

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC370	Digital Image Processing	3-0-0-3	2016
<b>Prerequisite:</b> EC301 Digital Signal Processing			
<b>Course objectives:</b>			
<ol style="list-style-type: none"> <li>To study the image fundamentals and mathematical transforms necessary for image transform</li> <li>To study the image processing techniques like image enhancement, image reconstruction, image compression, image segmentation and image representation.</li> </ol>			
<b>Syllabus:</b>			
Digital image fundamentals, 2D Transforms, Image enhancement, Image restoration, Image segmentation, Image compression			
<b>Expected outcome:</b>			
The students will be able to:			
<ol style="list-style-type: none"> <li>Distinguish / Analyse the various concepts and mathematical transforms necessary for image processing</li> <li>Differentiate and interpret the various image enhancement techniques</li> <li>Illustrate image segmentation algorithm</li> <li>Analyse basic image compression techniques</li> </ol>			
<b>Text Books:</b>			
<ol style="list-style-type: none"> <li>Gonzalez Rafel C, Digital Image Processing, Pearson Education, 2009</li> <li>S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing ,Tata Mc Graw Hill, 2015</li> </ol>			
<b>References:</b>			
<ol style="list-style-type: none"> <li>Jain Anil K , Fundamentals of digital image processing: , PHI,1988</li> <li>Kenneth R Castleman , Digital image processing:, Pearson Education,2/e,2003</li> <li>Pratt William K , Digital Image Processing: , John Wiley,4/e,2007</li> </ol>			
<b>Course Plan</b>			
Module	Course content	Hours	End Sem. Exam Marks
<b>I</b>	<b>Digital Image Fundamentals:</b> Image representation, basic relationship between pixels, elements of DIP system, elements of visual perception-simple image formation model	3	<b>15</b>
	Vidicon and Digital Camera working principles	1	
	Brightness, contrast, hue, saturation, mach band effect,	1	
	<b>Colour image fundamentals</b> -RGB, CMY, HIS models	1	
	2D sampling, quantization.	1	
<b>II</b>	<b>Review of matrix theory:</b> row and column ordering- Toeplitz, Circulant and block matrix,	2	<b>15</b>
	<b>2D Image transforms</b> : DFT, its properties, Walsh transform, Hadamard transform, Haar transform,	3	
	DCT, KL transform and Singular Value Decomposition.	3	
<b>FIRST INTERNAL EXAM</b>			

III	<b>Image Enhancement:</b> Spatial domain methods: point processing- intensity transformations, histogram processing, image subtraction, image averaging	2	15
	Spatial filtering- smoothing filters, sharpening filters	1	
	Frequency domain methods: low pass filtering, high pass filtering, homomorphic filter.	2	
IV	<b>Image Restoration:</b> Degradation model, Unconstraint restoration- Lagrange multiplier and constraint restoration	2	15
	Inverse filtering- removal of blur caused by uniform linear motion, Weiner filtering,	2	
	Geometric transformations-spatial transformations	2	
<b>SECOND INTERNAL EXAM</b>			
V	<b>Image segmentation:</b> Classification of Image segmentation techniques, region approach, clustering techniques	2	20
	Segmentation based on thresholding, edge based segmentation	2	
	Classification of edges, edge detection, Hough transform, active contour	3	
VI	<b>Image Compression:</b> Need for compression, redundancy, classification of image compression schemes, Huffman coding, arithmetic coding, dictionary based compression, transform based compression,	5	20
	Image compression standards- JPEG& MPEG, vector quantization, wavelet based image compression.	3	
<b>END SEMESTER EXAM</b>			

### Question Paper Pattern ( End semester exam)

**Maximum Marks : 100**

**Time : 3 hours**

The question paper shall consist of three parts. Part A covers modules I and II, Part B covers modules III and IV, and Part C covers modules V and VI. Each part has three questions uniformly covering the two modules and each question can have maximum four subdivisions. In each part, any two questions are to be answered. Mark patterns are as per the syllabus with 50 % for theory and 50% for logical/numerical problems, derivation and proof.

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