

ME

CSE

①

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 2011

M.E./M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

Computer Science and Engineering

P19MA101 – APPLIED PROBABILITY & STATISTICS

(Common to Information Technology)

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the question

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	If $V(x) = 4$, find $V(3x + 8)$, where X is a random variable.	2	K2	CO1
2.	The mean of a Binomial distribution is 20 and S.D is 4. Determine the parameters of the distribution	2	K1	CO1
3.	Show that the function $f(x, y) = \begin{cases} \frac{2}{5}(2x + 3y), & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0, & \text{otherwise} \end{cases}$ is a joint p.d.f of X and Y	2	K2	CO2
4.	Find the value of k , if $f(x, y) = k(1 - x)(1 - y)$ in $0 < x, y < 1$ and $f(x, y) = 0$ otherwise, is to be the joint density function	2	K2	CO2
5.	State any three characteristics of Estimators.	2	K1	CO3
6.	State Rao-Blackwell theorem.	2	K1	CO3
7.	State Type I and Type II Error.	2	K1	CO4
8.	Define χ^2 test.	2	K1	CO4
9.	Find the Eigen values of a Matrix $A = \begin{pmatrix} 1 & 2 \\ 2 & -2 \end{pmatrix}$	2	K1	CO5
10.	Write the quadratic form into matrix $3x_1^2 + 2x_2^2 - 2\sqrt{2}x_1x_2$	2	K2	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.	Questions	Marks	KL																					
11. a)	A discrete random variable X has the following probability distribution	16	K3	CO1																				
	<table border="1"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>P(X=x)</td> <td>A</td> <td>3a</td> <td>5a</td> <td>7a</td> <td>9a</td> <td>11a</td> <td>13a</td> <td>15a</td> <td>17a</td> </tr> </table>	x	0	1	2	3	4	5	6	7	8	P(X=x)	A	3a	5a	7a	9a	11a	13a	15a	17a			
x	0	1	2	3	4	5	6	7	8															
P(X=x)	A	3a	5a	7a	9a	11a	13a	15a	17a															
	i. Find the value a. ii. Find $P(X < 3)$, $P(0 < X < 3)$, $P(X \geq 3)$ iii. Find the distribution function of X(15)																							
	(OR)																							
b)	i. A continuous random variable X that can assume any value between $x=2$ and $x=5$ has a density function given by $f(x) = k(1 + x)$. Find $P[X < 4]$. ii. Find the MGF of a Poisson random variable and hence find its mean and variance.	8	K3	CO1																				
12. a)	i. The two lines of regression are $8x - 10y + 66 = 0$ $40x - 18y - 214 = 0$ the variance of x is 9.i)find the mean values of x and y and correlation coefficient between x and y.	8	K3	CO2																				
	ii. Compute the coefficient of correlation between X and Y using the following data:	8	K3																					
	<table border="1"> <tr> <td>X</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>Y</td> <td>4</td> <td>3</td> <td>1</td> <td>2</td> <td>6</td> <td>5</td> <td>7</td> </tr> </table>	X	1	2	3	4	5	6	7	Y	4	3	1	2	6	5	7							
X	1	2	3	4	5	6	7																	
Y	4	3	1	2	6	5	7																	
	(OR)																							
b)	i. Given the joint p.d.f of (X,Y) as $f(x,y) = \begin{cases} 8xy, & 0 < x < y < 1 \\ 0, & \text{otherwise} \end{cases}$ Find the marginal and conditional p.d.f of X and Y. Are X and Y independent?	8	K5	CO2																				
	ii. The regression equations are $3x + 2y = 26$, $6x + y = 31$. Find the correlation coefficient between X and Y.	8	K3																					
13. a)	i. In a random sampling from normal population $N(\mu, \sigma^2)$, find the Maximum Likelihood estimator for μ when σ^2 is known.	8	K3	CO3																				
	ii. Find the Maximum Likelihood estimate for the parameter λ of a poisson distribution of a sample size 'n' and find its variance.	8	K3																					

(OR)

- b) i. Explain Characteristics of Estimators. 8 K3
 ii. Compute the Regression line of y on x the following data: CO3

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

8 K5

Also obtain an estimate of y which should correspond on the average to $x=6.2$

14. a) i. Theory predicts that the proportion of beans in four groups A,B,C,D should be 9:3:3:1 . in an experiment among 1600 beans, the numbers in the four groups are 882,313,287 and 118. Does the experiment Support the theory. 8 K3 CO4
 ii. Fit a Poisson distribution to the following data and test the goodness of fit

X	0	1	2	3	4	5	6
F	75	72	30	7	5	2	1

8 K3

(OR)

- b) A Group of 10 rats fed on diet A and another group of 8 rats fed on diet, recorded the following increase in weight 16 K3

Diet A	5	6	8	1	12	4	3	9	6	10
Diet B	2	3	6	8	10	1	2	8		

CO4

Find if the variances are significantly different.

15. a) Find the Spectral Decomposition of a Matrix 16 K3 CO5

$$A = \begin{pmatrix} 13 & -4 & 2 \\ -4 & 13 & -2 \\ 2 & -2 & 10 \end{pmatrix}$$

(OR)

- b) i. $\Sigma = \begin{pmatrix} 4 & 1 & 2 \\ 1 & 9 & -3 \\ 2 & -3 & 25 \end{pmatrix}$ find $V^{1/2}$ and ρ 8 K3 CO5

- ii. Consider the random vector $X' = \{X_1, X_2\}$. The discrete random variable X_1 have the following Probability function

8 K3

$$x_1 : -1 \quad 0 \quad 1$$

$$P_1(X_1) : 0.3 \quad 0.3 \quad 0.4$$

and X_2 have the following probability function:

$$x_2 : 0 \quad 1$$

$$P_2(X_2) : 0.8 \quad 0.2$$



Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 5033

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

Computer Science and Engineering

P19CS101 / P19IT101 – ADVANCED ALGORITHMS

(Common to Information Technology)

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Differentiate between Omega and Big-O notation.	2	K1	CO1
2.	Define Time and Space Complexity.	2	K1	CO1
3.	Why Greedy Method cannot be applied to Matrix Chain Multiplication, justify?	2	K3	CO2
4.	What is Huffman Codes and which algorithmic method best suits to derive Huffman Codes?	2	K2	CO2
5.	Define Minimum Spanning Trees. Give an example.	2	K1	CO3
6.	What is a sparse graph? Give an example.	2	K1	CO3
7.	What is Linear Programming? Give an example.	2	K1	CO4
8.	Define Multi-threaded algorithms. Illustrate with an example.	2	K1	CO4
9.	Explain NP-Completeness with an example.	2	K2	CO5
10.	How can string matching can be performed?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Explain the role of algorithms in computing and discuss any randomized algorithm.	13	K3	CO1
	(OR)			
b)	Discuss the elements of the Divide and Conquer strategy and discuss the algorithmic complexity for Quicksort.	13	K3	CO1
12. a)	Discuss the elements of the Greedy strategy and explain the algorithm for Activity-selection problem.	13	K3	CO2
	(OR)			
b)	Discuss Rod-Cutting and give an algorithm to solve it along with the derivation of the time complexity.	13	K3	CO2
13. a)	Discuss and differentiate between Kruskal and Prims Algorithm along with its complexity.	13	K3	CO3
	(OR)			
b)	Give an algorithm for single source shortest path and discuss its complexity.	13	K3	CO3
14. a)	Explain an algorithm for Multithreaded matrix multiplication and also compare and discuss its complexity with single-threaded algorithm.	13	K3	CO4
	(OR)			
b)	Explain Least-Squares approximation problem and its time complexity in detail.	13	K3	CO4
15. a)	Discuss Rabin-Karp Algorithm and discuss its time complexity.	13	K2	CO5
	(OR)			
b)	Discuss Knuth-Morris-Pratt algorithm and discuss its time complexity.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	What is All-Pairs-Shortest paths problem, derive an algorithm to solve the problem and discuss its complexity	15	K5	CO3
	(OR)			
b)	Explain Merge-sort algorithm and improve it for multi-threaded Merge-sort algorithm and compare the algorithmic complexity for both.	15	K5	CO4

Reg.No.:								
----------	--	--	--	--	--	--	--	--



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 5034

M.E./M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

Computer Science and Engineering

P19CS102 / P19IT102 – MACHINE LEARNING TECHNIQUES

(Common to Information Technology)

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Explain different types of Learning/Training models in ML? Give a real life example in each type.	2	K2	CO1
2.	Give 2 advantages and disadvantages of decision trees?	2	K1	CO1
3.	What do you understand by the term curse of dimensionality?	2	K1	CO2
4.	Explain the E and M step in the EM algorithm	2	K1	CO2
5.	Give the name of the function used for adding datasets in R?	2	K1	CO3
6.	Explain how you can create a table in R without an external file?	2	K1	CO3
7.	What is Markov Decision Process?	2	K1	CO4
8.	Give the difference between Off-Policy and On-Policy Learning?	2	K2	CO4
9.	Give any non-linear activation function name and formulation.	2	K1	CO5
10.	Explain the working of LSTM networks.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11.	a) What is the role of hyperparameter C in SVM? (OR)	13	K2	CO1
	b) Illustrate decision tree classification with example.	13	K3	CO1
12.	a) Elaborate on K-nearest neighbor algorithm with suitable example (OR)	13	K2	CO2
	b) Cluster the following eight points (with (x, y) representing locations) into three clusters: A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9) Initial cluster centers are: A1(2, 10), A4(5, 8) and A7(1, 2). The distance function between two points a = (x1, y1) and b = (x2, y2) is defined as- $P(a, b) = x2 - x1 + y2 - y1 $ Use K-Means Algorithm to find the three cluster centers after the second iteration.	13	K5	CO2
13.	a) Let's say you need to scale data that has many outliers, how do you perform this operation in Scikit-Learn? (OR)	13	K1 K2	CO3
	b) Elaborate on Markov random fields in probabilistic graphical models.	13	K2	CO3
14.	a) State and explain about Q-Learning algorithm in reinforcement learning. (OR)	13	K2	CO4
	b) Draw a state diagram for a basic Reinforcement Learning problem on a real-life example.	13	K3	CO4
15.	a) Explain the working principle in convolutional neural network. (OR)	13	K2	CO5
	b) Explain the concept of multilabel classification with examples.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

- | Q.No. | Questions | Marks | KL | CO |
|--------|--|-------|----|----|
| 16. a) | For the below data, apply decision tree and find the information gain. | | | |

Day	Weather	Temperature	Humidity	Wind	Play ?
1.	Sunny	Hot	High	Weak	No
2.	Cloudy	Hot	High	Weak	Yes
3.	Sunny	Mild	Normal	Strong	Yes
4.	Cloudy	Mild	High	Strong	Yes
5.	Rainy	Mild	High	Strong	No
6.	Rainy	Cool	Normal	Strong	No
7.	Rainy	Mild	High	Weak	Yes
8.	Sunny	Hot	High	Strong	No
9.	Cloudy	Hot	Normal	Weak	Yes
10.	Rainy	Mild	High	Strong	Yes

15 K5 CO1

(OR)

- | | | | | |
|----|---|----|----|-----|
| b) | Explain spectral clustering and differentiate with other clustering method. | 15 | K2 | CO5 |
|----|---|----|----|-----|

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 5036

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

Computer Science and Engineering

P19CSE05 / P19ITE05 – MINING MASSIVE DATASETS

(Common to Information Technology)

(Regulation 2019)

Time : Three Hours

Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 – Evaluating
	K2 – Understanding	K4 – Analyzing	K6 – Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the two types of data mining?	2	K1	CO1
2.	Define MapReduce.	2	K1	CO1
3.	Mention the process of similarity search.	2	K2	CO2
4.	How is a nearest neighbor approach used?	2	K3	CO2
5.	What is data stream analysis?	2	K4	CO3
6.	How do you identify a spammy link?	2	K2	CO3
7.	List the role of community in a social network graph.	2	K3	CO4
8.	How do you count triangles in a graph?	2	K4	CO4
9.	What are the 3 types of online advertising?	2	K5	CO5
10.	Give some examples of recommendation systems.	2	K6	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	With diagrams and examples, explain the Map Reduce style of computing.	13	K1	CO1

(OR)

- | | | | | | | |
|-----|----|-----|---|---|----|-----|
| | b) | i. | Discuss in brief about the statistical limits on Data mining. | 7 | K2 | CO1 |
| | | ii. | Design a MapReduce algorithm to take a very large file of integers and produce as output , the count of the number of distinct integers in the input. | 6 | K3 | CO1 |
| 12. | a) | i. | What do you mean by shingling of documents? Explain. | 7 | K2 | CO2 |
| | | ii. | What is the connection between Minhashing and Jaccard Similarity? | 6 | K3 | CO2 |

(OR)

- | | | | | | | |
|-----|----|-----|---|----|----|-----|
| | b) | | What are Distance Measures? What are their types? Highlight the salient features of each with an example. | 13 | K3 | CO2 |
| 13. | a) | i. | How is filtering done on streams? Explain with an example. | 7 | K4 | CO3 |
| | | ii. | Explain the working of Flajolet-Martin Algorithm. | 6 | K3 | CO3 |

(OR)

- | | | | | | | |
|-----|----|-----|---|---|----|-----|
| | b) | i. | With a block diagram, explain the working of a data stream model. | 7 | K3 | CO3 |
| | | ii. | Explain the working of Alon-Matias-Szegedy Algorithm for Second Moments. | 6 | K3 | CO3 |
| 14. | a) | i. | What is betweenness? How to use the betweenness score to find communities in a graph? | 7 | K4 | CO4 |
| | | ii. | How does clustering of social network graphs work? Explain with an example. | 6 | K5 | CO4 |

(OR)

- | | | | | | | |
|-----|----|-----|---|----|----|-----|
| | b) | | With appropriate examples, explain the various issues related to sampling data in a stream. | 13 | K3 | CO4 |
| 15. | a) | i. | Explain the CUR decomposition method with an example. | 7 | K5 | CO5 |
| | | ii. | What is Adwords problem? Explain. | 6 | K4 | CO5 |

(OR)

- | | | | | | | |
|--|----|-----|--------------------------------------|---|----|-----|
| | b) | | Write short notes on | | | |
| | | i. | Issues related to advertising on web | 7 | K5 | CO5 |
| | | ii. | Collaborative filtering | 6 | K4 | CO5 |

PART – C

- | | | | | | | |
|-------|----|---|--|---------------------|----|-----|
| | | | | (1 x 15 = 15 Marks) | | |
| Q.No. | | Questions | | Marks | KL | CO |
| 16. | a) | What is a page rank? With an example, explain an efficient method to compute the page rank for a large graph. | | 15 | K4 | CO4 |
| | | (OR) | | | | |
| | b) | What are Recommendation systems? What are their types? Explain the working of each, listing their advantages and disadvantages. | | 15 | K5 | CO5 |

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 5035

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

Computer Science and Engineering

P19CS103 – SECURITY PRINCIPLES AND PRACTICES

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 – Evaluating
	K2 – Understanding	K4 – Analyzing	K6 – Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Compute GCD(2735, 572).	2	K3	CO1
2.	How indirect counting helps in solving combinatorial problems?	2	K2	CO1
3.	Compare stream cipher with block cipher with example.	2	K1	CO2
4.	Convert the Given Text “CRYPTOGRAPHY” into cipher text using Rail fence Technique.	2	K3	CO2
5.	Define symmetric and asymmetric encryption.	2	K2	CO3
6.	List four general characteristics of schema for the distribution of the public key.	2	K1	CO3
7.	What is the role of Ticket Granting Server in inter realm operations of Kerberos?	2	K2	CO4
8.	Why the leading two octets of message digest are stored in PGP message along with encrypted message digest?	2	K3	CO4
9.	What are the common techniques used to protect a password file?	2	K2	CO5
10.	What is application level gateway?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Illustrate a communication game to illustrate any security principles.	13	K3	CO1
	(OR)			
b)	Explain the important concepts of number theory for mathematical foundations in security.	13	K2	CO1
12. a)	i. Briefly explain the design principles of block cipher.	8	K2	CO2
	ii. Discuss in detail block cipher modes of operation.	5	K2	
	(OR)			
b)	i. Draw the general structure of DES and explain the encryption decryption process.	8	K3	CO2
	ii. Mention the strengths and weakness of DES algorithm.	5	K3	
13. a)	Discuss the Diffie-Hellman key exchange algorithm with its merits and demerits.	13	K3	CO3
	(OR)			
b)	Explain public key cryptography and when it is preferred and give a suitable example.	13	K2	CO3
14. a)	i. What is Kerberos? Explain how it provides authenticated services.	8	K3	CO4
	ii. Elaborate on SSL protocol stack.	5	K2	
	(OR)			
b)	Discuss about authentication protocols for internet security.	13	K2	CO4
15. a)	Elaborate on different ways of protecting programs and data.	13	K2	CO5
	(OR)			
b)	List and explain the following with examples			
	i. Software failures	8	K3	CO5
	ii. Computer crime	5	K3	

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Encrypt the message "PAY" using hill cipher with the following key matrix and show the decryption to get original plain text.	15	K3	CO2
	$K = \begin{bmatrix} 17 & 17 & 5 \\ 21 & 18 & 21 \\ 2 & 2 & 19 \end{bmatrix}$			
	(OR)			
b)	i. Explain key-distribution center with all aspects with neat diagram.	10	K3	CO2
	ii. Find $1113 \pmod{53}$ using modular exponentiation.	5	K4	CO1

