...swer **SIX** questions, taking any **THREE** from each section.
   All questions are of equal values
iii. Use **separate answer script** for each section.

Section A

1.	a)	What do you mean by AI?	1
	b)	Write some advantages and disadvantages of AI.	3.67
	c)	Define Agent with a diagram.	1+2
	d)	What is environment? List and explain the properties of environment.	1+3

2. a) What is knowledge? How knowledge is represented in computer?   1+3

b) What is proposition? Discuss about properties of statements.   1+4

c) Represent the following English sentences into FOPL: 2.67
   I. All employee earning $1500 or more per year pay taxes
   II. Some employees are sick today.
   III. No employee earns more than the president.

3. a) What is LISP? Explain the basic building blocks of LISP.   1+3

b) Find the output of the following expressions in LISP: 4
   i) (car'(a b c))   ii) (cons' a'(b c))
   iii) (cdr'(a b c))   iv) (list 'a '(b c))

c) Briefly explain property list and mapping function.   3.67

4. a) What are the four stages of a fuzzy expert system?   1+2

b) What are Linguistic variables and Hedges?   2

c) Describe genetic algorithm with proper example.   6.67

Section B

5. a) What is prolog?   1

b) Define fact, relation and predicate.   3

c) Describe about prolog execution rules.   4

d) Discuss the issues identified with Hill Climbing and Simulated Annealing.   3.67

6. a) Define natural language processing.   1

b) Explain the steps in natural language processing.   5

c) Briefly explain about recursive transition network.   3

d) Arrange a parse tree for the sentence "The silly robot moved the red pyramid to the big table."   2.67

7. a) Write any two differences between traditional computer system programs and expert systems.   1+3

b) List and explain the steps in developing the expert system.   4

c) Discuss the following search Technique with the help of an example. Also discuss the benefits and shortcoming of each. I. Breadth First Search. II. Depth First Search.   3.67

8. a) What is Robotics? Write down the applications of robotics.   1+3

b) What is robot locomotion? Discuss various types of locomotion.   1+4

c) Describe ANN with example   2.67

N.B.:
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ii. All questions are of equal values
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Section- A

1. a) Define supervised and unsupervised classification. 2.67
    b) Classification is a two step process? Do you agree or not? Explain briefly. 3
    c) What is information gain? How can you make a decision tree based on the following table 6

age	income	student	credit_rating	buys_computer
<=30	high	no	fair	no
<=30	high	no	excellent	no
31...40	high	no	fair	yes
>40	medium	no	fair	yes
>40	low	yes	fair	yes
>40	low	yes	excellent	no
31...40	low	yes	excellent	yes
<=30	medium	no	fair	no
<=30	low	yes	fair	yes
>40	medium	yes	fair	yes
<=30	medium	yes	excellent	yes
31...40	medium	no	excellent	yes
31...40	high	yes	fair	yes
>40	medium	no	excellent	no

2. a) Define the terms loss, risk, decision rule and bayes risk. 3.67
    b) What is probability density function? Define minimum error rate classification. 2
    c) What is discriminant function? Explain how Bayesian can help for multi-classification problem? 6

3. a) What do you understand by overfitting and tree pruning? 2.67
    b) State the *Bayes Rule* and explain how it is applied to pattern classification problems. 3
    c) Define naive bayes classifier? For the above table 1(c) find class label if data sample X = (age <=30, Income = high, Student = yes). 6

    c

4. a) How can we measure accuracy, error rate, sensitivity and specificity, precision and recall for the following table? 6

Actual Class\Predicted class	cancer = yes	cancer = no	Total
cancer = yes	90	210	300
cancer = no	140	9560	9700
Total	230	9770	10000

b) What do you understand by Bagging, Boostin, Adaboost and Random Forest? Explain with appropriate example and equation. 5.67

Section - B

5. a) What is pattern clustering? How it differs fromclassification?
    b) Write a short note on General theory of Bayesian Parameter estimation. 5
    c) Discuss different attribute selection measures. 4.67

6. a) How a multi-layer neural network works? Explain with figure. 5
    b) What is SVM? Why is SVM effective on high dimensional data? 4
    c) What are the difference between SVM and Neural Network? 2.67

7. a) What is Hidden Markov Model? For the following figure calculate P({'Dry','Rain'}) 6
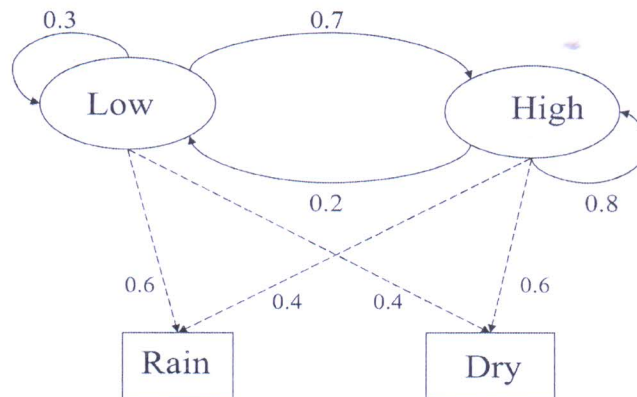
    b) What is Baum-Welch algorithm? 3
    c) What is the problem of the K-Means method? How can we solve this problem? 2.67

8. a) Explain Principal Component Analysis (PCA) with analytical treatment. 4
    b) Discuss Strength and Weakness of *CLIQUE*. 2.67
    c) What is the basic concept of partition algorithms? 4
    (d) Clustering is an unsupervised learning method. Do you agree or not. Why? 1

Course No. : CSE 462   Course Name: Cryptography and Network Security

Full Marks: 70   Times: 4 Hours

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

Section- A

|		
1.	a) Define Cryptography.	2
	b) What is the difference between passive and active security threats?	3
	c) Write different categories of security mechanisms in details.	4.67
	d) What is the difference between a block cipher and a stream cipher?	2
2.	a) List and briefly define categories of security services.	4
	b) Explain the ceaser cipher and monoalphabetic cipher.	4
	c) What are the essential ingredients of a symmetric cipher? Explain with appropriate figure.	3.67
3.	a) Draw the figure of DES Encryption Algorithm and Single Round of DES Algorithm.	4
	b) Perform decryption and encryption using RSA algorithm with p=3;q=11;e=7 and N=5.	5
	c) What is triple encryption?	2.67
4.	a) What was the original set of criteria used by NIST to evaluate candidate AES ciphers?	4.67
	b) If a bit error occurs in the transmission of a cipher text character in 8 bit CFB mode, how far does the error propagate?	3
	c) Briefly explain Digital Signature algorithm	4

Section - B

|		
5.	a) What is the principle elements of a public key cryptosystem?	3
	b) What are the difference between Conventional and Public Key Encryption?	3
	c) What types of attacks are addressed by message authentication? Explain briefly.	3
	d) Define weak collision property of a hash function.	2.67
6.	a) Describe different kinds of authentication functions.	6
	b) What is the role of a compression function in a hash function?	2.67
	c) What four requirements were defined for Kerbors?	3
7.	a) Define Malicious software.	1
	b) Explain the different types of firewall and its configurations in detail.	5.67
	c) Comment on password selection strategies and their significance.	5
8.	a) What is S/MIME ? Explain details.	3.67
	b) What protocols comprise SSL?	3
	c) Discuss different kinds of Viruses and their attacking process.	5

er **SIX** questions, taking any **THREE** from each section.
questions are equal values.
Use **separate answer script** for each section

SECTION-A

1.	a)	What is an image? How image captured and stored in a computer?	3
	b)	What are the properties of a good quality image?	4
	c)	Write down application of image processing in different field.	4.67
2.	a)	What are the errors converting image in digital form? Describe basic concept of sampling and quantization.	3
	b)	What is pixel? What do you a simple image formation model? Give an example.	3
	c)	Describe fundamental steps in image processing.	5.67
3.	a)	How we represent a digital image? Describe spatial and intensity resolution.	4.67
	b)	Describe neighbors of a pixel.	3
	c)	What do you mean by adjacency, connectivity, regions and boundaries in an image?	4
4.	a)	Define Image compression. Write the goal of image compression.	1+3
	b)	Discuss the two approaches of image compression.	3.67
	c)	What happens in Dilation and Erosion? Consider the following input image. Show the Dilated Image using the structuring element.	4
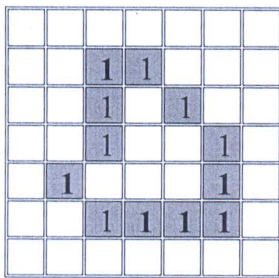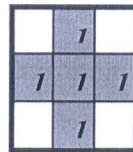
Input Image   Structuring Element

SECTION-B

5	a)	What is filtering? Explain different types of filtering techniques	3
	b)	Describe process of histogram equalization?	5
	c)	What happened when we equalize histogram of an image? Which type of image enhanced by histogram equalization?	3.67
6.	a)	How you detect boundary of an image in spatial domain.	4
	b)	What do you mean by bit plane? How image spitted into different bit plane?	4
	c)	Draw transfer function of negative of an image.	3.67
7.	a)	What do you mean by spatial filtering? Describe mechanics of spatial filtering.	4.67
	b)	What do you mean by image mask? Give example of image averaging mask.	4
	c)	How sharpen an image in spatial domain.	3
8	a)	List some applications of image Segmentation.	3
	b)	What is the basic principle of edge detection technique? List some commonly used edge detecting operators.	4
	c)	Discuss opening and closing morphological operation