

TE / HONOURS / SEM-V / C-2019 / JUNE 2023  
MINOR

Duration: 3hrs

[Max 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** [20]
- a What are the various types of hackers? Explain each of them giving examples. 5
  - b Write a short note on lightweight cryptographic algorithms. 5
  - c Differentiate between Reconnaissance and Scanning. 5
  - d What are Side Channel Attacks? Can you give an example for the same? 5
  - e Differentiate between Cross Site Scripting and Cross Site Request Forgery citing examples. 5
  - f What is DVWA? Explain the applications of a framework such as DVWA. 5
- 2 a What is IP addressing? Explain the routing protocols in detail. 10
- b What is Hashing? Elaborate the significance of a Cryptographic Hash Function with neatly labeled diagrams (Wherever applicable). 10
- 3 a What are the various ways in which wireless networks are hacked? Highlight the steps for the same in detail. 10
- b What is Address Resolution Protocol? How is ARP Poisoning carried out? 10
- 4 a What is a Firewall? What are its various types? How are they different from Intrusion Detection Systems? 10
- b What are the various ways in which a network attack could be implemented? Explain the steps. 10
- 5 a What is a Denial-of-Service attack? Explain the various Denial of Service Attacks each in detail. 10
- b How is a password cracked in the real world? What are the various ways of cracking a password? Explain the techniques. 10
- 6 a What is a Virtual Private Network? Explain VPN Security in detail. 10
- b Explain the phases of Ethical Hacking in detail. Draw diagrams and cite examples wherever required. 10

TE / HONOURS - MINOR / SEM - V / C-2019 / JUNE 2023

(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) Discuss the values of a and b, for which the following system of equations has (a) no solution (b) a unique solution and (c) infinite number of solutions : (5)

$$\begin{aligned} x + 2y + 3z &= 0 \\ x + 3y + 5z &= 9 \\ 2x + 5y + az &= b \end{aligned}$$

- (b) The joint probability mass function of two discrete variables X and Y are given by  $P(X=x, Y=y) = c(2x+y)$  where X and Y can assume all integer in the range  $0 \leq x \leq 2, 0 \leq y \leq 3$  (5)

- (i) Find the value of c  
 (ii) Marginal density function of X (5)
- (c) Obtain the Graph of  $y = \log(2x)$  (5)
- (d) Find the stationary points of the function (5)

$$Z = 2x_1 + x_3 + 3x_2x_3 - x_1^2 - 3x_2^2 - 3x_3^2 + 17$$

- Q.2.** (a) Find the dimension and basis for the four fundamental subspaces for (10)

$$A = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$$

- (b) A random sample of 395 people were surveyed and each person was asked to report the highest education level they obtained. The data that resulted from the survey is summarized in the following table: (10)

	High School	Bachelors	Masters	Ph.d.	Total
Female	60	54	46	41	201
Male	40	44	53	57	194
Total	100	98	99	98	395

Are gender and education level dependent at 5% level of significance?

(Given  $\chi^2(3, 0.05) = 7.815$ )

- 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 nominal and ordinal data (10)

- Q.4. (a) What is Ogive. Construct less than Ogive and greater than Ogive using the give data (10)

Class	Frequency
100-120	2
120-130	5
130-140	9
140-150	14
150-160	7
160-170	3

- (b) Discuss the need for exploratory data analysis and explain EDA techniques (10)
- Q.5. (a) Minimize  $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$  starting from the point  $X_1=(0,0)$  using steepest descent method. (10)
- (b) 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)
- Q.6. Write short notes on (any four) (20)
- (a) Four Fundamental Subspaces (5)
- (b) Non linear dimensionality reduction-Multidimensional Scaling (5)
- (c) Principal Component Analysis (PCA) algorithm. (5)
- (d) 5 Number Summary plot (5)
- (e) Gradient based optimization Techniques (5)
- (f) Machine learning algorithms (5)