



FIRST INTERNAL ASSESSMENT

Sem: VII
Date: 15/09/2019

Sub: Digital Image Processing
Time: 3.00 to 4.00 pm

Sub. Code: 15EC72
Max. Marks:25

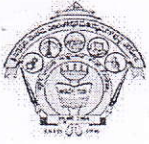
Note: Answer two full questions, draw sketches wherever necessary.

Q. No	Description of Question	Marks	CO	RBT LEVEL
1	a) What is digital image ? Explain digital image processing.	6	C402.1	L2
	b) Explain the fundamental steps in digital image processing.	7	C402.1	L2
OR				
2	a) Give and explain the examples of any two fields that use digital image processing.	6	C402.1	L2
	b) With diagram explain the components of an image processing system.	7	C402.1	L2
3	a) Explain the concept of image sampling and quantization.	6	C402.1	L2
	b) Explain the three ways of zooming an digital image.	6	C402.1	L2
OR				
4	a) Explain with neat diagram how image is acquired using sensor strips?	6	C402.1	L2
	b) i) What is meant by shrinking of an image.Explain. ii) A common measure of transmission for digital data is the baud rate defined as the number of bits transmitted per second. Generally transmission is accomplished in packets consisting of a start bit,a byte(8 bits) of information ,and a stop bit.Using these facts find how many minutes it would take to transmit a 2048 X 2048 image with 256 intensity levels using a 33.6K baud modem.	6	C402.1	L3


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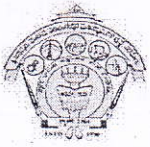
IA - 1 SCHEME OF EVALUATION

Sem :	VII	Subject : Digital Image processing	Sub Code : 15EC72	Date : 15/09/2019	
Q. No.	Bit	Description	Marks	CO's	RBT Level
1	a)	<p>Image may be defined as a two dimensional function, $f(x, y)$ where x & y are spatial (plane) coordinates & amplitude of f at any pair of coord coordinates (x, y) is called intensity or gray level of the image at that point. when x, y & the intensity values of f are all finite, discrete quantities then image is a digital Image.</p> <p><u>Digital Image processing</u> :- processing digital images by means of a digital computer.</p> <p>* Encompasses that extract attributes from images up to, & including, recognition individual objects.</p>	2+4	C402.1	L2
	b)	<p>Fundamental steps in Digital Image processing;</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <pre> graph TD subgraph Steps A[Image Acquisition] --> B[Image Filtering & Enhancement] B --> C[Image Restoration] C --> D[Colour Image Processing] E[wavelets & other Image Transforms] <--> B F[Compression & water marking] <--> C G[Morphological Processing] <--> D H[Segmentation] <--> E I[Feature Extraction] <--> F J[Image Pattern Classification] <--> G end KB[Knowledge Base] <--> A KB <--> B KB <--> C KB <--> D KB <--> E KB <--> F KB <--> G KB <--> H KB <--> I KB <--> J </pre> </div> <p>Problem Domain</p> <p>Image acquisition is the first process. Image Enhancement is the process of manipulating an image so the result is</p>	3+4	C402.1	L2

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IA - 1 SCHEME OF EVALUATION

Q. No.	Bit	Description	Marks	CO's	RBT Level
Sem : VII Subject : Digital Image processing Sub Code : 15EC72 Date : 15/09/2019					
2	a)	<p>more suitable than original for a specific application. Enhancement which is subjective. <u>Image Restoration</u>: is an area that also deals with improving the appearance of an image. Image restoration is objective.</p> <p><u>color Image processing</u>: is an area that has been gaining in importance b'coz of significant increase in the use of digital images over internet.</p> <p><u>wavelets</u>: foundation for representing images in various degrees of resolution.</p> <p><u>compression</u>: deals with techniques for reducing the storage required to save an image, or B.W req^d to transmit it.</p> <p>Any two fields that use DIP:</p> <ol style="list-style-type: none"> 1) Gamma-Ray Imaging 2) X-Ray Imaging 3) Images in the UV band. 4) Imaging in the visible & Infrared Bands. 5) Imaging in the microwave Band. 6) Imaging in the Radio band. 	3+3	C402.1	L2
2	b)		2+5	C402.1	L2

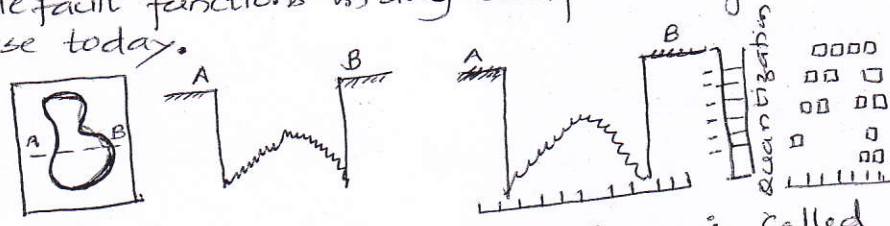
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IA - 1 SCHEME OF EVALUATION

Sem : VII		Subject : Digital Image Processing	Sub Code : 17ES51	Date : 15/09/2019		
Q. No.	Bit	Description	Marks	CO's	RBT Level	
2	b)	<p>Two subsystems are required to acquire digital images.</p> <p><u>Physical sensor</u>:- Responds to the energy radiated by the object we wish to image.</p> <p><u>Digitizer</u>:- Device for converting o/p of the physical sensing device, into digital form.</p> <p><u>Specialized Ip H/w</u> - consists of the digitizer plus H/w that performs other primitive operations.</p> <p><u>Specialized Image processing Hardware</u>: consists of digitizer just mentioned, plus hardware that performs other primitive operations such as ALU, that performs arithmetic & logical operations in parallel on entire images.</p> <p><u>Computer</u>: In an image processing system is a general purpose computer & can range from a pc to a supercomputer.</p> <p><u>Software</u> for IP consists of specialized modules that perform specific tasks.</p> <p><u>Mass storage</u>: is a must in image processing applications.</p> <p><u>Image displays</u>: Mainly, flat screen monitors.</p> <p><u>Hardcopy devices</u>: for recording images, include</p> <p><u>Networking & cloud communication</u>:- Are almost default functions in any computer system in use today.</p>				
3	a)	 <p>Digitizing the coordinate values is called sampling. Digitizing amplitude values is called quantization.</p>	3+3	C402.1	L2	

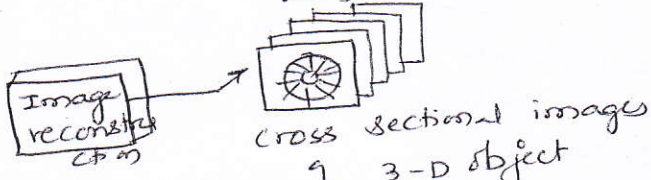
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IA -1 SCHEME OF EVALUATION

Sem : VII		Subject : Digital Image processing	Sub Code : 15ECT2	Date : 15/09/2019		
Q. No.	Bit	Description	Marks	CO's	RBT Level	
3	b)	<p>Noise :- Random variations due to noise.</p> <p>Nearest Neighbour Interpolation → Pixel Replication → when we increase the size of an image Bilinear Interpolation.</p> <p>Nearest Neighbour Interpolation:- Laying an imaginary grid over the original image. Gray level assignment:- look for the closest pixel in the original image & assign its gray level to the new pixel in grid. when done with all points in overlay grid, expand it to original specified size to obtain the zoomed image.</p> <p>Pixel Replication: Duplicate each column → doubles the image size in the horizontal direction. then duplicate each row of the enlarged image to double the size in vertical axis.</p> <p>Bilinear Interpolation :- * Sophisticated way of accomplishing gray level assignment using four nearest neighbours of a point. Let $v(x', y')$ denote the gray level assigned to it.</p> $v(x', y') = ax' + by' + cx'y' + d$ $v(x, y) = \sum_{i=0}^3 \sum_{j=0}^3 a_{ij} x_j y_j$	3+3	C402.1	L2	
4	a)	 <p>Image reconstruction cross sectional images of 3-D object</p>	1.5+ 4.5	C402.1	L2	

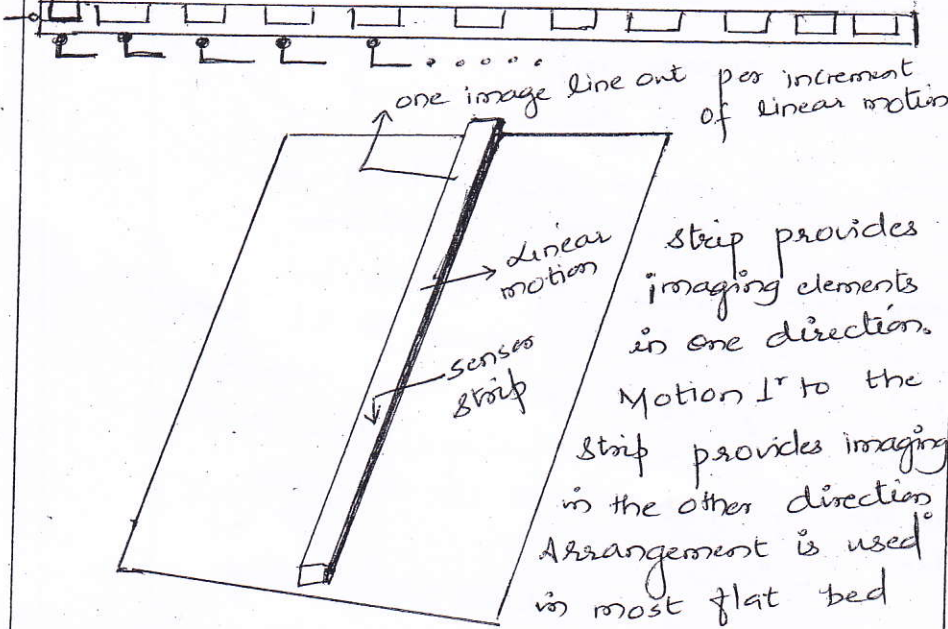
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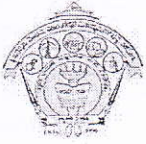
IA -1 SCHEME OF EVALUATION

Sem : VII		Subject : Digital Image processing	Sub Code : 15ECT2	Date : 15/09/2019		
Q. No.	Bit	Description	Marks	CO's	RBT Level	
		 <p>strip provides imaging elements in one direction. Motion \perp to the strip provides imaging in the other direction. Arrangement is used in most flat bed scanners.</p> <p>Sensing devices with 4000 or more in line sensors are possible. * In-line sensors are used routinely in airborne imaging applications, in which the imaging system is mounted on an aircraft that flies at a constant altitude & speed over the geographical area to be imaged. one dimensional imaging sensor strips that respond to various bands of the E.M spectrum are mounted \perp to the direction of flight. An imaging strip gives one line of an image at a time, & the motion of the strip relative to the scene completes the other dimension of a 2-D image.</p>				
4	b) i)	shrinking of an image. Equivalent process of pixel replication	3+3	C402.1	L2	

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		<p>is row-column deletion.</p> <p>To shrink an image by one-half we delete every other row & column.</p> <p>To shrink an image by one half we delete every other row & column.</p> <p>To shrink an image by a non-integer factor, we expand the grid to fit over original image, do gray level nearest neighbour or bilinear interpolation & then shrink the grid back to its original specified size.</p> <p>4b ii) The total amount of data (including start & stop bit) in an 8 bit, 2048x2048 image is = $2048^2 \times (8+2)$ bits</p> <p>Baud rate = 33.6 K</p> <p>33600 bits are transmitted per sec.</p> <p>Time taken to transmit the image is</p> $\frac{2048^2 \times 10}{33600} = 1,248 \text{ sec}$ $= 20.8 \text{ min}$ $= 20.8 \text{ sec.}$				

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