INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-II

B.Tech VII Semester End Examinations, November - 2019
Regulations: R16
DIGITAL IMAGE PROCESSING
(Only for ECE)

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)	State and prove separability property of 2D-FFT.with help of mathematical expressions	[7M]
	b)	Write the Walsh transform forward and reverse kernels. with help of mathematical expressions	[7M]
2	a)	Discuss and Explain Fundamental steps on Digital Image Processing with examples	[7M]
	b)	Discuss about the Slant transform(1-D &2-D)with properties of Slant transform	[7M]

UNIT – II

3	a)	Explain Image Enhancement in spatial domain, Discuss Sampling and Quantization	[7M]
	b)	Explain Histogram manipulation and point processing	[7M]
4	a)	Discuss about Ideal High Pass Filter and Butterworth High Pass filter.	[7M]
	b)	Description of homomorphic filtering	[7M]

UNIT – III

5	a)	Explain about Wiener filter used for image restoration..	[7M]
	b)	Discuss and Explain Relation with inverse filtering and Iterative Wiener filters	[7M]
6	a)	Explain Least mean square filters with examples	[7M]
	b)	Explain three principle ways to estimate the degradation function for use in image restoration.	[7M]

UNIT – IV

7	a)	Discuss in detail about region based segmentation	[7M]
	b)	Explain any two methods for linking the edge pixels to form a boundary of an object	[7M]
8	a)	Explain about Region Splitting and Merging with an example.	[7M]
	b)	Determined the opening operation in image morphology with examples?	[7M]

UNIT – V

9   a)   Explain arithmetic encoding process with an example   [7M]

       b)   Discuss Redundancies and their removal methods with examples.   [7M]

10   a)   Explain lossy compression and JPEG 2000 standards   [7M]

       b)   Explain about Compression techniques and wavelet coding.   [7M]

COURSE OBJECTIVES:
The course should enable the students to:

I	Understand the image fundamentals and mathematical transforms necessary for image processing
II	Describe the image enhancement techniques.
III	Evaluate the image restoration procedures
IV	Analyze the image compression procedures
V	Design the image segmentation and representation techniques.

COURSE OUTCOMES (COs):

CO 1	Review the fundamental concepts of a Digital Image Processing System. Analyze general terminology of DIP. Examine various types of Transforms
CO 2	Examine various types of images, intensity transforms and Image Enhancement with spatial filtering. Develop FT for Image Enhancement in frequency domain. Analyze images in the frequency domain using various filters.
CO 3	Evaluate the model, approaches, and filtering techniques for image Restoration.
CO 4	Interpret Image Segmentation and representation techniques. Evaluate the methodologies for image segmentation, restoration etc.,
CO 5	Categorize various Compression techniques and Interpret Image Compression standards.

COURSE LEARNING OUTCOMES (CLOs):

AEC508.01	Understand the image fundamentals, image transforms, relationship between pixels.
AEC508.02	Explore sampling and quantization in terms of images.
AEC508.03	Analyze the types of transforms, properties mathematical proofs etc.,
AEC508.04	Determine the Advanced transforms, implementations using software's
AEC508.05	Explore the Image enhancement in spatial domain, different types of point processing.
AEC508.06	Understand the Histogram , histogram manipulation, Linear and nonlinear gray level transformation
AEC508.07	Analyze the Local or neighborhood operation, median filter processing, Spatial domain high pass filtering etc.
AEC508.08	Generating filters directly in the frequency domain, obtaining frequency domain filters from spatial filters
AEC508.09	Understand the filtering in frequency domain, smoothing and sharpening filters in frequency domain.
AEC508.10	Understand the Image restoration degraded model
AEC508.11	Determine algebraic approach to restore and inverse filtering.
AEC508.12	Understand Least mean square filters

AEC508.13	Determine the constrained least square restoration, restoration, image restoration
AEC508.14	Illustrate the Image segmentation detection of discontinuities and edge linking and boundary detection.
AEC508.15	Determine the threshold and the region oriented segmentation morphological image processing dilation and erosion.
AEC508.16	Understand structuring element decomposition, the strel function, opening and closing and hit and miss transform.
AEC508.17	Describe the image compression, redundancies and removal methods.
AEC508.18	Understand fidelity criteria, image compression models, source encoder and decoder, error free compression
AEC508.19	Determine lossy compression, JPEG 2000 standards

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No			Course Learning Outcomes	Course Outcomes	Blooms Taxonomy Level
1	a	AEC508. 1	Understand the image fundamentals, image transforms, relationship between pixels.	CO 1	Understand
	b	AEC508.2	Explore sampling and quantization in terms of images.	CO 1	Understand
2	a	AEC508.3	Analyze the types of transforms, properties mathematical proofs etc.,	CO 1	Understand
	b	AEC508.4	Determine the Advanced transforms, implementations using software's	CO 1	Understand
3	a	AEC508. 5	Explore the Image enhancement in spatial domain, different types of point processing.	CO 2	Understand
	b	AEC508.6	Understand the Histogram , histogram manipulation, Linear and nonlinear gray level transformation	CO 2	Remember
4	a	AEC508. 7	Analyze the Local or neighborhood operation, median filter processing, Spatial domain high pass filtering etc.	CO 2	Understand
	b	AEC508.8	Generating filters directly in the frequency domain, obtaining frequency domain filters from spatial filters	CO 2	Understand
5	a	AEC508. 9	Understand the filtering in frequency domain, smoothing and sharpening filters in frequency domain.	CO 3	Understand
	b	AEC508.10	Understand the Image restoration degraded model	CO 3	Understand
6	a	AEC508.11	Determine algebraic approach to restore and inverse filtering.	CO 3	Understand
	b	AEC508.13	Determine the constrained least square restoration, restoration, image restoration	CO 3	Understand
7	a	AEC508.14	Illustrate the Image segmentation detection of discontinuities and edge linking and boundary detection.	CO 4	Understand
	b	AEC508.15	Determine the threshold and the region oriented segmentation morphological image processing dilation and erosion.	CO 4	Understand
8	a	AEC508.16	Understand structuring element decomposition, the strel function, opening	CO 4	Understand
	b	AEC508.15	Determine the threshold and the region oriented segmentation morphological image processing dilation and erosion.	CO 4	Understand
9	a	AEC508.17	Describe the image compression, redundancies and removal methods.	CO 5	Understand
	b	AEC508.18	Understand fidelity criteria, image compression models, source encoder and decoder, error free compression	CO 5	Understand

10	a	AEC508.17	Describe the image compression, redundancies and removal methods.	CO 5	Understand
	b	AEC508.19	Determine lossy compression, JPEG 2000 standards	CO 5	Understand

Signature of Course Coordinator

Dr. S China Venkateswarlu, Professor　　　　　　　　　　　　　　　　**HOD, ECE**