

<b>6E7101</b>	Total No. of Questions : 22	Total No. of Pages : <span style="border: 1px solid black; padding: 2px;">04</span>
	Roll No. : .....	
<b>6E7101</b>		
<b>B.Tech. VI-Sem. ( Main/Back ) Exam. - 2024</b>		
<b>COMPUTER SCIENCE &amp; ENGG.</b>		
<b>6CS3-01/Digital Image Processing</b>		
<b>CS, IT, AID, CAI</b>		
Time : 3 Hours	Maximum Marks : 70	

**Instructions to Candidates :**

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (As mentioned in Form No. 205)*

- 1. ....
- 2. ....

**PART-A**

**[10×2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

**Q.1.** Discuss about contrast stretching and intensity slicing.

**Q.2.** How are color images represented digitally?

- Q.3. What is unsharp masking?
- Q.4. What are intensity transform functions?
- Q.5. What are the performance metrics for evaluating image compression?
- Q.6. What is directional derivative? Where it is used?
- Q.7. Differentiate between lossy and lossless compression techniques.
- Q.8. State the conditions for Region Splitting and Merging Processes.
- Q.9. What is spatial filtering?
- Q.10. How do frequency domain filters work.?

**PART-B**

[5x4=20]

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. Explain what you would expect the result of Sampling and Quantization operations on image.



Fig.1

- Q.2. Consider a 1-D image  $f(x) = [10 \ 10 \ 10 \ 10 \ 40 \ 40 \ 40 \ 20 \ 20]$ . Calculate the first and second order derivatives. Locate the respective edge positions.
- Q.3. Explain HIS color model with an appropriate figure. Explain the conversion procedure from RGB color space to HSI color space.
- Q.4. Explain the image restoration technique to remove the blur caused by uniform linear motion.
- Q.5. What are the derivative operators useful in image segmentation? Explain their role in segmentation.

- Q.6. Explain any two boundary representation schemes and illustrate with example.
- Q.7. How do you link edge pixels through global processing? Also explain Hough Transforms.

**PART-C**

[3x10=30]

**(Descriptive/Analytical/Problem Solving/Design question)**

**Attempt any three questions**

- Q.1. Consider the image shown in Fig. 2. Explain what you would expect the result to be in each of the following four filtering operations :
- (a) Horizontal gradient operation
  - (b) Vertical gradient operation
  - (c) Horizontal Sobel operator
  - (d) Vertical Sobel operator



Fig.2

- Q.2. Decode the arithmetic coded message, 0.23355 for the coding model .

Symbol	Probability
A	0.2
E	0.3
I	0.1
O	0.2
u	0.1
!	0.1

And also explain LZW coding with an example and Explain Redundancies and their removal methods.

**Q.3.** Consider the Image 'I' below and the filters 'F' and 'L'.

'I'			'F'			'L'		
1	1	1			1/8			1
1	8	1	1/8	1/2	1/8	1	-4	1
1	1	1			1/8			1

- (a) Correlate the image 'I' with the filter 'F' and compute the output image.
- (b) Apply filter 'L' to the same image 'I' to produce a 3 by 3 output image.

**Q.4.** (a) Differentiate Correlation and Convolution with example.

(b) What are the derivative operators useful in image segmentation?

**Q.5.** With a neat block diagram, explain transform based image compression scheme. Also give two valid reasons for the choice of "Discrete Cosine Transform" in JPEG image compression standard.

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