

B.E (Full Time) DEGREE END SEMESTER EXAMINATIONS, May 2012

ELECTRONICS AND COMMUNICATION ENGINEERING

SEVENTH SEMESTER

EC9401 – RF AND MICROWAVE ENGINEERING

(REGULATIONS 2008)

Time: 3Hrs

Max Marks : 100

Answer ALL Questions

Part – A (10x2=20)

1. A 10 dB attenuator having an input VSWR of 1.2 is terminated by matched load. Find the reflected power, the absorbed power and the transmitted power for 1W input.
2. Define S matrix.
3. Obtain the relationship between the S parameters with respect to ABCD parameters.
4. Write the condition for stability.
5. Define Gunn Effect
6. What is the effect of avalanche transit time?
7. What are the advantages of TWT?
8. Define coupling coefficient.
9. Define insertion loss.
10. Calculate the VSWR in dB in a waveguide when the load is a 3 dB attenuator terminated by a short circuit.

Part – B (5x16=80)

11. Derive the S parameters for the two port network and explain the various properties of S parameter. (16 Marks)
 - 12a.(i) Derive the amplifier power relation. (8 Marks)
 - (ii) Derive the stability consideration for the matching networks. (8 Marks)
- OR
- 12b. Derive the frequency response for the T and π matching networks. (16 Marks)
 - 13a.(i) Explain the working of faraday rotator of Isolator. (8 Marks)
 - (ii) Derive the S matrix for magic Tee. (8 Marks)
- OR
- 13b Explain the working principle of IMPATT diode and derive its power efficiency. (16 Marks)

13.b)(i) What is meant by histogram equalization?. Perform the histogram equalization for the given image.

$$f(x,y) = \begin{pmatrix} 1 & 3 & 5 \\ 4 & 4 & 3 \\ 5 & 2 & 2 \end{pmatrix} \quad (8)$$

(ii) Briefly explain how the gradient and the laplacian operators/filters are being used in image enhancement. (8)

14.a) Find the deblur filter using

(i) Inverse filter approach

(ii) Pseudo Inverse filter approach taking $\epsilon = 0.05$.

given the blur filter $h(m,n) = \begin{pmatrix} 0 & 0.1 & 0.1 & 0 \\ 0.1 & 0.1 & 0.1 & 0.1 \\ 0.05 & 0.1 & 0.1 & 0.05 \\ 0 & 0.05 & 0.05 & 0 \end{pmatrix}$ (16)

(OR)

14.b) Explain the geometric transformation and spatial transformation techniques in detail with neat sketches. (16)

15.a)(i) With neat diagrams, explain in detail about how a point is getting detected and linked using Hough transform (10)

(ii) Use region growing algorithm to segment the following image. Take the seed points to be the 4th element in the second row and 2nd element in the fourth row.

$$f(x,y) = \begin{pmatrix} 1 & 0 & 7 & 8 & 7 \\ 0 & 1 & 8 & 9 & 8 \\ 0 & 0 & 7 & 9 & 8 \\ 0 & 1 & 8 & 8 & 9 \\ 1 & 2 & 8 & 8 & 9 \end{pmatrix} \quad (6)$$

(OR)

15.b) With necessary diagrams, briefly explain how the segmentation is performed using morphological watersheds and also elaborate the watershed segmentation algorithm. (16)
