K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22

(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

Nov./Dec. 2021 ~~April - May 2022~~ conducted in March 2022

(M.Tech.) Program: Artificial Intelligence

Examination: FY Semester: I

Course Code: 1PCEC103 and

Course Name: Mathematical Foundation of Data Science

Duration: 03 Hours
Max. Marks: 60

Instructions:

(1)All questions are compulsory.

(2)Draw neat diagrams wherever applicable.

(3)Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	**12**		
i)	Justify the need of statistics from a data science perspective.	**2**	1	U
ii)	List out Matrices properties?	**2**	2	U
iii)	What is Matrix factorizations?	**2**	3	U

iv)	Define term – population, sample, parameter, statistics.	2	4	U
v)	Explain the concept of Random sampling?	2	4	U
vi)	What is p value?	2	5	U
vii)	Define f1 score.	2	6	U
viii)	What is the meaning of optimization?	2	6	A
Q.2	**Solve any four questions out of six.**	16		
i)	Explain elements of structured data with example.	4	3	A
ii)	What is sampling distribution? Explain with example.	4	4	A
iii)	Explain hypothesis testing in detail.	4	5	A
iv)	Explain confusion matrix, precision and recall with example.	4	6	A
Q.3	**Solve any two questions out of three.**	16		
i)	What is linear algebra? Explain application of linear algebra.	8	1	A
ii)	Why do we need Binomial distribution? How do you solve Binomial distribution?	8	4	A
iii)	Explain ANOVA test with example.	8	5	A
Q.4	**Solve any two questions out of three.**	16		
i)	Find the eigenvalues and eigenvectors of this symmetric 3 x 3 matrix	8	2	A

	$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 4 \\ 0 & 4 & 9 \end{bmatrix}$			
ii)	Differentiate Covariance and correlation in detail.	**8**	3	A
iii)	Explain local and global optima in detail.	**8**	6	A