

2025-12-17

ADVANCED PROBABILITY, LINEAR ALGEBRA AND OPTIMIZATION TECHNIQUES

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OPTIMIZATION TECHNIQUES

SRM UNIVERSITY A.P

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SRM UNIVERSITY – AP, ANDHRA PRADESH

End Term Examination, Dec 2025

[Question Paper ID: 010916]

Subject	: ADVANCED PROBABILITY, LINEAR ALGEBRA	Subject	: FIC 504
Title	AND OPTIMIZATION TECHNIQUES	Code	
Batch	: 2025	Max Marks	: 100
Degree	: M.Tech.	Duration	: 3 hours
Branch	: AIML, CS, DS	QP Set	: 2

1 (10 × 10 = 100 Marks)

Answer **all** Questions

Marks CO BL

1. Find the QR decomposition of the matrix

10 3 4

1	2	2
2	1	1
2	0	2

2. By the Gauss Jordan elimination method find the inverse of the matrix

10 3 3

1	1	2
2	1	1
1	2	1

Also find the LU decomposition of the above matrix.

3. Find the eigenvalues and the eigenvectors of the matrix

10 2,3 2

2	2	2
2	1	3
2	1	1

Find whether this matrix is diagonalizable or not?

4. Find whether the vectors (1,2,4), (3,2,2), (1,1,0) are linearly independent in $\mathbb{R}^3$.

10 2,3 2

Find whether they form a basis or not.

Can four vectors in $\mathbb{R}^3$ be linearly independent, give reasons. (4+3+3)

5. Find the Rank of the linear transformation given by

1	3	5
2	3	2

1	0	-3
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10 2,3 1

Is this linear transformation invertible?

6. Find a line $y = mx + c$ which is at the least distance from the points (1,2), (2,1), (3,2), (4,5) by performing linear regression. 10 3,4 2
7. Find the maximum and minimum value of $x^2 + y^2 + z^2$, where a point is situated on the plane $x + y + z = 3$. 10 3,4 3
8. Find the expectation of the random variable given by the exponential distribution with parameter $\lambda = 1$. Also find the variance for the exponential distribution. 10 1,2 1
9. Find the probability that in a throw of two dice, the sum of the numbers appearing is at least 5 and at most 7. 10 1,2 2
10. Find the expectation of the Normal distribution with parameters $\mu = 1, \sigma = 2$. 10 1,2 1

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