

(3 Hours)

[Marks: 80]

- N.B.: 1) Question No. 1 is compulsory.
2) Answer any three out of the remaining questions.
3) Assume suitable data if necessary.
4) Figures to the right indicate full marks.

- | | Marks |
|--|-------|
| Q1. Attempt any four. | 20 |
| a. Explain Simplified Payment Verification (SPV) and write down its key features. | |
| b. What is mining and what is need of Mining in Blockchain? | |
| c. Explain how Bitcoin Transaction works. | |
| d. Explain Public Key and Private key in bitcoin wallet with its generation process. | |
| e. Explain peer to peer network architecture in Blockchain. | |
| Q2 a. Explain Merkle trees also explain what is importance of Merkle in Blockchain? | 10 |
| b. What is decentralized consensus? Explain Byzantine General's Problem in detail. | 10 |
| Q3 a. What is need of fork in Blockchain; differentiate between soft fork and hard fork. | 10 |
| b. Explain different types of wallets along with their merits and demerits; also explain factors which decide which type of wallets are used for any particular application. | 10 |
| Q4 a. Explain Pay to public key hash (P2PKH) transaction in detail with example. | 10 |
| b. Which cryptographic algorithm is used in Blockchain explain with example. | 10 |
| Q5 a. What is a node in Blockchain network? List and explain various types node in Blockchain. | 10 |
| b. Explain SVP nodes and privacy in detail. | 10 |
| Q6 Write short note on any four. | 20 |
| a. Assembling and selecting chain of blocks. | |
| b. Bitcoin relay network | |
| c. Blockchain Technology in Supply chain & logistics | |
| d. Blockchain Technology in Energy | |
| e. Bitcoin Transaction | |

P-CODE
5000

(3 Hours)

[Total Marks: 80]

- N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR.
- a Write a note on Lightweight Cryptographic algorithms. [5]
 - b Describe the various vulnerabilities and possible attacks on passwords. [5]
 - c Compare WEP, WPA, WPA-2. [5]
 - d Explain the role of steganography in data hiding. [5]
 - e Write a note on account harvesting. [5]
- 2 a Write a note on VPN security. [10]
b What is ethical hacking? Describe the steps of the ethical hacking process. [10]
- 3 a Explain various stages in penetration testing. [10]
b A user has received a link on SMS to claim the bonus prize money that he has won in a lottery. What action does the user take on receiving such SMS? Should he claim the amount by clicking on the link, or not? Justify. What are the various attacks that can happen through the SMS and how do we prevent these attacks? [10]
- 4 a Outline the top ten security projects in OWASP with their analysis. [10]
b What are physical unclonable functions? How are they implemented? Explain with the help of examples. [10]
- 5 a Write a note on session hijacking and management. [10]
b What is a side-channel attack? Explain various side-channel attacks with suitable examples. [10]
- 6 a Explain protocol vulnerabilities with the help of examples. [10]
b Explain phishing and pharming in detail. [10]

Q.P. CODE
15209

(3 Hours)

Total Marks: 80

- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any three questions out of remaining five questions

Q.1. (a) Find the Eigen values and Eigen vectors of $A = \begin{bmatrix} -5 & 2 \\ -7 & 4 \end{bmatrix}$ (5)

(b) A random variable X has following probability distribution (5)

X	0	1	2	3	4	5	6
P(X=x)	K	3K	5K	7K	9K	11K	13K

Find (i) Value of K and Mean of X

(ii) Find Cumulative Distribution function of X

(c) Compare discrete and continuous data. (5)

(d) Obtain the Hessian Matrix for the function (5)

$$Z = x_1x_2 + 9x_1 + 6x_3 - x_1^2 - x_2^2 - x_3^2$$

Q.2. (a) Find Singular Value of Decomposition of matrix $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \\ -1 & 1 \end{bmatrix}$ (10)

(b) Two samples of sizes 9 and 8 give the sum of squares of deviations from their respective means as 160 inches square and 91 inches square respectively. Test the hypothesis that the variances of the two populations from which the samples are drawn are equal at 10% level of significance. (10)
 (Given $f_{((8,7),0.05)}=3.73$, $f_{((8,7),0.95)}=0.286$)

Q.3. (a) The following table gives the random sample of marks obtained by students in two schools, A and B (10)

School A	63	72	80	60	85	83	70	72	81
School B	86	93	64	82	81	75	86	63	63

Is the variance of Marks of the students in School A is less than that of those in School B? Test at 5% level of significance.

(Given $F_{((8,8),0.95)}=0.291$)

(b) Explain types of data. Compare and contrast quantitative and qualitative data. (10)

Q.4. (a) What is a Graph? Explain any four types of Graph along with its uses. (10)

(b) Describe with example and action to be taken for the following (10)

- Data cleaning
- Irrelevant data
- Incorrect data
- Handle Missing Data
- Outliers

Q.5. (a) Minimize the function $f(x_1, x_2) = 4x_1 + 8x_2 - x_1^2 - x_2^2$ (10)
 subject to $x_1 + x_2 = 4$, $x_1, x_2 \geq 0$

(b) Find the minimizer of $f(x) = x^2 + \frac{54}{x}$ using bisection method in (2,5) (10)
 within a range of 0.3

- Q.6. Write short notes on (any four)
- (a) Four Fundamental Subspaces. (20)
 - (b) Linear Discriminant Analysis technique. (5)
 - (c) Principal Component Analysis (PCA) algorithm. (5)
 - (d) Machine learning Models. (5)
 - (e) Non gradient based optimization technique. (5)
 - (f) Time series graph. (5)

(3 Hours)

Total Marks: 80

(1) Question No. 1 is compulsory.

(2) Attempt any three questions out of remaining five questions

- (a) By using matrices, Solve the following system of linear equation $x+y+z=9, 2x+5y+7z=52, 2x+y-z=0$. (5)
- (b) Differentiate between Simple Random Sampling and Stratified Random Sampling (5)
- (c) Explain Scatter plots. (5)
- (d) Compare constrained and non constrained optimization Techniques (5)

(a) Find Singular Value of Decomposition of matrix $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \\ -1 & 1 \end{bmatrix}$ (10)

(b) A company gave an intensive training to its salesmen to increase the sales. A random sample of 10 salesmen was selected and the value (in lakhs of Rupees) of their sales per month, made before and after the training is recorded in the following table. (10)

Salesman	1	2	3	4	5	6	7	8	9	10
Before	15	22	6	17	12	20	18	14	10	16
After	17	23	16	20	14	21	18	20	10	11

Test whether there is any increase in mean sales at 5% level of significance.

Table Values: $t(\alpha, df, \text{test type})$

$t(0.05, 10, \text{one-tailed}) = 1.812$

$t(0.05, 9, \text{one-tailed}) = 1.833$

$t(0.05, 10, \text{two-tailed}) = 2.228$

$t(0.05, 9, \text{two-tailed}) = 2.262$

- (a) A survey was conducted with 500 female students of which 60% were intelligent, 40% had uneducated fathers, while 30% of the not intelligent female students had educated fathers. Test the hypothesis that the education of fathers and intelligence of female students are independent at 5% level of significance. (Given $\chi^2(1, 0.05) = 3.841$) (10)
- (b) What is a Graph? Explain any four types of Graph along with its uses. (10)

(a) Explain types of data. Compare and contrast quantitative and qualitative data. (10)

(b) Discuss the need for exploratory data analysis and explain types of Exploratory data analysis. (10)

(a) Minimize the function $f(x_1, x_2) = 4x_1 + 8x_2 - x_1^2 - x_2^2$ subject to $x_1 + x_2 = 4, x_1, x_2 \geq 0$ (10)

(b) Find the minimizer of $f(x) = x^2 + \frac{54}{x}$ using bisection method in (2,5) within a range of 0.3 (10)

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15343

Q.6.

Write short notes on (any four)

- (a) Four Fundamental Subspaces
- (b) Principal Component Analysis (PCA) algorithm.
- (c) Benefits of Dimensionality Reduction.
- (d) 5 Number Summary (the box and whisker plot.)
- (e) Gradient based optimization Techniques
- (f) Exponential function and their graph.

(20)
(5)
(5)
(5)
(5)
(5)

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TE / HONOR. MINOR / SEM-V / C-2019 / DEC. 2022

(3 Hours)

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- N. B. 1) Question No. 1 is compulsory.
2) Answer any 3 questions from the remaining 5 questions.
3) Assume suitable data wherever necessary.

Q1 Solve any four

20

- (a) Explain principles and strategies of Automation
- (b) Classify the sensors you have studied.
- (c) Describe the working of stepper motor.
- (d) Draw the block diagram of PLC Architecture.
- (e) State four applications of SCADA .
- (f) What are different types of displays used in DCS?

- Q2 (a) What are different types of material Handling technologies
(b) Explain Hierarchical levels in Automation

10

10

- Q3 (a) Describe various functions and new trends in SCADA system
(b) What do you mean by wireless sensors ? Explain

10

10

- Q4 (a) What is PLC ? Explain PLC based conveyor system .
(b) Explain the Rotary actuators in detail

10

10

- Q5 (a) Why plc is interfaced with DCS. Explain advantages.
(b) Explain in brief communication protocols.

10

10

- Q6 (a) Explain static and dynamic characteristics of sensors.
(b) Compare between PLC, DCS and SCADA.

10

10
