INSTITUTEOF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER -II

Four Year B.Tech V Semester End Examinations (Regular), May – 2018
Regulation: IARE-R16
IMAGE PROCESSING
(CSE)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT - I

1. (a) What is Image Processing and explain about fields where image processing is used **[7M]**
        i) X-Ray imaging ii)Ultraviolet and visible bands iii) Infrared bands
    (b) List different components used in digital image processing system and explain **[7M]**
        with neat diagram

2. (a) Define sampling and quantization and discuss about spatial and gray-level **[7M]**
        resolution of digital images
    (b) Discuss about the following relationships between pixels with neat diagrams **[7M]**
        i)   Neighbours of a pixel
        ii)   Connectivity
        iii)   Distance measures
        iv)   Path

UNIT – II

3. (a) Explain smoothing spatial filters and nonlinear order statistic spatial filters **[7M]**
    (b) What is the method of using second derivate for Image sharpening by Laplacian Operator **[7M]**
        and discuss it

4. (a) Show how the Bit Plane Slicing is useful in image processing and describe Homo-morphic **[7M]**
        filtering.
    (b) Discuss the importance of a kernel or mask or window in spatial filtering used for **[7M]**
        enhancement of a digital image

UNIT – III

5. (a) Discuss how the probability density functions work for both Erlang and Salt and Pepper noise models. **[7M]**

   (b) Explain the method of Least Mean Squares Filtering (Wiener) for image. **[7M]**

6. (a) Explain the method of Constrained Least Squares Filtering for image restoration **[7M]**

   (b) What is image restoration? Discuss the process of image restoration by direct inverse filtering? **[7M]**

UNIT – IV

7. (a) Explain about color models in detail
   i). RGB color model
   ii). HSI model **[7M]**

   (b) Describe the process of smoothing and sharpening of color images **[7M]**

8. (a) What is the meaning of Pseudocolor image of intensity slicing and gray level to color transformations. **[7M]**

   (b) Discuss about color transformations in detail **[7M]**

UNIT – V

9. (a) Write a notes on
   i).Coding Redundancy
   ii).Psychovisual Redundancy **[7M]**

   (b) List various morphological algorithms and discuss any two morphological algorithms **[7M]**

10. (a) Explain about the error free compression with Huffman coding and LZW coding. **[7M]**

    (b) Discuss about the lossy compression with predictive coding. **[7M]**

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COURSE OBJECTIVES:

The course should enable the students to:

I	Understand the concepts of digital image processing methods and techniques.
II	Study the image enhancement techniques in spatial and frequency domain for image quality improvement..
III	Learn the image restoration and compression techniques for optimization.
IV	Explore on color image features and transformation techniques.
IV	Illustrate the techniques of image segmentation to identify the objects in the image.

COURSE OUTCOMES:

CO 1	To Understand the need for image transforms different types of image transforms and their properties.
CO 2	Learn different techniques employed for the enhancement of images.
CO 3	Learn different causes for image degradation and overview of image restoration techniques.
CO 4	Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.
CO 5	Learn different morphological algorithms for image analysis and recognition.

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

CACS511.01	Understand the key concepts of Image Processing.
CACS511.02	Identify the origins of the Digital image processing
CACS511.03	Demonstrate the scope of the digital image processing in multiple fields
CACS511.04	Explore on overview of the components contained in the general purpose image processing system and its use in real time applications
CACS511.05	Describe the concept of elements of visual perception.
CACS511.06	Use the concept of sampling and quantization in generating digital images
CACS511.07	Explore on the basic relationships existed between the pixels in the image
CACS511.08	Illustrate different mathematical tools used in image intensity transformations for quality enhancement
CACS511.09	Use histogram processing techniques in image enhancement and noise reduction
CACS511.10	Understand the impact of smoothing and sharpening filters in spatial domain.

CACS511.11	Apply the Fourier transform concepts on image function in frequency domain filters(low pass/high pass).
CACS511.12	Describe the concept of image degradation or restoration of images.
CACS511.13	Understand the various kind of noise present in the image and how to restore the noisy image.
CACS511.14	Understand the differences of inverse, least square and Wiener filtering in restoration process of images
CACS511.15	Understand the color fundamentals and models in image processing
CACS511.16	Memorize the transformation techniques in pseudo color image processing.
CACS511.17	Use wavelet concepts in multi-resolution processing.
CACS511.18	Understand the basic multi-resolution techniques and segmentation methods
CACS511.19	Explore on lossy/lossless compression models using wavelets
CACS511.20	Use morphological operations like dilation and erosion to represent and describe regions, boundaries etc. in identification of the components in images.

MAPPING OF MODEL QUESTION PAPER QUESTIONS TO THE ACHIEVEMENT OF COURSE LEARNING OUTCOMES:

SEE QUESTION No.			COURSE LEARNING OUTCOMES	COURSE OUTCOMES	BLOOM TAXONOMY LEVEL
1	a	ACS511.02	Identify the origins of the Digital image processing	CO 1	Remember
	b	ACS511.03	Demonstrate the scope of the digital image processing in multiple fields	CO 1	Understand
2	a	ACS511.01	Understand the key concepts of Image Processing.	CO 1	Remember
	b	ACS511.01	Understand the key concepts of Image Processing.	CO 1	Understand
3	a	ACS511.06	Use the concept of sampling and quantization in generating digital images	CO 2	Understand
	b	ACS511.08	Illustrate different mathematical tools used in image intensity transformations for quality enhancement	CO 2	Remember
4	a	ACS511.09	Use histogram processing techniques in image enhancement and noise reduction	CO 2	Understand
	b	ACS511.09	Use histogram processing techniques in image enhancement and noise reduction	CO 2	Remember
5	a	ACS511.11	Apply the Fourier transform concepts on image function in frequency domain filters(low pass/high pass).	CO 3	Understand
	b	ACS511.11	Apply the Fourier transform concepts on image function in frequency domain filters(low pass/high pass).	CO 3	Remember
6	a	ACS511.10	Understand the impact of smoothing and sharpening filters in spatial domain.	CO 3	Understand
	b	ACS511.12	Describe the concept of image degradation or restoration of images.	CO 3	Remember

7	a	ACS511.15	Understand the color fundamentals and models in image processing	CO 4	Understand
	b	ACS511.17	Use wavelet concepts in multi-resolution processing.	CO 4	Understand
8	a	ACS511.16	Memorize the transformation techniques in pseudo color image processing	CO 4	Remember
	b	ACS511.15	Understand the color fundamentals and models in image processing	CO 4	Remember
9	a	ACS511.20	Use morphological operations like dilation and erosion to represent and describe regions	CO 5	Remember
	b	ACS511.20	Use morphological operations like dilation and erosion to represent and describe regions boundaries etc. in identification of the components in images.	CO 5	Understand
10	a	ACS511.20	Use morphological operations like dilation and erosion to represent and describe regions, boundaries etc. in identification of the components in images.	CO 5	Understand
	b	ACS511.18	Understand the basic multi-resolution techniques and segmentation methods	CO 5	Remember

Signature of Course Coordinator   **HOD, CSE**