

Seat No.: _____

Enrolment No. _____

NATIONAL FORENSIC SCIENCES UNIVERSITY**M. Tech AI&DS.****FINAL EXAM - REMEDIAL****Subject Code: CTMTAIDS SI P1****Date : 29/4/2024****Subject Name: Mathematical and Computational Foundation for Artificial Intelligence****Time: 02:00 PM to 05:00 PM****Total Marks: 100****Instructions:**

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

			Marks
Q.1		Attempt any three.	
	(a)	What is Orthogonal Matrix, Define and explain with example. Write any two properties of Orthogonal Set.	4+4
	(b)	Define an Orthonormal set and prove that $S = \{(1,0,0), (0,1,0), (0,0,1)\}$ is a Orthonormal Determine if the set S is linearly independent.	2+6
	(c)	Prove that matrix A is Orthogonal and the product of A and A is also orthogonal. $A = \frac{1}{\sqrt{3}} \begin{bmatrix} -2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & -2 & 2 \end{bmatrix}$	08
	(d)	Define null space. Compute the null space for the following matrix $D = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ and two special solution $Dx=0$	2+6
Q.2		Attempt any three.	
	(a)	Show that the least square solution to a problem $ax = b$ in one unknown is $\hat{x} = \frac{a^T b}{a^T a}$	08
	(b)	Show that slope b_1 of an estimated regression line ($y = b_0 + b_1 x$) in simple linear regression model is $b_1 = \frac{co - variance(x, y)}{variance(x, y)}$	08
	(c)	What is Single Value and its importance. Find the SVD of the following matrix $A = \begin{pmatrix} 4 & 5 \\ 6 & 7 \end{pmatrix}$	2+6
	(d)	Write the Gram-Schmidt algorithm and explain the importance of it.	6+2
Q.3		Attempt any three.	
	(a)	Definition of simple linear regression. Purpose and applications of simple linear regression. Assumptions of simple linear regression.	2+3+3

	(b)	How to interpret the slope and intercept of the regression line. How to use the regression line to make predictions. Write steps to evaluate the regression coefficients of the given set of values $X = [2,4,6,8]^T$ and $Y = [5,7,9,11,13]^T$	2+2+4
	(c)	How PCA is used for dimensionality reduction. Explain the relationship between eigenvectors, eigenvalues, and principal components in PCA.	3+5
	(d)	Define the term (Sum of squared error) SSE, (Mean of squared error) MSE, Root Mean Squared error (RMSE). MAE (Mean Absolute Error) and R2 Error. Explain each term by considering an example.	08
Q.4		Attempt any two.	
	(a)	Differentiate classification from regression. How low dimensional data are reduced into high dimensional data using kernel function in support vector machine.	07
	(b)	Write the steps for Linear discriminant projection for the given 2D dataset $X_1 = (x_1, x_2) = \{(4,1), (2,4), (2,3), (3,6), (4,8)\}$ $X_2 = (x_1, x_2) = \{(4,8), (6,7), (9,7), (5,10), (8,8)\}$	07
	(c)	Define polynomial, RBF, ANN kernel function. Minimum marginal distance determines hyper plane in SVM. Justify the answer.	07
Q.5		Attempt any two.	
	(a)	A box contains 5 red balls and 3 green balls. Two balls are drawn at random without replacement. Let X be the number of green balls drawn. Determine the possible values of X and find the number of points in the inverse images of X .	07
	(b)	Suppose the height of adult male students in a college follows a Gaussian distribution with a mean of 175 cm and a standard deviation of 10 cm. What is the probability that a randomly selected adult male student from this college has a height between 160 cm and 190 cm?	07
	(c)	Define Projection of a vector on another vector on a three dimensional space. Show that the projection of a vector v on vector u is $\text{proj}_u^v = \frac{uv}{\ u\ } u$	07

--- End of Paper---

Seat No.: _____

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NATIONAL FORENSIC SCIENCES UNIVERSITY

M. Tech. Cyber Security
Semester – II – MAY- 2024

Subject Code: CTMSCS SII P1**Date: 1/05/2024****Subject Name: Artificial Intelligence****Time: 2:00 PM to 5:00 PM****Total Marks: 100****Instructions:**

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. The figures to the right indicate full marks.

Marks**Q.1****Attempt any three.**

- (a) Explain the following in the context of Python. **08**
 a) List b) Tuple c) Set d) Dictionary
- (b) Calculate the regression coefficient and obtain the lines of regression **08**
 for the following data.
- | | | | | | | | |
|---|----|----|----|----|----|----|----|
| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Y | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
- (c) Explain the following with a proper Example. **08**
 1) Time series analysis 2) Unsupervised
 3) Regression 4) Reinforcement
- (d) 1) Do Matrix multiplication of the following. **08**

$$AB = \begin{bmatrix} 0 & 4 & -2 \\ -4 & -3 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 1 & -1 \\ 2 & 3 \end{bmatrix}$$

2) Do products of the given Matrix and Vector.

$$A\mathbf{x} = \begin{bmatrix} 1 & -1 & 2 \\ 0 & -3 & 1 \end{bmatrix} \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$$

Q.2**Attempt any three.**

- (a) Explain Decision Tree classification by considering the given example. **08**

Age	Income (rs)	Current Phone Age (Years)	Buy or not
25	50000	2	YES
36	60000	1	NO
50	90000	3	NO

45	75000	4	YES
30	40000	2	YES

- (b) A medical team tests 500 individuals for a particular viral infection. Out of these:

400 people are actually infected with the virus (positive cases).

100 people are actually healthy (negative cases).

For the infected individuals:

The test correctly identifies the infection (true positive) in 300 cases.

The test wrongly identifies a healthy person as infected (false positive) in 100 cases.

For the healthy individuals:

The test correctly confirms they are healthy (true negative) in 70 cases.

The test wrongly identifies a healthy person as infected (false positive) in 30 cases.

1. Construct a confusion matrix for this data.

2. Calculate the accuracy and precision.

- (c) Explain PCA with an appropriate example.

- (d) Explain that KNN is a lazy learner algorithm.

08

Q.3

Attempt any three.

- (a) Discuss the SVM algorithm working in detail.

08

- (b) Define perceptron neural network. Calculate the output y of three input neurons with a bias. The input feature vector is $(x_1, x_2, x_3) = (0.8, 0.4, 0.3)$ and weight values are $[w_1, w_2, w_3, b] = [0.2, 0.1, -0.3, 0.35]$. Use binary Sigmoid function as activation function.

08

- (c) Draw and describe ANN Architecture and CNN architecture and the differences between them.

08

- (d) Difference between LSTM and RNN.

08

Q.4

Attempt any two.

- (a) Write a short note on computer vision and its application in brief.

07

- (b) Explain NLP Text-prepossessing with appropriate example.

07

- (c) How to generate following output using python & other library from the given text "The quick brown fox jumps over the lazy dog." Explain output as well.

07

OUTPUT

[('The', 'DT'), ('quick', 'JJ'), ('brown', 'NN'), ('fox', 'NN'), ('jumps', 'VBZ'), ('over', 'IN'), ('the', 'DT'), ('lazy', 'JJ'), ('dog', 'NN'), ('.', '.')]

Q.5

Attempt any two.

- (a) How machine learning can be used to detect email spam and ham.

07

- (b) Explain the role of supervised learning algorithms in DDOS attack classification.

07

- (c) Explain Pen testing life cycle. How AI can support Pen testing?

07

--- End of Paper---

Seat No.: _____

Enrolment No. _____

NATIONAL FORENSIC SCIENCES UNIVERSITY

M.Tech. Cyber Security
Semester – I – May - 2024

Subject Code: CTMTCS SI P5

Date: 03/05/2024

Subject Name: Introduction to Forensic Science and Law

Time: 2:00 PM to 5:00 PM

Total Marks: 100

Instructions:

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

			Marks
Q.1		Attempt any three.	
	(a)	Define Copyright and delineate Copyright violation through a relevant case-study.	08
	(b)	Write short notes on (a) Fingerprint Bureaus (b) Police academies	08
	(c)	Explore the myriad tools and techniques utilized across diverse domains within forensic science.	08
	(d)	Explore the various forms of data representation, elucidating each with illustrative examples.	08
Q.2		Attempt any three.	
	(a)	Define Patent and analyze exclusions under Sections 3 and 4 of the Patents Act 1970.	08
	(b)	Elaborate on the distinctions between Civil and Criminal Justice systems.	08
	(c)	Explore Legal implications of Sections related to: i. Punishment for sending offensive messages through communication service ii. Punishment for dishonestly receiving stolen computer resource or communication device. iii. Punishment for identity theft. iv. Punishment for cheating by personation by using computer resource. v. Punishment for violation of privacy	08
	(d)	Define and differentiate between Cognizable Offences, Non-Cognizable Offences, Bailable Offences, and Non-Bailable Offences.	08
Q.3		Attempt any three.	
	(a)	Describe all the fundamental principles of forensic science.	08

	(b)	Write short notes on (a) National Crime Records Bureau (b) Bureau of Police Research and Development	08
	(c)	Illustrate the distinct branches of forensic science by giving pertinent examples of evidence and cases encountered within each field.	08
	(d)	Illustrate the hierarchical structure of Central and State Forensic Science Laboratories.	08
Q.4	Attempt any two.		
	(a)	Give an overview of the historical development of forensic science within India.	07
	(b)	Highlight the crucial significance of ethics for a forensic scientist.	07
	(c)	Elaborate the process of report writing.	07
Q.5	Attempt any two.		
	(a)	Examine Trademarks in detail.	07
	(b)	Define Plaintiff, Defendant, Litigation, Verdict, Appeal, Evidence, and Trial, elucidating their legal significance.	07
	(c)	Discuss the significance of the Information Technology (IT) Act 2000 in regulating cyberspace.	07

--- End of Paper---

NATIONAL FORENSIC SCIENCES UNIVERSITY**M.Sc. Digital Forensics and Information Security****Semester – III – January - 2024****Subject Code: CTMSDFIS SHI P1****Date: 03/01/2024****Subject Name: Network Security & Forensic****Time: 11:00 AM to 2:00 PM****Total Marks: 100****Instructions:**

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

		Marks
Q.1	Attempt any three.	
(a)	List all types of internetworking devices. Also explain any two application layer devices.	08
(b)	Compare and contrast between DNS and DHCP server with example.	08
(c)	Use the Vigenere cipher with keyword “NFSU” to encipher the message “SEMESTER EXAM”.	08
(d)	Discuss the merits and demerits of firewall with example.	08
Q.2	Attempt any three.	
(a)	Discuss all the phases of penetration testing with suitable example.	08
(b)	Explain dumpster diving and war driving.	08
(c)	What would you do if <i>nmap</i> port scans are blocked by network security administrator? How would you gather host information in such case?	08
(d)	Explain in details tools used for packet sniffing in network security and monitoring.	08
Q.3	Attempt any three.	
(a)	Given the two prime 5 and 7, the value of e is 5. Encrypt the message M = 2 , calculate the public key, private key, and the corresponding cipher text. (Hint: use RSA)	08
(b)	Encrypt the plain text “DFIS” with the key “MONARCHY” using Playfair cipher. Also, verify the plain text from the generated cipher text.	08
(c)	List and briefly explain the three security goals.	08
(d)	Explain virtual private network (VPN) with suitable example. How does it provide the end-to-end security?	08
Q.4	Attempt any two.	
(a)	Discuss in detail WEP and WPA protocol with suitable diagram.	07
(b)	Explain in detail security flaws in WLAN.	07
(c)	During a routine antivirus scan, a government system administrator	07

was alerted to suspicious files on a server. The files appeared to be part of a well-known root kit. The server did not host any confidential data other than password hashes, but there were several other systems on the local subnet that contained Social Security numbers and financial information of thousands of state residents who had filed for unemployment assistance. The administrative account usernames and passwords were the same for all servers on the local subnet.

Answer the following question on the above scenario:

- i. Was the server truly compromised?
- ii. If so, how was the system exploited?

Q.5

Attempt any two.

- | | | |
|-----|---|----|
| (a) | Discuss in detail network traffic capture analysis for Linux operating system. | 07 |
| (b) | What is network forensic? What are various network forensics instigation methods? | 07 |
| (c) | Differentiate the ARP poising and MAC flooding. | 07 |

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NATIONAL FORENSIC SCIENCES UNIVERSITY

M.Tech. Cyber Security
Semester – I – January - 2024

Subject Code: CTMTCS SI P5

Date: 10/01/2024

Subject Name: Introduction to Forensic Science and Law

Total Marks: 100

Time: 2:00 PM to 5:00 PM

Instructions:

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

	Marks
Q.1	Attempt any three.
(a)	Describe hierarchical setup of Central and State Forensic Science Laboratories. 08
(b)	Explain all the fundamental principles of forensic science and their respective significance in detail. 08
(c)	Write short notes on (a) Bureau of Police Research and Development 08 (b) Fingerprint Bureaus
(d)	Discuss the difference between Civil and Criminal Justice. 08
Q.2	Attempt any three.
(a)	Explain Copyright and Copyright infringement with appropriate case-study. 08
(b)	Explain Patent and discuss what cannot be patented under Section 3 and 4 of Patents Act 1970. 08
(c)	Discuss Trademarks. 08
(d)	Explain the following terms: Cognizable Offences, Non-Cognizable Offences, Bailable Offences, Non-Bailable Offences. 08
Q.3	Attempt any three.
(a)	Enlist various tools and techniques in different fields of forensic science. 08
(b)	Write short notes on (a) NIA (b) CCTNS 08
(c)	Describe different fields of forensic science with relevant examples of evidences and cases received in them. 08
(d)	How can data be represented in different forms? Explain with examples. 08

- Q.4** **Attempt any two.**
- (a) Elaborate the process of report writing. **07**
(b) Enlighten the importance of ethics in the life of a forensic scientist. **07**
(c) Provide insights into the history of forensic science in India. **07**
- Q.5** **Attempt any two.**
- (a) Discuss Section 43 of IT Act 2000 with appropriate case-study. **07**
(b) Discuss Section 66A,66B,66C,66D,66E. **07**
(c) Explain the following terms: Plaintiff, Defendant, Litigation, Verdict, Appeal, Evidence, Trial. **07**

--- End of Paper---

Seat No.: _____

Enrolment No. _____

NATIONAL FORENSIC SCIENCES UNIVERSITY

M.Sc. Cyber Security
Semester – I – January - 2024

Subject Code: CTMSCS SI P5

Date: 10/01/2024

Subject Name: Introduction to Forensic Science and Cyber Law

Time: 2:00 PM to 5:00 PM

Total Marks: 100

Instructions:

1. Write down each question on separate page.
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(b)	Explain Patent and Discuss what cannot be patented under Section 3 and 4 of Patents Act 1970. 08
(c)	Discuss Trademarks. 08
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- Q.4 Attempt any two.**
- (a) Discuss Section 43 of IT Act 2000 with appropriate case-study. 07
- (b) Discuss Section 66A,66B,66C,66D,66E. 07
- (c) Explain the following terms: Plaintiff, Defendant, Litigation, Verdict, Appeal, Evidence, Trial. 07
- Q.5 Attempt any two.**
- (a) Elaborate the process of report writing. 07
- (b) Enlighten the importance of ethics in the life of a forensic scientist. 07
- (c) Provide insights into the history of forensic science in India. 07

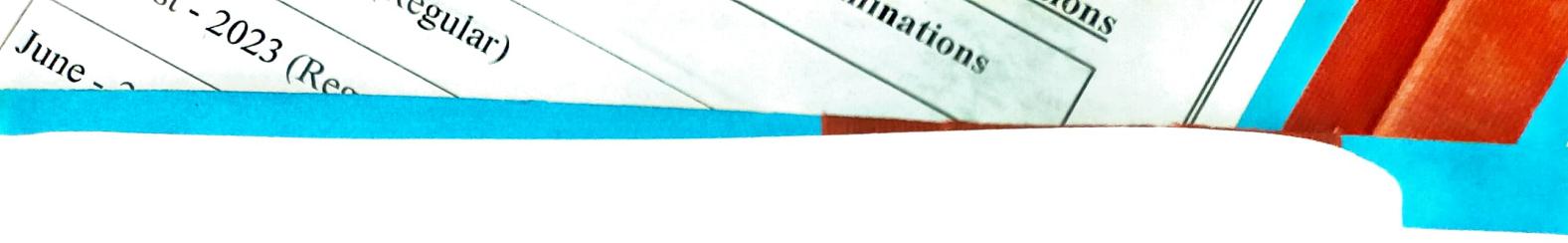
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NATIONAL FORENSIC SCIENCES UNIVERSITY
M.TECH. ARTIFICIAL INTELLIGENCE & DATA SCIENCE
Semester – I – January - 2024

Subject Code: CTMTAIDS SI P5**Date:10/01/2024****Subject Name: Introduction to Forensic Science
and Cyber Law****Time: 2:00 PM to 5:00 PM****Total Marks: 100****Instructions:**

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

	Marks
Q.1	Attempt any three.
(a)	(a) What do you understand from the term forensic science? Discuss the history and development of forensic science in India. 08
(b)	(b) Discuss the working and organizational setup of National Crime Records Bureau (NCRB) and Fingerprint Bureaus. 08
(c)	(c) Discuss Sec No. 66 of Cyber IT act with appropriate case-study. 08
(d)	(d) Discuss the basic principles of forensic science and their significance. 08
Q.2	Attempt any three.
(a)	(a) Discuss the organizational set up of central and state forensic science laboratories in India 08
(b)	(b) Discuss about the data depiction and process of forensic report writing in details. 08
(c)	(c) Discuss about the terminology of Law, Court, Judge, FIR and Punishment. 08
(d)	(d) Describe the international perspectives of forensic science. 08
Q.3	Attempt any three.
(a)	(a) Describe the criminal procedure code (CrPC) and explain the sections 291,291A, 292 & 293. 08
(b)	(b) What is the INTERPOL and FBI? Describe the structure and setup of INTERPOL and FBI. 08
(c)	(c) Write a note on police and detective training schools and its functions. 08
(d)	(d) Discuss the important tool and techniques useful in the different fields of forensic science. 08



Q.4

Attempt any two.

- (a) Explain the duties of forensic scientists in various discipline and discuss the code of conduct for forensic scientists 07
- (b) Explain the terms cognizable and non-cognizable offences. Bailable and nonbailable offences. 07
- (c) Describe the various contemporary disciplines of forensic sciences with their significance. 07

Q.5

Attempt any two.

- (a) Describe about various computer storage devices and list out the volatile vs non-volatile memory difference. 07
- (b) Enlist the sentences which the court of magistrate may pass and discuss about objective and kind of punishment. 07
- (c) Explain the Indian penal code sections 299, 300, 375 & 377 07

--- End of Paper---



Seat No.: _____

Enrolment No. _____

NATIONAL FORENSIC SCIENCES UNIVERSITY

M.Tech. Applied Data Science and Artificial Intelligence

Semester – I – January – 2024

Subject Code: ESMTDA SI P1

Date: 11/01/2024

Subject Name: Introduction to Data Science

Total Marks: 100

Time: 11:00 AM to 2:00 PM

Instructions:

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

	Marks
Q.1	Attempt any three.
(a)	08
(b)	08
(c)	08
(d)	08
Q.2	Attempt any three.
(a)	08
(b)	08
(c)	08
(d)	08
Q.3	Attempt any three.
(a)	08
(b)	08
(c)	08
(d)	08
Q.4	Attempt any two.
(a)	07
(b)	07
(c)	07
Q.5	Attempt any two.
(a)	07

- (b) List out and explain various charts used for data visualization. 07
- (c) List out and explain various libraries/tools available for data visualization. 07

--- End of Paper---

NATIONAL FORENSIC SCIENCES UNIVERSITY
M.Tech Artificial Intelligence and Data Science (AIDS)
Semester – I – January - 2024

Subject Code: CTMTAIDS SI P1**Date: 11/1/2024****Subject Name: Mathematical and Computational Foundations for Artificial Intelligence****Time: 11:00 AM to 2:00 PM****Total Marks: 100****Instructions:**

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

			Marks
Q.1		Attempt any three.	
	(a)	Define orthogonal matrix . prove that the product of any two orthogonal matrices is also orthogonal. Show that S is a orthogonal set where $S = \{(4,0,0,0), (0,7,0,0), (0.0.8,0), (0,0,0,9)\}$	2+3+3
	(b)	I. Define an orthonormal set and prove that $S = \{(1,0,0), (0,1,0), (0,0,1)\}$ is a orthonormal. II. Define L_1 and L_2 Norm. Find distance between $x=(1,-2,3)$ and $y=(4,6,-5)$ using L_2 Norm.	4+4
	(c)	Find the condition on b_1 , b_2 , and b_3 such that the systems $\begin{bmatrix} 1 & 4 & 2 \\ 2 & 5 & 8 \\ -1 & -4 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$ are solvable.	08
	(d)	Define nullspace of a matrix. Compute nullspace for the matrix $C = \begin{bmatrix} 1 & 2 & 4 & 5 \\ 3 & 5 & 7 & 2 \end{bmatrix}$ and two special solution to $Cx=0$.	08
Q.2		Attempt any three.	
	(a)	Apply the Gram-schmidt orthogonal process to obtain an orthonormal basis from the basis $B = \{\beta_1, \beta_2, \beta_3\}$ of R^2 where $\beta_1 = (1, -3, 4)$, $\beta_2 = (-4, 6, 8)$, $\beta_3 = (-2, 5, 3)$	08
	(b)	Solve the system of equations $x+y+z=1$, $4x+3y-z=6$, $3x+5y+3z=4$ by using LU decomposition. List the importance of LU decomposition over Gauss Elimination method.	6+2
	(c)	Solve the system of equations $6x_1+18x_2+3x_3=3$, $18x_1+12x_2+15x_3=19$, $3x_1+15x_2+3x_3=0$ by using Cholesky decomposition method.	08
	(d)	Define Singular value. Find the Singular value decomposition of A $\begin{pmatrix} 4 & 6 & 8 \\ 5 & 7 & -2 \end{pmatrix}$.	08
Q.3		Attempt any three.	
	(a)	Define Simple Linear Regression. How is simple Linear Regression different from Multiple Regression? Write steps to evaluate the regression coefficients of the given set of values $X = [4, 9, 10, 5, 2]^T$ and $Y = [1, 68, 51, 94, 32]^T$.	2+2+4

	(b)	Define the term (Sum of squared error) SSE, (Mean of squared error) MSE, Root Mean Squared error (RMSE), MAE (Mean Absolute Error) and R2 Error. Explain each term by considering an example.	08															
	(c)	Why dimensionality reduction method is important in ML. Given the data in Table, reduce the dimension from 2 to 1 using principal component algorithm.	08															
		<table border="1"> <thead> <tr> <th>Feature</th><th>obs1</th><th>obs2</th><th>obs3</th><th>obs4</th></tr> </thead> <tbody> <tr> <td>X1</td><td>4</td><td>5</td><td>7</td><td>8</td></tr> <tr> <td>X2</td><td>5</td><td>6</td><td>8</td><td>10</td></tr> </tbody> </table>	Feature	obs1	obs2	obs3	obs4	X1	4	5	7	8	X2	5	6	8	10	
Feature	obs1	obs2	obs3	obs4														
X1	4	5	7	8														
X2	5	6	8	10														
	(d)	Write the steps for Linear discriminant projection for the given 2D dataset $X_1 = (x_1, x_2) = \{(4,1), (2,4), (2,3), (3,6), (4,8)\}$ $X_2 = (x_1, x_2) = \{(4,8), (6,7), (9,7), (5,10), (8,8)\}$	08															
Q.4		Attempt any two.																
	(a)	Differentiate classification from regression. How low dimensional data are reduced into high dimensional data using kernel function in support vector machine.	07															
	(b)	Define polynomial, RBF, ANN kernel function. Minimum marginal distance determines hyperplane in SVM. Justify the answer.	07															
	(c)	Let the positively labeled data points are $\{\begin{pmatrix} 2 \\ 2 \end{pmatrix}, \begin{pmatrix} 2 \\ -2 \end{pmatrix}, \begin{pmatrix} -2 \\ 2 \end{pmatrix}, \begin{pmatrix} -2 \\ -2 \end{pmatrix}\}$ and negatively labeled data points are $\{\begin{pmatrix} 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ -1 \end{pmatrix}, \begin{pmatrix} -1 \\ 1 \end{pmatrix}, \begin{pmatrix} -1 \\ -1 \end{pmatrix}\}$ respectively. Draw an optimal hyperplane to classify the given data points.	07															
Q.5		Attempt any two.																
	(a)	In a pack of 52 playing cards, two cards are drawn at random simultaneously. If the number of white cards drawn is a random variable, find the values of the random variable and number of points in its inverse images.	07															
	(b)	i. Define probability density function (pdf). Write the pdf of Gaussian distribution and plot it with specific mean and variance. ii. Let us define the probability density that a person who is born today assuming that life span is 100 years as $p(t) = 3 \times 10^{-9} \times t^2 \times (100 - t^2)$. Find the probability that a person dies at age t_0 and find the probability that a person will die between the ages 70 to 80.	07															
	(c)	A die is tossed and a random variable x is defined by the amount of won (+) or lost (-) on the face of the die as given in the table. Find the cdf $F(x)$ <table border="1"> <thead> <tr> <th>pips on the die</th><th>win/loss</th></tr> </thead> <tbody> <tr> <td>1,4</td><td>+9</td></tr> <tr> <td>2</td><td>-3</td></tr> <tr> <td>3,6</td><td>-8</td></tr> <tr> <td>5</td><td>+6</td></tr> </tbody> </table>	pips on the die	win/loss	1,4	+9	2	-3	3,6	-8	5	+6	07					
pips on the die	win/loss																	
1,4	+9																	
2	-3																	
3,6	-8																	
5	+6																	

Seat No.: _____

Enrolment No. _____

NATIONAL FORENSIC SCIENCES UNIVERSITY
M.Sc. Digital Forensics an Information Security - Semester - I - Jan-2024

Subject Code: CTMSDFIS SI P2

Date: 12/01/2024

Subject Name: Cyber Security Audit and Compliance

Time: 11:00 AM to 2:00 PM

Total Marks: 100

Instructions:

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

Q.1	Attempt any three.	Marks
(a)	What are the auditing standards of ISO/IEC 27001/2?	08
(b)	Define terms with Example or Scenario I)Policies, ii)Framework, iii)Rules, iv)Laws.	08
(c)	Differentiate between I. Audit and Assessment. II. Difference Between Compliance Audit and Financial	08
(d)	Explain Business Continuity Planning and life Cycle of BCP.	08
Q.2	Attempt any three.	
(a)	Discuss IT audit Approaches for Change Management.	08
(b)	What systems does an audit cover? Explain steps involved in a security audit.	08
(c)	Discuss one Case study based on the importance of the audit.	08
(d)	What is risk analysis and risk response? Give example.	08
Q.3	Attempt any three.	
(a)	IT audit Approaches for Vendor and Third-Party Management.	08
(b)	What Are Controls and Why Are They Important?	08
(c)	Explain Disaster Recovery & planning of DR.	08
(d)	Discuss System/Application in IT Domain.	08
Q.4	Attempt any two.	
(a)	Expand and elaborate the following terms I. HIPAA, II. GDPR and III. PCIDSS.	07
(b)	Explain threat analysis in assessing IT security.	07
(c)	Discuss Risk Assessment and Mitigation.	07

Q.5

Attempt any two.

- (a) Explain Remote Access in IT Domains for audit.
- (b) Draw Structure of the standard of ISO 270001.
- (c) Write short note on Gramm-Leach-Bliley Act.

07

07

07

--- End of Paper---

Seat No.: _____

Enrolment No. _____

NATIONAL FORENSIC SCIENCES UNIVERSITY
M.Sc. Cyber Security
Semester – I – January - 2024

Subject Code: CTMSCS SI P2

Date: 12/01/2024

Subject Name: Cyber Security Audit and Compliance

Time: 11:00 AM to 2:00 PM

Total Marks: 100

Instructions:

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

Q.1	Attempt any three.	Marks
(a)	State the importance of Cyber Security Audit in the banking sector.	08
(b)	In case of any disaster or manmade attack that disrupts organization's IT infrastructure and critical services. The organization want to continue their business in that situation. What is the solution? Explain that in detail.	08
(c)	Discuss the Operations Security controls with respect to ISO 270001/2 standard.	08
(d)	Explain remote access domain and discuss how to maximize C-I-A in this domain.	08
Q.2	Attempt any three.	
(a)	Write a detailed note on Indian IT Act with their important sections.	08
(b)	What strategies can be used to minimized the risk? Explain them in detail.	08
(c)	How an organization can be in compliance? What they need to do?	08
(d)	i) State the difference between Audit and Assessment. ii) State the difference between Qualitative and Quantitative risk analysis methods.	08
Q.3	Attempt any three.	
(a)	Draw and discuss 7 domains of IT infrastructure in brief.	08
(b)	What do you mean by control? Explain that and their various types in detail.	08
(c)	Discuss various risk analysis strategies in detail.	08
(d)	Explain LAN to WAN domain and also discuss various control.	08

Q.4

Attempt any two.

- | | |
|--|--|
| (a) What do you understand by CAAT? Explain it's importance in audit with an example. 07 | |
| (b) Explain various disaster recovery strategies. 07 | |
| (c) Discuss base line security controls and its importance. 07 | |

Q.5

Attempt any two.

- | | |
|--|--|
| (a) You are IT manager in your organization and joined recently. Due to last audit non compliance you have been given charge to select and design proper security controls for your organization. What and How will you complete the task with respect to any applicable law and standard? Explain the process. 07 | |
| (b) Write a detailed note on HIPAA with its rules and safeguards. 07 | |
| (c) How to maximize C-I-A of user and LAN domain. 07 | |

--- End of Paper---

NATIONAL FORENSIC SCIENCES UNIVERSITY
Master of Technology, AI and DS (specialization in Cyber Security)
Semester – I – January – 2024

Subject Code: CTMTAIDS SI P2**Date: 12/01/2024****Subject Name: Network Security And Forensics****Time: 11:00 AM to 2:00 PM****Total Marks: 100****Instructions:**

1. Write down each question on separate page.
2. Attempt all questions.
3. Make suitable assumptions wherever necessary.
4. Scientific Calculator is allowed.
5. Figures to the right indicate full marks.
6. Parts of the question should be attempted at the same place.

			Marks
Q.1		Attempt any three.	
	(a)	You are the network administrator of a large organization. Justify the selection of specific internetworking devices to optimize network performance, considering scalability and security concerns.	08
	(b)	Differentiate between TCP and UDP. Explore potential vulnerabilities and attack scenarios for each protocol.	08
	(c)	Construct a Playfair cipher for following: Key: MTECH AIDS Plaintext: MTECH AI DS is future of NFSU.	08
	(d)	Provide an overview of SSL/TLS and its role in securing communication over the internet.	08
Q.2		Attempt any three.	
	(a)	During live network enumeration, unexpected challenges arise. Describe a specific scenario and outline how you would adapt your live forensics approach to overcome these challenges.	08
	(b)	Name and briefly describe some tools used for packet sniffing in network security and monitoring.	08
	(c)	Consider the use of RSA encryption with two distinct prime numbers, where $p=101$ and $q=97$. Additionally, the public exponent is $e=11$. Perform the following operations: (i) Calculate the RSA public key (e,n) for encryption and determine the corresponding private key (d) for decryption. (ii) Encrypt the message $M=3$ using the computed public key.	08
	(d)	Discuss various applications of hash functions in network security and cryptography. Explain any one Hash algorithm.	08

		Attempt any three.	
Q.3		<p>(a) Elaborate on the concept of Penetration Testing. Define the Network Pen Testing Life-Cycle and its key phases.</p> <p>(b) In an e-commerce platform, a customer purchases an expensive item and later denies making the transaction, attempting to get a refund while keeping the product. How can non-repudiation mechanisms be employed to ensure that the customer cannot falsely repudiate the transaction?</p> <p>(c) Describe the role of Public Key Infrastructure (PKI) in the context of digital signatures.</p> <p>(d) Alice and Bob decide to use the Diffie-Hellman key exchange algorithm to establish a shared secret key. They agree on the prime modulus $p=31$ and the base or generator $g=11$.</p> <p>a. Calculate the secret key for both Alice and Bob if Alice's private key is $a=7$ and Bob's private key is $b=9$.</p> <p>b. Determine the shared session key that Alice and Bob will use for secure communication.</p> <p>c. Illustrate the step-by-step process of the Diffie-Hellman key exchange algorithm.</p>	08 08 08 08
Q.4		Attempt any two.	
	(a)	Describe the OSCAR Methodology in penetration testing. Provide examples of scenarios where the OSCAR Methodology is particularly effective.	07
	(b)	Assume you are implementing a SIEM tool in a large organization. Describe the steps involved in the implementation process and how the tool enhances the organization's overall security posture.	07
	(c)	Investigate the concept of Evil Twin in wireless networks. Discuss potential threats and countermeasures against such attacks.	07
Q.5		Attempt any two.	
	(a)	During a confidential corporate board meeting conducted over a video conferencing platform, sensitive financial information is discussed. Unbeknownst to the board members, an employee is eavesdropping on the meeting. Discuss the potential consequences of such eavesdropping and propose measures to prevent it.	07
	(b)	Provide an in-depth overview of IEEE 802.11 protocols. Discuss the vulnerabilities associated with WEP and propose alternative security measures.	07
	(c)	Explain following terms: (i) HTTPS (ii) IPv6	07