ঙ্গবন্ধু Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science & Engineering

4th Year 2nd Semester B.Sc. Engineering Final Examination-2016

Course Title: Cryptography and Network Security **Course No: CSE 462**
Full Marks: 60 **Time: 3 Hours**

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

SECTION-A

1. (a) What is Cryptography? Explain three dimensions of security. 3
(b) Describe five types of access attacks. 5
(c) Describe the procedure of Transposition ciphers. 2

2. (a) Explain security policy and standards. 3
(b) Define attacks and threat. Explain three major components of worm attacks. 4
(c) Explain Denial of Services (DoS) attacks. 3

3. (a) Explain the requirements of message authentication. 3
(b) What is MAC? Explain its operation. 3
(c) What is intrusion detection? Describe the implementation of distributed intrusion detection agent. 4

4. (a) What is message authentication? Describe digital signatures model. 3
(b) What do you mean by hacker? Write down some intrusion techniques. 4
(c) What is virus? Explain the behavior of blocking software. 3

SECTION-B

5. (a) Explain symmetric encryption system. 2
(b) Explain the encryption and decryption process of RSA with corresponding key generation. 4
(c) If $p = 3$, $q = 11$ and public key $e = 7$ then calculate the private key d and perform encryption and decryption operation the message 2. 4

6. (a) Explain the process of Steganography to ensure multimedia security. 3
(b) What is Kerberos? Write down its requirements. 3
(c) Describe the operation of Kerberos. 4

7. (a) What is block ciphers? Explain an ideal block cipher. 3
(b) Show the difference between Block vs. Stream ciphers. 3
(c) What is Data Encryption Standard? Give an overview of DES encryption. 4

8. (a) Draw the IP security Architecture. 2
(b) Describe Encapsulating Security Payload (ESP) format. 3
(c) Draw the Secure Socket Layer (SSL) architecture. Also explain SSL record protocol operation. 5

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4th Year 2nd Semester B.Sc. Engineering Final Examination-2016

Course Title: Wireless Communication **Course No: CSE 480**
Full Marks: 60 **Time: 3 Hours**

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

SECTION-A

1. (a) Define GSM identities? Discuss the following identitiesbriefly: 5
(i) MSISDN, (ii) IMEI, (iii) IMSI and (iv)TMSI
(b) How MSRN routes the call? Briefly explain. 2
(c) Draw the geographical network structure of GSM. Briefly explain each of them. 3

2. (a) Which types of frequency is better suited for long and small distance communication? Why? 3
(b) Why duplex distance and carrier separation are necessary for wireless communication? 3
(c) Define Cell. Why the shape of the cell is hexagonal? Explain briefly. 4

3. (a) Define frequency reuse. Explain briefly how it can improve the capacity of a cellular system. 3
(b) Write down the differences between fixed and dynamic channel assignment. 3
(c) If a total of 33 MHZ of bandwidth is allocated to a particular FDD cellular telephone system which uses 25 KHZ simplex channels to provide full duplex voice and control channel. Compute the no. of channels available per cell if a system uses i) 4 cell reuse, ii) 7cell reuse, iii) 12 cell reuse. If 1 MHZ of the allocated spectrum is dedicated to control channel, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems. 4

4. (a) What do you know about the Modern Wireless Communication System? Illustrate the Growth of Cellular Telephone Subscriber throughout the World. 5
(b) Explain Bluetooth and Personal Area Networks (PANs). Illustrate an example of a PAN as provided by the Bluetooth Standard. 5

SECTION-B

5. (a) Briefly describe various types of transmission problems that may occur during the transmission of a radio signal. 3
(b) Briefly describe about cell splitting and cell sectoring. Determine: 3
i) Channel capacity for a cellular telephone comprised of 7 microcells with 10 channels/cell.
ii) Channel capacity if each microcell is split into 4 minicells.
iii) Channel capacity if each minicell is split into 4 microcells.
(c) What are the limitations of 1G and 2G mobile communication system? Provide some features of 3G, 4G and 5G technologies. 4

6. (a) Compare GSM and CDMA Technology. 3
(b) Explain the hand off process. What are the differences between soft hand off and hard hand off? 3
(c) Write short notes on: i) HLR, ii)VLR, iii)AUC and iv)BSC 4

7. (a) What is Wi-Fi? What are the advantages and disadvantages of Wi-Fi and WIMAX? 3
(b) What do you mean by Hotspots? How does Wi-Fi Work? Briefly explain. 4
(c) Briefly describe about WIMAX and Bluetooth Security Functions. 3

8. (a) Explain Doppler Shift and Doppler Effect. 3
(b) Write note on i) Coherence Bandwidth, ii) Cell Splitting, iii) Doppler Spread 7

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4th Year 2nd Semester B.Sc. Engineering Final Examination-2016

Course Title: Digital Image Processing | **Course No: CSE 452**
Full Marks: 60 | **Time: 3 Hours**

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

SECTION-A

1. (a) Define digital image. Explain the model for digital image representation. 4
(b) Define 4-adjacency and 8-adjacency with example. 2
(c) Consider the image segment shown in figure 1(c). Let, V= {0, 2} and compute the lengths of the shortest 4,8 and m path between p and q. If a particular path doesn't exist these paths, explain why? 4

	3	1	2	0	(q)
	2	2	1	1	
	1	2	1	1	
(p)	0	1	1	2	

Figure 1(c)

2. (a) Define spatial filtering method with general equation. Explain the effects of mask size. 4
(b) What do you mean by local and global histogram processing? 2
(c) If the continuous intensity values in an image have the PDF 4

$$P_r(r) = \begin{cases} \frac{2r}{(L-1)^2} & for\ 0 \le r \le L-1 \\ 0 & otherwise \end{cases}$$

Where, r is the continuous intensity values of the image. Then, show that the transformed/mapped image has a uniform PDF.

3. (a) Describe fundamental steps in image processing. 4
(b) (i) Show that the steps of histogram equalization for the following image of size 5x5 given in figure 3(b). 6

251	250	254	254	248
235	220	250	254	253
253	252	220	221	221
221	252	253	251	252
225	253	252	254	252

Figure 3(b)

(ii) Also perform the histogram matching operation for the specified histogram given below.

Zq	0	1	2	3	4	5	6	7
SpecifiedPz(Zq)	0	0	0	0.15	0.20	0.30	0.20	0.15

4. (a) With the reference to the gray-level transformation curve, justify that the log transform is a special case of power transform. 3

(b) Find out the image negative for the image segment in figure 4(b).

1	3	0	1	0
6	5	2	6	7
5	7	3	5	6
7	3	4	4	6
7	5	6	7	4

Figure 4(b)

(c) Perform the spatial correlation and convolution of a 2-D filter ω(x,y) with the image f(x,y) given in figure 4(c). 4

0	0	0	0	0
0	0	1	1	0
0	0	2	0	0
0	1	0	0	0
0	0	0	0	0

f(x,y)

1	2	3
4	5	6
7	8	9

ω(x,y)

Figure 4(c)

SECTION-B

5. (a) What do you mean by pepper and salt noise? 2

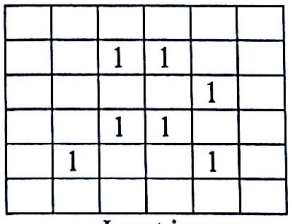
(b) Figure 5(b) shows a 8-bit noisy image of size 5x5. Now, show the result of filtering with a (i) harmonic mean filter of size 3x3,ii)geometric mean filter of size 3x3 6

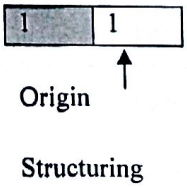
100	200	225	125	100
248	200	100	225	144
166	144	200	100	150
200	255	100	225	99
105	201	212	110	100

Figure 5(b)

(c) Determine the Hadamard matrix of order 8. 2

6. (a) What do you mean by Erosion and Dilation? Consider the input image in figure 6(a). Apply erosion and dilation process in the image. 4





Input image

Figure 6(a)

(b) What do you mean by data compression? Why is image compression necessary? 3

(c) What do you mean by fidelity criteria? Classify it and describe each. 3

7. (a) What is inter-pixel redundancy? How can it be reduced? 3

(b) Explain the relation between data redundancy and compression. 4

(c) Explain a general image compression system model with block diagram. 3

8. (a) What is Image Segmentation? Why image segmentation is necessary? 3

(b) Write the basic formulation of region-based segmentation. 2

(c) How thresholding can be applied in image segmentation? Illustrate the basic global thresholding algorithm for image segmentation. 5

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Course Title: Artificial Intelligence **Course No: CSE 450**
Full Marks: 60 **Time: 3 Hours**

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

SECTION-A

1. (a) Below are the two definitions of AI. Which one you will consider appropriate and why? 3
i) System that act humanly ii) Systems that act rationally.
(b) Write some advantages and disadvantages of AI. 2
(c) Discuss different types of knowledge and different levels of knowledge representation. 5

2. (a) What are semantics? Explain with example. 3
(b) What is proposition? Discuss about properties of statements. 4
(c) Represent the following English sentences into FOPL: 3
i) All lecturers earning 50000 taka or more per year pay taxes.
ii) Some Lecturers are weak now.
iii) No lecturer earns more than the VC.

3. (a) What is LISP? Find the output of the following expressions in LISP: 5
i) (append '(a) '(b c)) ii) (last '(a b c d)) iii) (member 'b '(a b d)) iv) (reverse '(a (b c) d))
(b) Represent the following sentences in first – order logic, using a consistent vocabulary: 5
i) Everyone studying in Koblenz is smart
ii) Someone studying in Landau is smart
iii)There is someone who studies at Landau and is smart
iv)Everyone in the world is loved by at least one person
v) Everyone has a mother

4. (a) What is Fuzzy Logic? Why is fuzzy logic used? Explain fuzzy logic system with example. 6
(b) Describe a model-based reflex agent with internal state. Give an example where it might be useful. 4

SECTION-B

5. (a) Define fact, relation and predicate. 3
(b) Describe about prolog execution rules. 3
(c) Discuss about string operations in prolog. 4

6. (a) Write down the goal of natural language processing. 4
(b) Discuss about the Chomsky hierarchy of generative grammars. 2
(c) Arrange a parse tree for the sentence"The silly robot moved the red pyramid to the big table." 4

7. (a) What is expert system? Mention some applications of an expert system. 3
(b) Differentiate between case-based reasoning and model-based reasoning. 3
(c) Explain rule-based system architecture. 4

8. (a) Write the applications of ANN. 2
(b) Discuss back propagation algorithm with example. 4
(c) Find out the differences among DFS, DLS, Bidirectional and IDS in terms of optimality, time and space complexity. 4