EXTC
B.E Sem VII CBSGS NID- 2016 21-12-16

Sub :- Neural Network & Fuzzy logic

QP Code :789101

(3 Hours) Total Marks: 80

N.B. : (1) Questions No.**1** is **compulsory**.
(2) Solve any three questions out of remaining **five** questions
(3) Draw neat labeled diagram whenever necessary
(4) Assume suitable data if necessary

Q1: Solve any five out of six (5x4)

a) Define epoch, iteration, error surface, and error function with reference to neural networks

b) Draw and explain neural networks based AND function.

c) What are the advantages of fuzzy logic over the crisp logic?

d) Explain with block diagram the supervised neural networks.

e) Draw and explain Radial Basis Function neuron with its mathematical interpretation.

f) Differentiate biological neural network and artificial neural network

Q.2 A) Draw the architecture of a Multilayer perceptron (MLP) and explain its operation. Mention its advantages and disadvantages. (10)

Q.2 B) i) Hopfield network made up of five neurons, which is required to store the following patterns:

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

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

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

Evaluate the 5-by 5 weight matrix of the Hopfield Network (6)

ii) For the two fuzzy sets: (4)

Consider two fuzzy sets given by:

$$\underset{\sim}{A} = \left\{\frac{0.5}{2} + \frac{0.1}{3} + \frac{0.6}{4}\right\}$$

[Turn Over

$$\underset{\sim}{B} = \left\{\frac{0.7}{2} + \frac{0.2}{3} + \frac{0.4}{4}\right\}$$

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

Q.3A) i) What is fuzzy membership function? Hence define Support, Core, and Boundary of a membership function (5)

ii) For the Fuzzy relation R find the λ- Cut relation when λ = 0, 0.1, 0.7 and 1.0: (5)

$$R = \begin{bmatrix} 1.0 & 0.1 & 0.2 & 0.1 & 0.4 \\ 0.6 & 0.7 & 0.3 & 0.5 & 0.0 \\ 0.8 & 0.9 & 0.6 & 0.3 & 0.2 \\ 0.1 & 0.1 & 1.0 & 0.9 & 0.7 \end{bmatrix}$$

Q.3 B) Draw and explain the McCulloch-Pitts neuron architecture. Generate the output of Exclusive-OR logic function using McCulloch-Pitts neuron. (10)

Q.4 A) Draw Hopfield Neural Network with four output nodes. Also explain training and testing algorithm of Hopfield neural network. (10)

Q.4 B) Explain with diagrams any four methods for defuzzification in details. (10)

Q.5. A) Explain with block diagram the application of Neural Network for face recognition. (10)

Q.5.B) i) Write any four properties of fuzzy sets. (4)

ii) Develop graphically membership function to describe the linguistic variables (6)

"cold", "warm" and' Hot". The temp. range is 0 to 100 degrees. Use trapezoidal

and triangular shaped membership functions.

Q.6. A) Give any one application of Fuzzy logic in image processing. (6)

Q.6. B) i) Explain Fuzzy Control System with a block diagram and its application in fuzzy

control of washing machine. (8)

ii) Describe image compression using Neural Networks. (6)

B.E. Sem VII EXTC NID-2016 CBSGS 21-12-16

Sub:- Analog & Mixed Signal VLSI.

Q.P. Code : 789201

(3 Hours) **[Total Marks : 80**

N.B: (1) Question **No.1** is **compulsory**.
(2) Solve **any three** questions from the remaining **five**.
(3) **Figures** to the **right** indicate **full marks**.
(4) Assume suitable **data** if **required** and **mention the same** in the **answer sheet**.

1 Solve **any four** : **20**

(a) Explain the effect of offset error and gain error on performance of Analog to Digital Converter (ADC) with the help of transfer curve.

(b) What is flicker noise? Explain how same is modeled in CMOS technology.

(c) For the circuit shown in **Fig 1c**, derive expression for voltage gain $Av=V_{out}/V_{in}$.

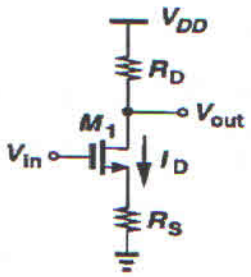


Fig. 1c

(d) What are performance parameters of current source/sink? How to improve the same

(e) Discuss various problems associated with MOSFET switch.

2 (a) Explain in detail working of switched capacitor Integrator with neat circuit diagram and appropriate waveforms. **10**

(b) Explain with the help of suitable example why input referred noise modeled by single voltage source in series with input is incomplete representation of noise at the input. How this problem is overcome? **10**

TURN OVER

3 (a) Design 2 stage Operational Transconductance Amplifier (OTA) to meet the following specifications with phase margin of 60°. Use all transistors with L=1μm. **15**

$A_V > 6000V/V$, $V_{DD} = 3.0V$, $V_{SS} = -3.0V$, GB = 5 MHz,

$C_L = 12pF$, $SR > 10V/\mu S$, V_{out}range = ±2.5V,

ICMR = -0.5 to 2.5V, $P_{diss} \leq 3.5mW$

Use NMOS and PMOS transistors with following parameters.

NMOS: $V_{TN} = 0.5V$, $\mu nC_{ox} = 150\mu A/V^2$, $\lambda_n = 0.01V^{-1}$ and for

PMOS: $V_{TP} = -0.5V$, $\mu pC_{ox} = 75\mu A/V^2$, $\lambda_p = 0.02V^{-1}$.

For the designed circuit calculate expected voltage gain, power dissipation, and output voltage swing.

(b) For NMOS device with W=100μm, L = 0.5μm, gm = 10mS, the $1/f$ noise corner frequency is measured to be 500kHz. If tox=90A^0, what is flicker noise coefficient 'K' in this technology. **5**

4 (a) Explain design procedure to design current mirror load differential amplifier using appropriate equations to meet the specifications like Voltage gain (Av), High Cut-off frequency(f_{-3db}), Slew Rate (SR), Power Dissipation (P_{diss}), Input Common Mode Range (ICMR). **10**

(b) Explain with the help of neat diagram working of CMOS bandgap reference generator and derive the expression for its output voltage. **10**

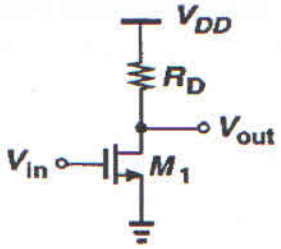
5 (a) The resistive load common source amplifier as shown in Fig 5a is suppose to provide an output swing from 1V to 2.5V. **10**

Assume $(W/L)_1 = 50/0.5$, $R_D = 2K\Omega$, and $\lambda = 0$.

(i) Calculate the input voltages that yield $V_{out} = 1V$ and $V_{out} = 2.5V$

(ii) Calculate the drain current and transconductance of M1 for both cases.

(iii) How much does the small signal gain (gmR_D) vary as output goes from 1V to 2.5V



$V_{DD} = 3V$

$V_{TN} = 0.7V$

$\mu nCox = 90\mu A/V^2$

Fig 5a

(b) Consider 4-bit DAC with following measured output voltage with V_{REF} = 5V. Find DNL and INL. Does this DAC provide 4-bit resolution?

{0.00:0.3195:0.625:1.0375:1.325:1.5625:1.755:2.1875:2.5:2.8125: 3.125:3.5875:3.75:4.0625:4.495:4. 6875}.

6 Write short notes on **any four** : **20**

(a) Beta Multiplier

(b) Successive Approximation Register (SAR) ADC

(c) Folded Cascode Amplifier

(d) Errors associated with Sample and hold circuit

(e) Basic CMOS comparator Design

B.E. Sem VII ~~Rev.~~ CBSGS EXTC NID- 2016 24-12-16
Sub:- Data Compression & Encryption

Q.P. Code : 788901

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question **No.1** is **Compulsory.**
(2) Attempt **any three** questions out of remaining questions.
(3) Assume suitable data wherever necessary.

1. Answer in brief. **(Any Four)** **20**
   (a) Explain different redundancies in data and how they are used for data compression. Also give evaluation parameters for compression techniques.
   (b) What are the goals of cryptographic systems? Describe various attacks compromising these goals.
   (c) State Fermat's Little Theorem, Euler's Theorem in modular arithmetic. What is Euler's Totient function? Compute $\Phi(37)$, $\Phi(35)$, and $\Phi(75)$.
   (d) Give an example of each:
      - Substitution cipher
      - Transposition cipher
      - Stream cipher
      - Block cipher
   (e) Explain extended Euclid's algorithm, and compute multiplicative inverse of 7 modulo-160.

2. (a) Explain the principle of arithmetic coding. Hence generate a decimal tag for the sequence: **SWISS_ MISS.** Also decode the decimal tag. **10**

   (b) What are the advantages of minimum variance Huffman codes over normal Huffman codes? Design a minimum variance Huffman code on the sourse with alphabet A={ a1, a2, a3, a4, a5} with respective probabilities {0.25, 0.2, 0.15, 0.3, 0.1}. **10**

3. (a) Explain lossy and lossless schemes for image compression. Give an overview of JPEG-2000. **10**

   (b) Explain Frequency masking, Temporal masking with respect to audio compression. Also explain how an MP-III encoder works. **10**

TURN OVER

4. (a) Compute the encrypted and decrypted text using RSA algorithm for the plaintext 88. Public key is (n, e)=(187,7). **10**

(b) Perform LZ-78 compression on the following string and find the compression ratio. 1000111101011110001111100011111 **10**

5. (a) Explain Triple-DES with two keys and the "Meet-in-the-middle-attack". **10**

(b) Consider a Diffie-Hellman scheme with a common prime q=11 and a primitive root α =2. **10**

(i) Show that 2 is primitive root of 11.

(ii) If user A has public key Y_A =9, what is A's private key X_A?

(iii) If user B has public key Y_B =3, what is the shared secret key K?

6. Write short notes on **(Any Four)**. **20**

(a) Digital Signatures

(b) H.264. Video coding standard

(c) Ethical Hacking

(d) Digital Immune Systems

(e) Elliptic curves for cryptography

COURSE : B.E. (Sem VII) (CBSGS) (All Branch)

QP Code: 788901

There is no correction or additional data required for question 2(a) in the subject " Data compression and Encryption " of semester VII EXTC engg.

Students are supposed to understand that probabilities of symbols have to be computed from the given strin

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BE EXTC SEM VII (CBSGS) 15/12/2016

Microware & Radar Engineering

Q.P. Code : 788802

(3 Hours) **Total Marks : 80**

Note : 1. Question **No. 1** is **compulsory.**
2. Out of remaining questions, attempt **any three** questions.
3. Assume suitable additional data if required.
4. Figures in brackets on the right hand side indicate full marks.

1. a) What is meant by RADAR range? **5**
   b) Explain the working of Hybrid ring. **5**
   c) Explain travelling wave tube as an amplifier. **5**
   d) Explain working of IMPATT. **5**

2. a) Match a load impedance ZL=60-j80 to a 50 Ω line using a double stub tuner. The stubs are open circuited and are spaced $\lambda/8$ apart. The match frequency is 2 GHz. **10**
   b) With a neat functional diagram explain the working principle of Cylindrical Magnetron. **10**

3. a) Discuss the various frequency bands and characteristics of microwaves. **10**
   b) Explain Doppler Shift and its role in pulsed and CW RADAR. **10**

4. a) Explain instrument landing system for aircraft navigation. **10**
   b) 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 1 m^2 If the minimum receivable power of the receiver is $2x10^{-13}$ Watt, what is the smallest diameter of the antenna reflector could have assuming it to be a full paraboloid with η=0.65. **10**

5. a) State various modes of Gunn diode and explain any one of them in detail. **10**
   b) With block diagram explain the MTI radar system. Give its limitations. **10**

6. a) Give the working principle difference between Two Cavity Klystron and Reflex Klystron. **10**
   b) Write a short note on rectangular waveguide. **10**

Sem-VII (EXTC) CBGS
Optical Comm. & Networks.

8/12/16.

Q.P. Code : 788702

(3 Hours) **[Total Marks : 80**

N.B. : (1) **Question no.1** is compulsory.
(2) **Attempt** any **three** questions from remaining questions.
(3) **Figures** to the right indicate **full** marks.

1. Attempt any **four** of the following :- **20**
a) Compare intermodal and intramodal dispersion.
b) Explain the basic working principle of Lasers.
c) Differentiate between the optical components isolator and circulator.
d) Explain the concept of Bragg Grating.
e) Define crosstalk .What are the types of crosstalk in optical transmission system?

2. a) Derive the expression for pulse spreading in intermodal dispersion. **10**
b) Draw architecture of SONET/SDH and explain in brief. **10**

3. a) Explain Material attenuation in optical fiber communication. **6**
b) What do you mean by bit interleaving and packet interleaving? **7**
c) Derive the expression of Power Penalty with impairment and without impairment. **7**

4. a) Explain SPM and how it is mitigated by GVD. **8**
b) Explain four waves mixing. **8**
c) Cornment on need of Wavelength stabilization. **4**

5. a) Explain important network management functions to the operation of the Network. **8**
b) What is micro bending loss? Explain how to minimize the these losses with neat sketch. **8**
c) How DWDM is different from WDM? **4**

6. Write a short notes on :- **20**
i) Link Budget
ii) Dispersion and OTDR
iii) Optical Access Network
iv) WDM network element and architecture

788500 EVP Sem VIII 24 NOV 2016

Q. P. Code : 788500

(3 Hours) Total Marks : 80

N. B. : (1) Q.1 is compulsory.

(2) Solve any three questions from remaining 6 questions

(3) Assume suitable data if it is required.

Q.1 (a) Justify /Contradict the following statements [20]
(i) K.L. transform is also called as method of principal component analysis
(ii) Entropy of an image is maximized by histogram equalization.
(b) Compare: Dilation and Erosion
(c) Explain deferment types of frames in video signal.

Q.2 (a) For following Digital image as shown in Fig.(2), find (i) Negative of the image
(ii) Bit plane slicing (iii)Perform contrast modification as per the characteristics given in fig 1
(iv) Draw histogram of new image [10]

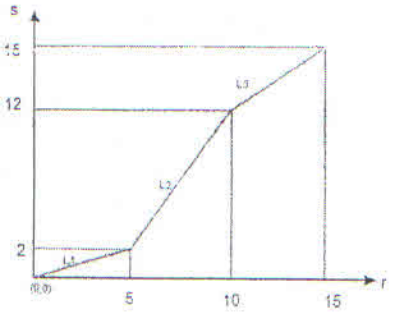


Fig.(1)

10	2	13	7
11	14	6	9
4	7	3	2
0	5	10	7

Fig.(2) Digital Image

(b)Explain dynamic range compression techinque with application . [05]
(c) Explain image deradation model in detail. [05]

Q.3 (a) Write short no on: Wiener Filter [08]

b) Find DFT of the following image [06]

0	1	2	1
1	2	3	2
2	3	4	3
1	2	3	2

(c) Given set of points use Hough transform to join these points [06]
A(1,4) , B(2,3) , C(3,1) , D(4,1) , E(5,0)

[TURN OVER]

Q.4 (a) Consider the following image [10]

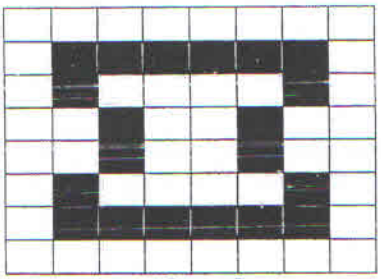
(i)Perform Low Pass Filtering
(ii) Perform Median Filtering
(iii) Find High pass fitered output.
(iv) compare result in(i) and (ii).

0	5	4
7	120	5
4	3	7

(b) What are the different motion estimation criteria for video signal.Explain Phase correlation method for motion estimation . [10]

Q. 5 (a) Explain image enhancement in frequency domain in detail [08]

(b) The input image and structuring element is as shown in the figure. Perform region filling Operation [08]



Input Image

Stucturing element

(c) Define edge in an image. Give different edge detection mask. [04]

Q.6 (a) Using Graph Theoretical approach, find the edge corresponding to the minimum cost path [06]

1 2 6

2 6 4

4 3 3

(b) Segment the following image using region split and merge technique .Draw quad tree representation for the corresponding segmentation. [06]

(c) What is unitary transform. [04]

(d) Explain in brief Hit or Miss Transform [04]

B.E. Extc Sem VII CBGS. Mobile Comm
1/12/16

Q.P. Code : 788602

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No.**1** is **compulsory.**
(2) Solve any **3** questions from remaining questions
(3) Assume suitable data if necessary stating it clearly.

1. (a) Explain the advantages of Software Defined Radio Communication Systems. **5**
   (b) Compare between FCA and DCA channel assignment strategies. **5**
   (c) What is Soft Handoff? **5**
   (d) What are the bandwidths and chip rates used in WCDMA and how they are compare with cdmaOne? **5**

2. (a) Consider a cellular system with S/I ratio of 18 dB. The frequency reuse factor is N = 7, calculate the worst case for signal-to-co-channel interference ratio. Is the frequency reuse factor 7 still being acceptable? If not, what is it? **10**
   Assume path-loss exponent as 4 in a mobile radio environment
   (b) With respect to trunking theory describe following terms: **10**
      i. Busy Hour
      ii. Traffic Intensity A,
      iii. Average call arrival rate & Average call duration H.
      iv. Erlang-B System & Erlang-C System.
      v. Trunking efficiency & Grade of Service (GOS)

3. (a) Describe GSM frame structure. **10**
   (b) Why is power control used in cdma2000 and WCDMA? **10**

4. (a) Draw a neat diagram of UMTS system architectures with interfaces. Explain in details **10**
   (b) What is Multi path Path Signal Propagation and Rake Receiver. **10**

TURN OVER

. (a) Draw a neat diagram of LTE Network Architecture and explain in details. **10**

(b) Why LTE uses OFDMA for DL & SC-FDMA (Single Carrier FDMA) for UL? **5**

(c) How do we use space-time block code (STBC) and space-time trellis code (STTC) **5**

: (a) Compare between 3GPP/LTE and Advanced LTE. **5**

(b) Describe the Knife-edge Diffraction model. **5**

(c) In a cellular system, if carrier frequency fc=900MHz and mobile velocity is 70km/hr. Compute the received carrier frequency if the mobile is moving **10**

[i] directly towards the transmitter,

[ii] directly away from the transmitter

[iii] In a direction which is perpendicular to the direction of arrival of the transmitted signal.
