

BE / SEM V / ~~EXTC~~ (C.B.S.C.S) - Image & Video processing

Instructions:

- (1) Question No 1 is Compulsory
(2) Answer any 3 questions from the remaining questions

QP Code : 5875

NOV-5

Q1 Answer any 4

20

- Explain RGB and HSI colour models.
- Quality of picture depends on the number of pixels and grey level that represent the picture. Justify or contradict.
- What are the different types of order statistics filters? Discuss their advantages.
- Discuss the classifications of video frames.
- Explain opening and closing of a digital image.

Q2 a. Write an expression for a two dimensional DCT. Also, find the DCT of the given image.

10

$$\begin{bmatrix} 1 & 2 & 2 & 1 \\ 2 & 1 & 2 & 1 \\ 1 & 2 & 2 & 1 \\ 2 & 1 & 2 & 1 \end{bmatrix}$$

- Why Fourier transform and the frequency domain tools are so useful for image enhancement? With the help of neat block diagram explain the basic of filtering in the frequency domain. Give the reasons of shifting the origin.

10

Q3 a. Perform histogram Equalization for the following image. Plot the original and the Equalized Histograms

10

Intensity	0	1	2	3	4	5	6	7
No. of pixels	70	100	40	60	10	70	10	40

- Discuss region based segmentation.

10

Q4 a. What are the required sampling rates for video signals? Explain video sampling in three dimensions.

10

- Explain HIT or MISS transform using an example.

10

Q5 a. Explain the working of Wiener filter in image restoration.

10

- Discuss the concept of optical flow for motion estimation.

10

Q6 Write short notes on any two

- KL Transform.
- Exhaustive block matching algorithms.
- Hough transform.
- Point Processing.

20

Number Of Channels	Total Traffic Intensity (Erlangs)
57	45
19	12
100	88

b) Explain W-CDMA Forward channel structure in detail. 10

Q4. 10

a) Compare IS-95, WCDMA and CDMA2000 with respect to Channel bandwidth, chip rate, modulation schemes, data rates and frame size. 10

b) Draw LTE network architecture and discuss it in detail 10

Q5

a) What is the concept of software defined radio? Elaborate in detail. 10

b) Explain Hand off in UMTS. 10

Q6. Write a short note on **any two** of the following: 20

1. Multiantenna Techniques
2. Cellular capacity and coverage improvement Techniques
3. Indoor propagation Models

BE - Sem-VII - CCBsas) - EXTC - Optical communication
and Networks - Nov-15

QP Code : 5954

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No. 1 is compulsory
(2) Attempt any three questions out of the remaining five questions.
(3) Figures to the right indicate full marks.

1. (a) Differentiate DWDM, WDM and SONET. 5
(b) What is optical safety? 5
(c) Differentiate LED and LASER sources. 5
(d) Compare different types of splicing techniques. 5
2. (a) Draw the block diagram of optical communication and state its advantages and disadvantages. 10
(b) Explain different types of fibers with their refractive index profile and mention its dimensions. 5
(c) A multimode GIF exhibits total pulse broadening of ms over a distance of 15 km. 5
Estimate (i) The maximum possible Bandwidth on the link assuming no $|S|$
(ii) The pulse dispersion per unit length.
(iii) The Bandwidth length product.
3. (a) What is macrobending loss. Explain with neat diagram. Explain how to minimize microbending losses. 10
(b) Explain OTDR with neat sketch and mention its advantages and applications. 5
(c) Derive an Expression for responsivity of PIN photodiode. 5
4. (a) What are optical amplifiers. Explain different types of front end amplifiers. 7
(b) Explain in detail working principle of RAPD. Why it is called reach through APD. and compare its working with PIN diode. 8
(c) Explain SONET architecture in detail. 5
5. (a) Explain working principle of isolator with neat sketch. Also compare isolator and circulator. 10
(b) Write a short note on link power budget. 10
6. (a) Explain OTDM in detail. 10
(b) Explain optical access networks. 10

NOV-15

Q.P. Code : **6015**

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No.1 is compulsory.
 (2) Solve any three questions from the remaining.
 (3) Assume suitable data if necessary.

1. (a) Design circulator using magic tees. 5
 (b) Explain Travelling wave tube as an amplifier. 5
 (c) Explain the operation of 2-hole Directional coupler with s-matrix. 5
 (d) Explain Doppler shift and its role in pulsed and CW radar. 5
2. (a) The terminating impedance Z_L is $100 + j100\Omega$ and the characteristics impedance Z_0 of the line and stub is 50Ω . The first stub is placed at 0.40λ away from the load. The spacing between the two stubs is $3\lambda/8$. Determine the length of the short circuited stubs when the match is achieved. 10
 (b) Explain instrument landing system for aircraft navigation. 10
3. (a) Derive the wave equation for a TE wave and obtain all the field components in a circular waveguide. 10
 (b) What is the importance of beam coupling coefficient? Derive the equation of velocity modulation in klystron. 10
4. (a) Explain the significance of RWH model and two valley model in Gunn diode. 10
 (b) With a suitable diagram, explain the working on conical scan tracking radar. 10
 Explain the various factors that need to be considered in determining the optimum squint angle.
5. (a) Draw and explain with block diagram of MTI radar system. What are its limitations. 10
 (b) Discuss the power frequency, current frequency and power gain frequency limitations with reference to a microwave transistor. 10
6. (a) Design two lumped element L section matching network at 500 MHz to transform $Z_L = 200 - j100\Omega$ to a 100Ω transmission line. Use Smith Chart. 10
 (b) Write a short note on backward wave oscillator. 5
 (c) A radar operating at 1.5 GHz uses a peak pulse power of 2.5 MW and has a range of 100 nmi for objects whose radar cross section is 1m^2 . If the minimum receivable power of the receiver is 2×10^{-13} Watt. What is the smallest diameter of the antenna reflector could have, assuming it to be a full paraboloid with $\eta = 0.65$. 5

(3 Hours)

[Total Marks :80

- N.B. : (1) Question No.1 is compulsory
(2) Solve any three questions from remaining five questions.
(3) Assume suitable data wherever necessary with proper justification.

1. (a) Distinguish between cryptography and steganography 20
(b) A source emits letters $A \{ a_1, a_2, a_3, a_4 \}$ with probabilities $p(a_1) = 0.5$
 $p(a_2) = 0.15$ $p(a_3) = 0.25$ $p(a_4) = 0.10$ calculate the entropy of the source.
Also find the huffman code with minimum variance.
(c) Define the chinese remainder theorem find the solution to the simultaneous equations.
 $x = 2 \bmod 3$
 $x = 3 \bmod 5$
 $x = 2 \bmod 7$
(d) Define fermat's little theorem find the result of
(i) $3^{12} \bmod 11$
(ii) $3^{10} \bmod 11$
2. (a) Encode and decode the following sequence using Lz-77 and Lz-78 algorithm. 20
w a b b a b r a r b a r r a c b a e
Give drawbacks of Lz-77 and Lz-78 assume window size 9 for Lz-77.
(b) What is MDC and MAC ? Explain HMAC in detail.
3. (a) Write a short note on μ -law and A-law companding 20
(b) Explain diffie hellman key exchange algorithm with an example. Also explain attack on diffie hellman key exchange
4. (a) Explain attack on double DES with example write with neat black diagram 20
triple DES with two keys.
(b) Write short note on AES
5. (a) Write short note on H-264 encoder and decoder 20
(b) Explain Intrusion detection system in detail
6. Write short note (Any three) 20
(a) Ethical hacking
(b) Attacks on RSA
(c) JPEG - 2000
(d) Biometric Authentication.

QP Code : 6199

(3 Hours)

[Total Marks :80]

Instructions to the candidates, if any

N.B. 1) Question No. 1 is compulsory.

2) Solve any three questions out of remaining five questions.

3) Draw neat labeled diagram wherever necessary.

4) Answers to each new question to be started on a fresh page.

(5x4=20)

Q1: Solve any four:

a) Draw and explain neural networks based OR function.

b) Draw and explain McCulloch Pitts neuron architecture.

c) What do you mean iterations and epochs with reference to training of neural network

d) For the two fuzzy sets:

Consider two fuzzy sets given by:

$$\tilde{A} = \left\{ \frac{1}{2} + \frac{0.2}{3} + \frac{0.5}{4} \right\}$$

$$\tilde{B} = \left\{ \frac{0.9}{2} + \frac{0.4}{3} + \frac{0.8}{4} \right\}$$

Find i) $A \cup B$ ii) $A \cap B$ iii) \bar{A} iv) $\bar{A} \cup B$ of the fuzzy sets

e) Explain with block diagram the unsupervised neural networks with an example

Q.2 A) Describe delta learning rule with flow chart.

(10)

Q.2 B) Draw Hopfield Neural Network with four output nodes. Also explain training and testing algorithm of Hopfield neural network.

(10)

TURN OVER

Q.3A)i) A Hopfield network made up of five neurons, which is required to store the following patterns:

$$P1 = [1 \ 1 \ 1 \ 1 \ 1]^T$$

$$P2 = [1 \ -1 \ -1 \ 1 \ -1]^T$$

$$P3 = [-1 \ 1 \ -1 \ 1 \ 1]^T$$

Evaluate the 5-by 5 weight matrix of the Hopfield Network

(6)

ii) Explain any four properties of fuzzy sets

(4)

Q.3B) Explain the following:

(10)

i) Radial Basis Function Neural Network structure for Classification

ii) Fuzzy Inference System with block diagram

Q.4A) Explain perceptron learning algorithm and develop perceptron network to implement two inputs OR gate to function. Consider inputs and output as bipolar. Assume initial weight and bias values equal to zero. Consider learning rate equal to one.

(10)

Q.4B) Explain any four methods for defuzzification in details.

(10)

Q.5. A) Describe the application of Neural Network for face recognition.

(10)

Q.5. B) Explain how Fuzzy logic can be used in image smoothing.

(10)

Q.6. A) What do you mean by membership function? Explain with diagram. Describe any three fuzzy membership functions with diagram and mathematical equations.

(10)

Q.6. B) Describe the following with suitable diagram:

(10)

i) Hand written character recognition using Neural Networks.

ii) Application of Fuzzy logic for image contrast enhancement.