International Islamic University Chittagong

Department of Computer Science & Engineering

B.Sc. in CSE, Final Examination, Autumn 2024

Course Code: CSE-4875 **Course Title:** Pattern Recognition and Image Processing

Total Marks: 50 Time: 2 Hours 30 Minutes

[Answer all the following Questions. Figures in the right-hand margin indicate full marks]

CO Description

CO1 **Understand** basic image processing techniques for solving real problems

CO2 **Apply and demonstrate** image processing techniques for solving problems in computer science

CO3 **Evaluate** algorithms for higher level image processing.

Group - A

1(a)	What is bit-plane decomposition? Explain block coding algorithm with necessary example.	3	CO1	C1
1(b)	Finds the connected components from the following binary image using appropriate algorithm.	4	CO2	D3

1	1	0	1	1	1	0	1
1	1	0	1	0	1	0	1
1	1	1	1	0	0	0	1
0	0	0	0	0	0	0	1
1	1	1	1	0	1	0	1
0	0	0	1	0	1	0	1
1	1	0	1	0	0	0	1
1	1	0	1	0	1	1	1

(*a*) Binary image

OR

1(b)	Encode and decode the following 4 × 4, 8-bit image using LZW coding:	4	CO2	D3

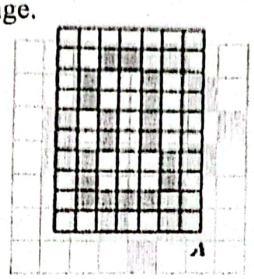
208	120	129	120
208	120	129	120
208	120	129	120
208	120	129	120

1(c)	If the original image is 256x256, 8 bits/pixel, it would occupy 65,536 bytes. After compression it occupies 6554/bytes. Calculate the compression ratio.	3	CO2	D3
2(a)	A source contains four symbols (i, i, u, c) with the corresponding probability of 0.3, 0.2, 0.4, and 0.1 respectively. Construct arithmetic coding to encode and decode a specific word.	4	CO2	D3

OR

2(a)	In the pattern recognition and classification there are four basic steps involved, which are sensing an image, segmenting the image, extracting the features from the segmented objects, and classification to recognize the specific object. Based on this procedure explain how you can segment and classify a specific object from an 8 bit color image.	4	CO2	D3

2(b)	"Template matching is a popular way to identify patterns from images" i. Justify the statement ii. Explain the formulation of correlation based algorithm with example.	4	CO2	C3
2(c)	Perform the region filling algorithm on the following image. Explain step by step how this algorithm works on this image.	2	CO2	D3



OR

2(c)	What does rotational invariant means in chain code? How can we make the chain code rotational invariant?	2	CO2	D3

Group - B

3(a)	An analytics produce a decision boundary with the equation $5.1\ x_1 - 0.3x_2 - 8.43$. The first and second decision functions are produced as $6.6x_1+1.2x_2-28.33$ and $5.6x_1+3.8x_2-10.0$ respectively. Determine the two mean vector (m_1, m_2) from the above information.	5	CO2	D3
3(b)	Write down the formulation of region in region oriented segmentation.	2	CO1	C2
3(c)	i. Represent the boundary in figure 1 with an eight directional chain code. ii. What does rotational invariant mean in this case? Make the chain code in a rotational invariant.	3	CO2	D3

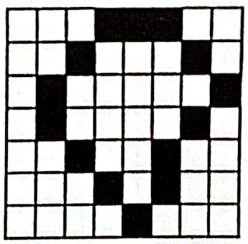
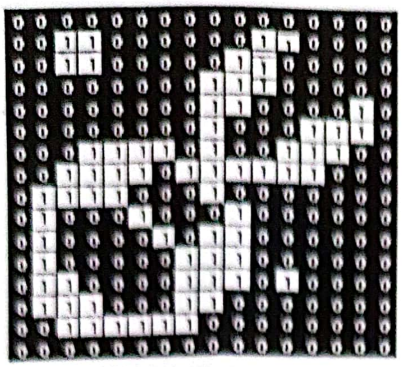


Figure 1

4(a)	What is Run-length-encoding (RLE)? How area can be calculated from run code?	3	CO1	C1

OR

4(a)	"Medial Axes Transformation(MAT) is used to identify the skeleton of an image"= Explain the MAT algorithm in brief.	3	CO1	C1
4(b)	Calculate the morphological eroson $A \ominus B$ operation. Where A denote the original image and B represent structuring element.	5	CO4	C3



A

B

4(c)	Define signature and polygonal approximation.	2	CO1	C1
OR				
4(c)	Describe Local Binary Pattern (LBP) in brief.	2	CO1	C1
5(a)	In the pattern recognition we have to extract the features from the object and that features are needed to recognize through recognizing algorithm. For recognizing a specific object, is it possible to recognize the object features through neural network that features are extracted from the object through local binary pattern? Justify your answer with a 4x4 8 bit color image.	5	CO3	D5
5(b)	What are the main significant of different operators i.e., Sobel in image processing? How these operators are used in the convolutional process to extract the features? How convolutional process plays a significant role in the convolutional neural network? Explain and justify your answer with a 4x4 8 bit color image.	5	CO3	D4
OR				
5(b)	In image processing edge information are extracted by analyzing the discontinuities around the neighboring pixels of an image. For that different operators are used in the image processing. There are many state of the art operators to detect the edges from the images; Sobel operator is one of them. Now explain step by step how the Sobel operators i.e., horizontal, vertical and diagonal are applied in the canny edge detection procedure to extract the different efficient edges from an image.	5	CO3	D4

International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Autumn-2024

Course Code: CSE-4805 Course Title: Social, Professional and Ethical Issues in Computing

Total marks: *50* Time: *2* hours *30* minutes

Group-A

			CO	DL
1.a)	i. Software developers are sometimes advised to "design for failure." Give some. Examples of what this might mean. ii. List two cases in which insufficient testing was a factor in a program error or system failure.	5	CO1	App
1.b)	Suppose you are on a consulting team to design a voting system for your state in which people can vote by logging on to a website. What are some important design considerations? Discuss some pros and cons of such a system. What is your opinion regarding this idea?	5	CO1	An
Or)	Discuss the ethical implications of software defects in the Therac-25 case. How did the presence of these defects result in life-threatening situations for patients? What responsibilities do software developers and manufacturers have in ensuring the safety and reliability of medical devices?			
2.a)	With respect to copyright issues for digital media and the Web, in what ways are entertainment companies victims? In what ways are entertainment companies villains?	5	CO2	U
2.b)	Debate whether software should be copyrightable or should be freely available for copying in context of Bangladesh.	5	CO1	App
Or)	Write Short Notes on the following: Copyrights, Moral rights, Trademarks			

Group-B

3.a)	Assume you are a professional working in your chosen field. Describe specific things you can do to reduce computer crime in your workplace.	5	CO2	U
3.b)	You are a manager at a health maintenance organization. You find that one of your employees has been reading people's medical records without authorization. What actions could you take? What will you choose? Why?	5	CO2	An
Or)	Gas stations, some grocery stores, and other stores do not require a signature for credit card purchases. Give arguments for and against this practice. Do you think retailers should always require a signature? Why or why not?			
4.a)	How do we deal with the dislocations and retraining needs that result when technology and the Internet eliminate jobs? What are the advantages and disadvantages of working from home or a coffee shop on a mobile device rather than at the traditional company office?	5	CO1	An
4.b)	Suppose your employer says you can use your smartphone for work purposes, but only if they can install software to erase the phone if it is lost or stolen or if you leave the company. Describe the pros and cons you will consider in deciding whether to accept this agreement. What is your decision?	5	CO1	An
Or)	Consider an automated system that large companies can use to process job applications. For jobs such as truck drivers, cleaning staff, and cafeteria workers, the system selects people to hire without interviews or other involvement of human staffers. Describe advantages and disadvantages of such a system.			
5.a)	What is meant by conflict of interest? What are the steps in confronting moral dilemma?	5	CO2	R
5.b)	Describe the various occupational crimes among the professional. Explain the risk benefit analysis in professional ethics.	5	CO3	U

International Islamic University Chittagong

Department of Computer Science and Engineering
B. Sc. Engineering in CSE
Final Examination, Autumn 2024

Course Code: **MGT-3601** Course Title: **Industrial Management**
Time: 2 hours 30 minutes Full Marks: 50

Part A

1.	a)	"A properly designed control system can help managers anticipate, monitor, and respond to changing circumstances." Explain the statement with the four basic purposes of controlling in an organization. Analyze different steps in control process.	**CO2**	**An**	**5**
1.	b)	One company uses strict performance standards. Another has standards that are more flexible. What are the advantages and disadvantages of each system?	**CO2**	**E**	**5**
2.	a)	Marketers market ten types of entities or things: goods, services, events, experiences, persons, places, properties, organizations, information and ideas. Briefly explain these ten entities with example. **Or** Chief Marketing Officers (CMO) perform five key functions within the organizations. Briefly discuss about those responsibilities.	**CO2**	**R**	**5**
2.	b)	Compare profit and sales variation with the change of time in different stages of Product Life Cycle. **Or** Which advertising media is more effective in your opinion to reach the target group of age 20s- FaceBook or YouTube? Defend your opinion.	**CO2**	**An**	**5**

Part B

3.	a)	Discuss the term *Operation Management*? Explain five P's of operation management.	CO2	An	5
3.	b)	Distinguish between product and service.	CO2	C	5
4.	a)	Describe the provisions for Health and Hygiene that must be maintained in an industry according to Bangladesh Labor Act 2006.	**CO2**	**R**	**10**
5.	a)	Discuss "Tender" with necessary required Documents and procedures. **Or** Write short notes on: Transformation process, Fixed Position Layout, Benchmarking, Persuasive Advertising	**CO3**	**U**	10

Product
Process
Planned
People
Program

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Autumn 2024

Course Code: **CSE 4743** Course Title: **Computer Security**

Time: 2 hours 30 minutes Full Marks: 50

(i) The figures in the right-hand margin indicate full marks

(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

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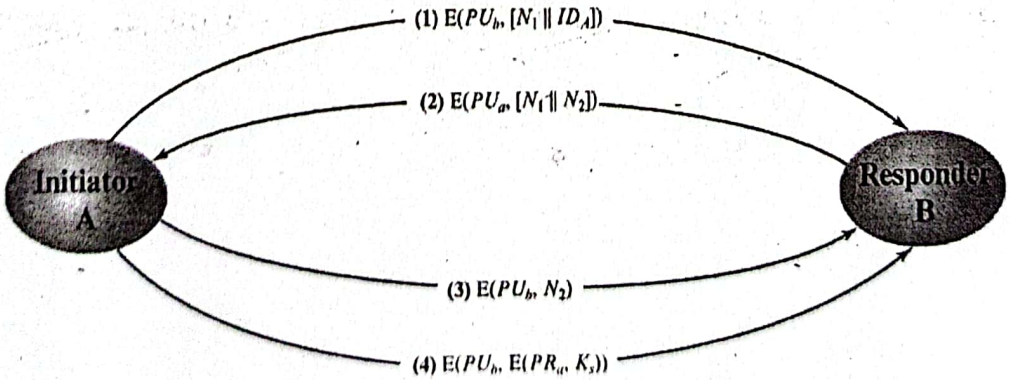
Part A

[Answer the questions from the followings]

1.	a)	Describe the difference between Confidentiality and Authentication in public key cryptosystems.	CO2	An	5
1.	b)	Explain the RSA algorithm with an example showing key generation and encryption/decryption process.	CO2	An	5
		OR (of 1b only)			
1.	b)	Given part of the RSA algorithm below, explain with suitable example what will happen and the weakness of the scheme if n is small: 1. Choose two large primes, p and q (typically 1024 bits). 2. Compute $n = p \times q$ and $z = (p-1) \times (q-1)$. 3. Choose a number relatively prime to z and call it d. 4. Find e such that $e \times d = 1 \ mod \ z$.	CO2	An	5
2.	a)	Given the following figure of secret key distribution explain the purpose of nonce, also explain how confidentiality and authentication are ensured.	CO1	An	5



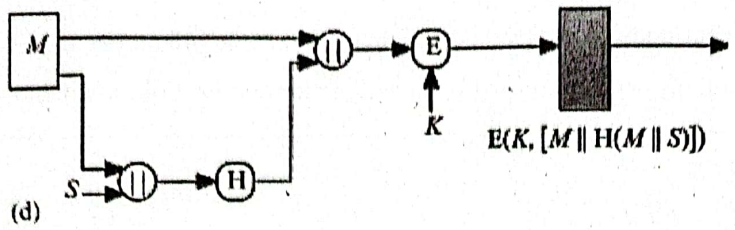
2.	b)	Explain the design and steps of Secure Hashing Algorithm-3 (SHA-3).	CO1	U	5
		OR (of 2b only)			
2	b)	Explain how origin, integrity and non repudiation are ensured in Digital signature.	CO1	U	5

change again

Part B

[Answer the questions from the followings]

3.	a)	Explain the requirements for a cryptographic hash function.	CO3	An	5
3.	b)	Complete the decryption and integrity checking part of the following figure, here S is the shared secret that both sender and receiver know.	CO2	App	5



(d)

4.	a)	What is IPSEC? Explain tunnel mode IPSEC with figure.	CO3	An	5
4.	b)	Explain security policy and security policy database with examples.	CO3	U	5
5.	a)	Elaborate the process of adding a new block to Blockchain.	CO2	An	5
5.	b)	How forged blocks can be detected in Blockchain?	CO4	U	5

OR

5.	a)	Identify three security threats in cloud computing and their corresponding countermeasures.	CO2	An	5
5.	b)	Explain how firewalls contribute to enhancing cloud security by protecting network resources.	CO4	U	5