Telecommunication Engineering Exclusive Model Question Papers

15TE63

Visvesvaraya Technological University, Belagavi
MODEL QUESTION PAPER

6th Semester, B.E (CBCS) Telecommunication Engg.

Course: 15TE63- MICROWAVE THEORY AND ANTENNAS

Time: 3 Hours **Max. Marks: 80**

Note: (i) Answer five full questions selecting any one full question from each Module.
(ii) Question on a topic of a Module may appear in either its 1st or/and 2nd question.

		Module-1	**Marks**
1	a	What are the high frequency limitations of conventional Vacuum Tubes / Transistors? Briefly Explain how these are overcome in Microwave Tubes?	8
	b	Describe the Structure and Operation of Reflex Klystron Oscillator.	8
		OR	
2	a	Define Reflection coefficient and Derive the expression for Reflection coefficient at load, in terms of Load and Characteristic impedances.	8
	b	A load impedance of 73-j80 Ω is required to be matched to a 50 Ω cable having operating wave length $\lambda = 30$ cm. Design a single stub matching section of length 'l' with position 'd' assuming main line and stub are of same type. Simplify using Smith Chart.	8
		Module-2	
3	a	List the properties of S-Parameters. State and Prove the following properties of S-parameters: i) Symmetrical property for Reciprocal Network ii) Unitary property for a lossless junction	8
	b	Explain with a neat diagram, the construction and working of Precision type variable Attenuator.	8
		OR	
4	a	Stating the characteristic features of E-plane tee junction, derive its S-matrix.	8

	b	Describe the characteristic features of a Two-hole waveguide directional coupler and derive its S-matrix.	8
Module-3			
5	a	List the various losses that occur in a Microstrip line. Derive the expression for dielectric loss in the Substrate and ohmic loss in the Strip conductor.	8
	b	A lossless parallel strip line has a conducting strip width 'w', substrate dielectric separating the two conducting strips has a relative dielectric constant ε_{rd} of '6' and a thickness 'd' of 4mm. Calculate: i) The required widths 'w' of the conducting strip in order to have a Characteristic impedance of 50Ω. ii) The Strip line Capacitance 'C'. iii) The strip line Inductance 'L'. iv) The velocity of the wave in the parallel strip line.	8
OR			
6	a	Define the following terms as applied to an Antenna. i) Directivity ii) Beam solid angle iii) Half Power Beam Width	6
	b	The Power received by the receiving Antenna at a distance of 1kM over a free space at a frequency of 1GHz is 12mW. Calculate the input to the transmitting Antenna if gain of transmitting Antenna and receiving Antenna are 25dB and 35dB respectively.	4
	c	Show that the maximum effective aperture of a $\lambda/2$ dipole is $0.13\ \lambda^2$.	6
Module-4			
7	a	Derive an expression for Radiation Resistance of a short electric Dipole.	8
	b	Obtain the relative Field Pattern for two Isotropic Point Sources of same Amplitude but opposite Phase spaced $\lambda/2$ apart.	8
OR			
8	a	Derive the Field equation for a linear array of n Isotropic Point Sources of equal amplitude and spacing.	8
	b	Explain the Principle of Pattern Multiplication with an example.	8

Module-5			
9	a	The Diameter of a circular Loop Antenna is 0.04 λ. How many turns of Antenna will give a Radiation Resistance of 36 Ω.	6
	b	Explain the Features and Practical Design considerations of a Mono-filar Helical Antenna.	10
OR			
10	a	With a neat diagram, explain the operation of Log-periodic Antenna.	8
	b	Obtain the Radiation Resistance of a small loop Antenna.	8

15TE655

Visvesvaraya Technological University, Belagavi

MODEL QUESTION PAPER – Set I

6th Semester, B.E (CBCS) TC

Course: 15TE655- IMAGE PROCESSING

Time: 3 Hours **Max. Marks: 80**

Note: (i) Answer Five full questions selecting any one full question from each Module.
(ii) Question on a topic of a Module may appear in either its 1st or/and 2nd question.

		Module-1	**Marks**
1	a.	With the help of neat block dig explain the components of a general purpose image processing system.	10
	b.	Explain briefly the following terms i) Neighbors ii) Path iii) Connectivity of pixels.	6
		OR	
2	a.	Mention the applications of image processing ?	8
	b.	Explain the importance of brightness adaptation and discrimination in image processing.	8
		Module-2	
3	a.	Explain the following i) Gray-level slicing ii) Bit plane slicing.	4
	b.	For the given 4X4 image having gray scale between [0,9] get the histogram equalized image and draw the histogram after and before equalization 2 3 3 2 4 2 4 3 3 2 3 5 2 4 2 4	12
		OR	
4	a.	Explain how logical operators are used for image enhancement	6
	b.	Explain the basic concepts of spatial filtering in image enhancement and hence explain the importance of smoothing filters.	10
		Module-3	
5	a.	Explain any four properties of two dimensional Fourier Transform	8
	b.	Explain Homomorphic filtering for image enhancement.	8
		OR	
6	a.	Explain any four important noise probability density functions	8
	b.	Draw and explain image degradation and restoration model	8
		Module-4	
7	a.	Explain in brief inverse filtering approach and its limitation in image restoration	8

	b.	Explain how adaptive filters can be used for single input system identification	8
		OR	
8	a.	Explain in brief any two boundary representation schemes and illustrate.	10
	b.	write short note on i) Hit and Miss transform ii) Dilation and Erosion	6
		Module-5	
9	a.	Explain region based segmentation technique.	8
	b.	Illustrate and explain how chain code is used for compression of monochrome images.	8
		OR	
10	a.	Explain How polygon approximation approach can be used for morphological shape approximation	8
	b.	Explain a boundary tracing algorithm and its applications.	8

15TE655

Visvesvaraya Technological University, Belagavi

MODEL QUESTION PAPER – Set II

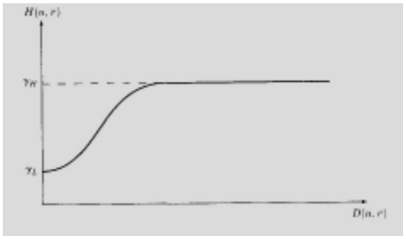
6th Semester, B.E (CBCS) TC

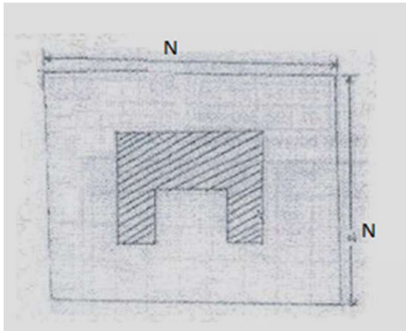
Course: 15TE655- IMAGE PROCESSING

Time: 3 Hours **Max. Marks: 80**

Note: (i) Answer Five full questions selecting any one full question from each Module.
(ii) Question on a topic of a Module may appear in either its 1st or/and 2nd question.

		Module-1	**Marks**
1	a	Highlight any 2 different fields in which Digital Image Processing is used?	4
	b	List the steps involved in digital image processing with Illustration? Briefly Discuss each step.	6
	c	What is Digital Image Processing? How do you represent the digital images? Explain about sampling and quantization of an image.	6
		OR	
	a	Define the (i) relationships between pixels.(ii) Neighbors of Pixel .	4
2	b	Consider the image segment given in figure Let V={ 3,4}.Compute the lengths of shortest 4,8 and m path between p and q. If the path does not exists, Explain why. 3 4 1 2 0 0 1 0 4 2 (q) 2 2 3 1 4 (P) 3 0 4 2 1 1 2 0 3 4	6
	c	Describe image formation in the eye with brightness adaptation and discrimination.	6
		Module-2	
3	a	What effect would setting to zero the half of lower-order bit planes have on the Histogram of an image in general.	4
	b	Specify the objective of image enhancement technique. Name various arithmetic and logical operations that can be done on Images.	6

<table>
<tr><td></td><td>c</td><td>Describe Histogram Specification.</td><td>6</td></tr>
<tr><td></td><td></td><td>OR</td><td></td></tr>
<tr><td>4</td><td>a</td><td>Discuss the importance of a kernel or mask or window in spatial filtering used for enhancement of a digital image.</td><td>4</td></tr>
<tr><td></td><td>b</td><td>Discuss the limiting effect of repeatedly applying a 3x3 low-pass spatial filter to a digital image. You may ignore border effects. Is this effect different from applying 5x5 filter? Illustrate.</td><td>6</td></tr>
<tr><td></td><td>c</td><td>Perform Histogram Equalization and Draw new equalized Histogram for the following Image Data.
<table>
<tr><td>Gray Level</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>No of Pixels</td><td>550</td><td>900</td><td>650</td><td>150</td><td>300</td><td>250</td><td>110</td><td>90</td></tr>
</table></td><td>6</td></tr>
<tr><td></td><td></td><td>Module-3</td><td></td></tr>
<tr><td>5</td><td>a</td><td>What is meant by image interpolation? Discuss about various interpolation methods.</td><td>4</td></tr>
<tr><td></td><td>b</td><td>Calculate the 2D-DFT of the image segment shown below using matrix multiplication method.
<table>
<tr><td>(x,y)=</td><td>0</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td></td><td>1</td><td>1</td><td>1</td><td>4</td></tr>
<tr><td></td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td></td><td>0</td><td>2</td><td>0</td><td>2</td></tr>
</table></td><td>6</td></tr>
<tr><td></td><td>c</td><td>Identify the filter function for Image Enhancement. Draw neat block diagram of the filtering steps and show how the f_H and f_L are obtained.
 </td><td>6</td></tr>
<tr><td></td><td></td><td>OR</td><td></td></tr>
<tr><td>6</td><td>a</td><td>Bring out the differences between Image enhancement and Image Restoration with Illustration.</td><td>4</td></tr>
<tr><td></td><td>b</td><td>Explain the importance of kernel separatility property of 2D-DFT in implementing 2D-FFT.</td><td>6</td></tr>
<tr><td></td><td>c</td><td>Discuss the importance of adaptive filters in image restoration system. Highlight the marking of Adaptive Median filters.</td><td>6</td></tr>
<tr><td></td><td></td><td>Module-4</td><td></td></tr>
<tr><td>7</td><td>a</td><td>Describe the process of image restoration by inverse filtering?</td><td>4</td></tr>
<tr><td></td><td>b</td><td>Explain three principle ways to estimate the degradation function for use in image restoration.</td><td>6</td></tr>
<tr><td></td><td>c</td><td>Discuss Structuring elements in Image morphological transformations.</td><td>6</td></tr>
</table>

		OR	
8	a	What are the Applications of morphology?	4
	b	Describe dilation and Erosion morphological transformations on a binary image.	6
	c	Write the mask for PreWitt, Sobel and Laplacian operator.	6
		Module-5	
9	a	Discuss about region based segmentation.	4
	b	What are the derivative operators useful in image segmentation? Explain their role in segmentation.	6
	c	What is global, Local and dynamic or adaptive threshold? Describe.	6
		OR	
10	a	How can you control over segmentation problem? Explain.	4
	b	Segment the Image shown by using the split and Merge procedure. Let $Q(R_i)$=TRUE if all the pixels in R_i have the same Intensity. Show the Quadtree corresponding to your segmentation. 	6
	c	Explain about the Global processing via the Hough Transform for edge linking.	6