4. Both I and II**	
Q24.	What is the equivalent for a WHITE, 8-bit pixel to be processed under logic operation on gray scale image? **1. 11111111** 2. 00000000 3. 00001111 4. 11110000	[2] [CO1]
Q25.	(AoB)oB is equal to 1. A .B 2. A+B 3. A - B **4. A o B**	[1.5] [CO3]
Q26.	A Laplacian for an image f(x, y) is defined as: $\nabla^2 f = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2}$. Then, $\frac{\partial^2 f}{\partial x^2}$ and $\frac{\partial^2 f}{\partial y^2}$ is given by **1. [f(x + 1, y) + f(x – 1, y) – 2f(x, y)] and [f(x, y + 1) + f(x, y – 1) – 2f(x, y)] respectively** 2. [f(x + 1, y + 1) + f(x, y – 1) – 2f(x, y)] and [f(x , y + 1) + f(x – 1, y) – 2f(x, y)] respectively 3. [f(x, y + 1) + f(x, y – 1) – 2f(x, y)] and [f(x + 1, y) + f(x – 1, y) – 2f(x, y)] respectively 4. [f(x, y + 1) + f(x, y – 1) + f(x, y)] and [f(x + 1, y) + f(x – 1, y) + f(x, y)] respectively	[2] [CO4]
Q27.	A mask of size 3*3 is formed using Laplacian including diagonal neighbors that has central coefficient as 9. Then, what would be the central coefficient of same mask if it is made without diagonal neighbors? **1. 5** 2. -5 3. 8 4. 4	[2] [CO2]
Q28.	Aim of image restoration is 1. Enhancement 2. Matching **3. Estimate original image** 4. All of the above	[1.5] [CO5]
Q29.	An____is a transformation that preserves collinearity and the ratio of distances (for example – the midpoint of a line segment is still the midpoint even after the transformation) **1. affine transformation** 2. rigid transformation 3. projective transformation 4. elastic transformation	[1.5] [CO5]
Q30.	Assume a square structuring element of size d/4 is used to dilate a square image of size d. Calculate the side of dilated image? 1. d 2. d/2 3. 3d/4 **4. 5d/4**	[2] [CO3]
Q31.	Assume a square structuring element of size d/4 is used to erode a square image of size d. Calculate the side of eroded image? 1. d 2. d/2 **3. 3d/4** 4. 5d/4	[2] [CO3]
Q32.	Convolution in spatial domain is equivalent to multiplication in **1. frequency domain** 2. time domain 3. spatial domain 4. all of the above	[1.5] [CO2]
Q33.	Filter that replaces pixel value with medians of intensity levels is 1. arithmetic mean filter 2. geometric mean filter	[1.5] [CO2]

	3. median filter 4. sequence mean filter	
Q34.	Example of similarity approach in image segmentation is 1. Edge based segmentation 2. Boundary based segmentation **3. Region based segmentation** 4. None of these	[1.5] [CO4]
Q35.	Find the effect of mean filter over center pixel in 3 X 3 neighborhoods. 2 2 2 2 2 2 2 2 2 2 2 2 5 2 2 2 2 2 2 2 2 2 2 2 2 **1. 21/9** 2. 21 3. 23/9 4. 23	[2] [CO2]
Q36.	First derivative approximation says that values of gradient for constant intensities must be **1. 0** 2. 1 3. non zero 4. -1	[2] [CO4]
Q37.	Following is/are types of Geometric Transformation 1. Rigid transformation 2. Affine transformation 3. Projection transformation 4. Elastic transformation **5. All of these**	[1.5] [CO5]
Q38.	Following is an example of affine transformation: 1. Rotation 2. Translation 3. Scaling **4. All of these**	[1.5] [CO5]
Q39.	For boundary extraction of an object, we can use 1. Sharpening 2. High pass filtering 3. Morphological Algorithm **4. All of the above**	[1.5] [CO4]
Q40.	Horizontal gradient of pixels is denoted by Gy True **False**	[1.5] [CO4]
Q41.	Gray level image segmentation is generally based on two properties **1. Discontinuity and similarity** 2. Continuity and similarity 3. Only similarity 4. None of the above	[1.5] [CO4]
Q42.	Image registration is often used as a preliminary step for **1. Image Fusion** 2. Image Enhancement 3. Edge Detection 4. Image Segmentaion	[1.5] [CO5]
Q43.	In Region Split and Merge algorithm splitting of the image is recorded using a tree structure known as Heaptree. True **False**	[1.5] [CO4]
Q44.	In diagnosis, image obtained from a single modality like MRI, CT etc, may not needed to combine information obtained from other modalities also to improve information from MRI and CT modalities gives more information than the indivi method for fusing the images from the individual modalities in	[1.5] [CO5]

	such a way that information without any loss of the input information and without any redundant obtained from different modalities the images might be in different coordinate fusion. The aligning of the input images before proceeding with the fusion is be able to provide all the required information. It is the information acquired. For example combination of dual modalities separately. The aim is to provide a the fusion results is an image that gives more cy or artifacts. In the fusion of medical images systems and have to be aligned properly for efficient called .... **1. Image registration** 2. Image morphing 3. Image Restoration 4. Image Compression	
Q45.	Inverse filtering is sensitive to noise 1. True 2. False 3. Not 4. Only Gaussian noise	[1.5] [CO2]
Q46.	Logic operations between image. Which one is that? two or more images are performed on pixel-by-pixel basis, except for one that is performed on a single. Which one is that? 1. AND 2. OR 3. XOR **4. NOT**	[1.5] [CO1]
Q47.	Methods for Estimation of degradation functions is/are 1. Observation 2. Experimentation 3. Mathematical Modelling **4. All of the above**	[1.5] [CO2]
Q48.	Region growing is a____image segmentation approach **1. bottom-up** 2. Top down 3. All of the above 4. None of the above	[1.5] [CO4]
Q49.	$R_i \cap R_j = \varnothing$ Above property states that 1. The union (or sum) of all regions equal the whole image. All pixels in the must be assigned to a region. 2. The region is contiguous and connected. **3. The intersection of any pair of adjacent regions equals the empty set. Each pixel belongs to a single region only; there is no overlap between adjacent regions.** 4. For each region the uniformity predicate is true. Each region must satisfy some particular uniformity criteria.	[1.5] [CO4]
Q50.	Several highly contrasted objects with different gray level distributions. The shape of the histogram contains several hills and valleys of separation. it is referred as **1. Multimodal distribution** 2. Bimodal distribution 3. Unimodal distribution	[1.5] [CO4]
Q51.	Two images having one pixel gray value 01010100 and 00000101 at the same location, are operated against AND operator. What would be the resultant pixel gray value at that location in the enhanced image? 1. 10100100 2. 11111011 **3. 00000100** 4. 11100011	[2] [CO1]
Q52.	What is the sum of the coefficient of the mask defined using gradient. **1. 0** 2. 1 3. -1 4. not defined	[1.5] [CO4]
Q53.	Which morphological operation is used for smoothing the contour of an object in grayscale image	[1.5] [CO3]

1. Erosion
2. Dilation
3. Opening
4. Closing

Q54. Which of the following filter(s) attenuates low frequency while passing high frequencies of an image? [1.5] [CO2]

1. Unsharp mask filter
2. Highpass filter
3. Zero-phase-shift filter
4. All of the above

Q55. Zero crossing operator use the following [1.5] [CO5]

1. First derivative
2. Second derivative
3. Sobel operator
4. Gaussian operator

Q56. wiener filtering is used for [1.5] [CO5]

1. noise filtering only
2. image enhancement
3. image restoration
4. image registration

Q57. Consider the two image subsets I1 and I2. For V = {2}, determine whether I1 and I2 are: [2] [CO5]

(i) 4-connected.
(ii) 8-connected.
(iii) M-connected.

I1					I2				
3	1	1	3	3	2	1	1	5	2
4	3	0	0	4	3	1	1	5	2
1	2	3	1	1	4	1	0	0	2
1	3	4	1	2	2	1	0	5	2
1	2	0	0	2	2	1	1	1	2

1. 4-Connected only
2. 8-Connected only
3. m-Connected only
4. 4,8 and m-Connected

Q58. Consider the following image segment [2] [CO5]

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

Let set of intensities V= {0, 1}. Compute the D_4, d_8, and D_m distances (if any) between pixels **p** and **q**.

1. D4=0, D8=5 and 6, Dm=5
2. D4=0, D8=0, Dm=5
3. D4=0, D8= 6, Dm=5
4. D4=0, D8=5 and 6, Dm=0

Q59. Consider the following histogram of 3-bit gray level image:The image has two regions R1 and R2, where R1 belongs to foreground pixels and R2 belongs to background. It is given that the 40% pixels belong to the r2 region. Find the optimum threshold T using p-tile method. [2] [CO5]

i	0	1	2	3	4	5	6	7

	Ni 10 80 210 200 100 150 50 200 1. 4 **2. 3** 3. 5 4. 6	
Q60.	An image has two segments R1 and R2 with 120 and 254 mean gray level values. The probability of a pixel to be in region is ½. Due to noise standard deviation from the mean values is 1 gray-level. Calculate the optimum threshold. **1. 187** 2. 80 3. 120 4. 70	[2] [CO4]