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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eight Semester, B.E. - Electronics and Communication Engineering
Semester End Examination; July / August - 2022
Digital Image Processing

Time: 3 hrs   Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1 - Apply basic mathematical and Signal Processing knowledge to understand different image processing stages.
CO2 - Analyse images in the partial frequency domain using various methods.
CO3 - Analyse an image through image segmentation, wavelets and multi resolution processing.
CO4 - Apply knowledge of image processing in image restoration, color, morphology processing and your representation and description.
CO5 - Develop algorithm to perform image processing using modern tool in a group and acquire team playing skills.

<u>*Note:*</u>*I) PART - A is compulsory. Two marks for each question.*
   II) PART - B: Answer any <u>Two</u> sub questions (from a, b, c) for Maximum of 18 marks from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Specify the elements of DIP system.	2	L1	CO1	PO1
b.	Define spatial filtering.	2	L1	CO2	PO1
c.	What are the types of noise models?	2	L1	CO4	PO1
d.	List the hardware oriented color models.	2	L1	CO4	PO1
e.	Write the application of segmentation.	2	L1	CO3	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	With block diagram, Explain the fundamental steps used in digital image processing.	9	L2	CO1	PO1
b.	Explain the process of sampling and quantization with relevant diagram.	9	L2	CO1	PO1
c.	Explain image acquisition using single sensor strips and sensor array with relevant diagram.	9	L2	CO1	PO1
	UNIT - II	**18**			
2 a.	Explain the power law transmission and piece-wise linear contrast stretching with a neat graphical illustration.	9	L2	CO2	PO2
b.	Explain the smoothing of image in frequency domain using, i) Ideal low pass filter ii) Butterworth low pass filter	9	L2	CO2	PO2
c.	Explain the histogram equalization and histogram matching process.	9	L2	CO2	PO1
	UNIT - III	**18**			
3 a.	With mathematical equations, discuss the minimum mean square error filtering.	9	L2	CO4	PO1

b.	Explain arithmetic mean filter and median filter used for noise removal in image processing.	9	L2	CO4	PO1
c.	Discuss the three principle way of estimate the degradation function for use in image restoration.	9	L2	CO4	PO2

UNIT - IV   **18**

4 a.	Discuss the following colour models: i) RGB color model ii) CMY model iii) HSI model	9	L2	CO4	PO1
b.	Discuss in detail dilation and erosion operations.	9	L2	CO4	PO1
c.	Explain opening and closing operations of morphological operators.	9	L2	CO4	PO1

UNIT - V   **18**

5 a.	Explain OTSU algorithm for global thresholding using suitable equations.	9	L2	CO3	PO2
b.	Explain image gradient and gradient operators for edge detection.	9	L2	CO3	PO2
c.	Discuss the process of region splitting and merging for region based segmentation.	9	L3	CO3	PO2

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