

DEPARTMENT OF MATHEMATICS
CHAUDHARY RANBIR SINGH UNIVERSITY

Session: 2023-24	
Part A – Introduction	
Subject	Mathematics
Semester	IV
Name of the Course	Basic Algebra & Quantitative Techniques
Course Code	B23- MAT-406
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	VOC
Level of the course	100-199
Pre-requisite for the course (if any)	NA
Course Learning Outcomes(CLOs):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none">1. Gain knowledge of the concepts of symmetric, skew-symmetric, Hermitian, skew-Hermitian, Linear dependence and independence of rows and columns of a matrix. Have knowledge of procedure and cognitive skills used in calculating rank of a matrix, eigen values, characteristic equation.2. Understand consistency of homogeneous and non-homogeneous system of linear equations and to learn cognitive and technical skills required for solving such type of problems using matrices.

30/11/23 *Ranbir Singh* *Ranbir Singh* *Ranbir Singh*

CLO 5 is related to the practical component of the course.

3. Develop cognitive skill to analyze the results of a sample using measures of central tendency and graphical representation (pie charts, frequency polygons,). To design and conduct a survey on a relevant topic of their choice (e.g., favorite leisure activities, dietary habits, etc.). Have procedural knowledge to solve linear programming problems used in everyday life.
4. Have the conceptual knowledge of Basics of operational research, Graphical solution, Simplex method.
5. Attain cognitive and technical skills required formulating and solving practical problems involving rank of a matrix, inverse of a matrix, homogeneous and non-homogeneous system of linear equations, straight lines, mean, mode, median, standard deviation and linear programming problems.

Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Internal Assessment Marks	20	10	30
End term Examination Marks	50	20	70
Examination Time	3 Hours	3 Hours	

Max. Marks:100

Part B- Contents of the Course

Handwritten signatures and notes:
 Sandeep, ~~_____~~, Ravinder, Meekes, A. S. J. A. L.

Instructions for Paper- Setter

The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Unit	Topics	Contact Hours
I	Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices, Elementary operations on matrices, Rank of a matrix, Inverse of a matrix, Linear dependence and independence of rows and columns of matrix.	12
II	Eigen values, Eigen vectors and characteristic equation of a matrix. Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations.	12
III	Mean, Mode, Median, Standard deviation, Variance. Bar graphs, Pie charts, Frequency polygons.	12
IV	Basics of operational research. Linear programming problems (LPP): Formulation, Graphical solution, Simplex method.	12
Practical		

Sumit *Sanjeev*
[Signature] *Ravish* *Neel*
[Signature] *A. Singh*

The examiner will set 4 questions at the time of practical examination by taking course learning outcomes (CLOs) into consideration. The examinee will be required to solve 2 questions. The evaluation will be done on the basis of practical record, viva-voce and written examination.

Problem Solving- Questions related to the practical problems based on following topics will be worked out and record of those will be maintained in the Practical Note Book:

1. Problems to find the rank of a matrix.
2. Problems to find the eigen values and eigen vectors of a matrix.
3. Problems to find the characteristic equation of a matrix.
4. Problems to solve homogeneous system of linear equations.
5. Problems to solve non-homogeneous system of linear equations.
6. Problems to solve Mean, Mode, Median.
7. Problems to solve Standard deviation and Variance.
8. Problems to solve linear programming problems.
9. Problems to solve Graphical solution.

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Revised

Needs

3/11/2024

V. Singh

Suggested Evaluation Methods

Internal Assessment:

- **Theory** 20
- Class Participation: 5
- Seminar/presentation/assignment/quiz/class test etc.: 5
- Mid-Term Exam: 10

- **Practicum** 10
- Class Participation: -
- Seminar/Demonstration/Viva-voce/Lab records etc.: 10
- Mid-Term Exam: -

End Term

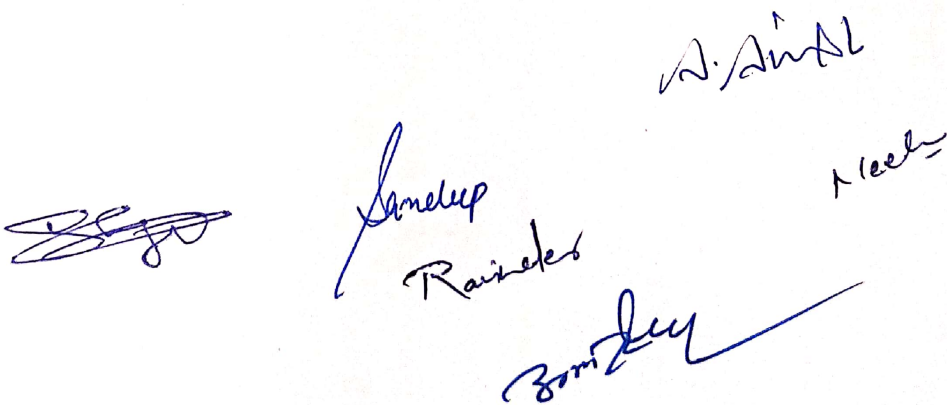
Examination:

- **Theory** 50
Written Examination
- **Practicum** 20
Lab record, viva-voce, write up and execution of the program

Part C- Learning Resources

Recommended Books/e-resources:

- 1) Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2022). *Linear Algebra* (5th edition). Prentice Hall of India Pvt. Ltd.
- 2) S.C. Gupta and V.K. Kapoor (2014). *Fundamentals of Mathematical Statistics*. S. Chand & Sons, Delhi.
- 3) K. B. Dutta (2004). *Matrix and Linear Algebra*. Prentice Hall of India Pvt. Ltd.
- 4) Kanti Swaroop operational Research , S. Chand(1978).
- 5) S.D Sharma. *Operation Research*, Kedar Nath Ram Nath (2014).
- 6) J. V. Dyke, J. Rogers and H. Adams (2011). *Fundamentals of Mathematics* (10th Edition), Brooks/Cole.
- 7) A. Tussy, R. Gustafson and D. Koenig (2010). *Basic Mathematics for College Students* (4th Edition). Brooks Cole.

Handwritten signatures and initials in blue ink, including a large signature on the left, 'Sandeep Raines' in the center, 'A. Insel' at the top right, and 'N. K. S.' at the bottom right.