PVKN GOVT. COLLEGE (A), CHITTOOR
DEPARTMENT OF MATHEMATICS

Certificate course

2021-22

Title: APPLICATION OF MATRICES

CERTIFICATE COURSE
CONDUCTED
BY THE
DEPARTMENT OF MATHEMATICS
ON
APPLICATION OF MATRICES

2021-22
(INSTITUTIONAL PERMISSION)

S.No.	RESOURCE PERSON	DESIGNATION
1	Smt. P. KAVITHA M.Sc., M.Phil,B.Ed.,SET	LECTURER IN MATHEMATICS

PVKN GOVT. COLLEGE (A), CHITTOOR
DEPARTMENT OF MATHEMATICS

The IQAC committee along with Chairperson and Coordinator, convened a meeting on 02-11-2021 and resolved to conduct "Certificate Course in the month of November according to the feasibility of the departments.

It is also resolved to submit the details as per the checklist well in advance by the departments who had given their consents.

Check list:

1. **IQAC Resolution**
2. **Department wise Resolution**
3. **Course structure and planning**
    a. **Date and timing schedule**
    b. **Course out comes, Syllabus**
    c. **Testing procedure**
    d. **Model Certificate**
4. **Students' enrolment list**
5. **Attendance register for 30 hours and more (Online/ Offline)**
6. **Audio visual Aids (if available), PPTs, Handouts/ Printed material**
7. **Conduct Practical Exam & Certificate distribution**
8. **Submission of Critical Analysis Report to IQAC**

Department Resolution Copy

Department of Mathematics

As per the circular issued by the IQAC dated 02-11-2021 the department of Mathematics has conducted a meeting on 04-11-2021 and unanimously resolved to conduct a Certificate course in the month of November with the duration of a minimum of 30 hours.

Notice Board

The Department of Mathematics is going to conduct a certificate course on **APPLICATION OF MATRICES** from 11-11-2021 with min 30 working hours. Interested candidates should come and register your names in the department on or before 10-11-2021

Student Enrolment list:

Register No	Name of the student	Group	Signature of the student
230303501			
230303502			
230303503			
230303504			
230303505			
230303506			
230303507			
230303508			
230306501			
230306502			
230306503			
230306504			
230306505			
230304501			
230304502			
230304503			
230304504			
230304505			
230304506			
230304507			

230304508			
230304509			
230304510			
230304511			
230304512			
230304513			
230304514			
230304515			
230304516			
230304517			
230304520			

Details of the Course

1.Mode: Blended Mode

2.Title: **APPLICATION OF MATRICES (Mathematics Students)**

3.No of Credits: 4

4.Semester and Year Offered: Even semester

5.Course Coordinator and Team:

Smt P.Kavitha
Email : porumamillakavitha@gmail.com

Aim: Matrices find extensive application across various fields including physics, computer graphics, economics, and engineering. They are utilized to represent complex systems, such as networks of connections in social sciences or electrical circuits in engineering. Matrices facilitate the solution of linear equations, aiding in optimization problems and data analysis through techniques like linear regression. Moreover, in computer science, matrices are fundamental in tasks like image processing, machine learning algorithms, and cryptography, showcasing their versatility and importance in modern technology.

Level:

a. Introductory
b. Estimated Effort: 12 hours/week
c. Subject: Mathematics
d. Institution: PVKN GDC(A)
e. Languages: English
f. Video Transcripts: English

2. **Brief description of modules/ Main modules**:

Duration of the course: 30 Hrs

Content of the course

1. **Introduction to Matrices**:
   - Definition of matrices and their basic properties.
   - Different types of matrices (e.g., square matrices, row and column matrices, symmetric matrices).

2. **Matrix Operations**:
   - Addition and subtraction of matrices.
   - Scalar multiplication.
   - Matrix multiplication (including dot product and cross product).
3. **Matrix Algebra**:
   - Transpose of a matrix.
   - Inverse of a matrix (including properties and methods for finding inverses).
   - Determinants and their properties.
4. **Systems of Linear Equations**:
   - Representing systems of linear equations using matrices and vectors.
   - Solving systems of linear equations using matrix methods (e.g., Gaussian elimination, matrix inversion, Cramer's rule).
5. **Eigenvalues and Eigenvectors**:
   - Definition of eigenvalues and eigenvectors.
   - Calculating eigenvalues and eigenvectors of a matrix.
   - Applications of eigenvalues and eigenvectors in various fields.
6. **Applications of Matrices**:
   - Applications in physics, engineering, economics, computer graphics, and computer science.
   - Examples of matrix applications in solving real-world problems, such as optimization, data analysis, image processing, and cryptography.

Learning Outcomes of the Course

1. **Understanding of Matrix Fundamentals**: Students will develop a solid understanding of the fundamental concepts of matrices, including their properties, operations, and representations.

2. **Problem-Solving Skills**: Through practice and application, students will acquire proficiency in solving problems involving matrices, including systems of linear equations, matrix operations, and determinants.
3. **Critical Thinking and Analysis**: Students will develop critical thinking skills by analyzing and interpreting mathematical results within the context of real-world problems, enabling them to make informed decisions and draw logical conclusions.
4. **Application in Various Fields**: Students will recognize the broad applicability of matrices across diverse fields such as physics, engineering, economics, and computer science, and understand how to leverage matrix techniques in solving problems within these domains.
5. **Advanced Concepts Mastery**: For advanced courses, students will demonstrate proficiency in advanced matrix concepts such as eigenvalues, eigenvectors, and matrix factorization techniques, and apply these concepts to solve complex problems.
6. **Numerical and Computational Skills**: Students will gain proficiency in using computational tools and software to perform matrix operations, analyze data, and solve numerical problems efficiently.
7. **Communication and Collaboration**: Through collaborative problem-solving exercises and presentations, students will enhance their communication skills and ability to work effectively in teams, articulating mathematical concepts and solutions clearly and concisely.
8. **Preparation for Further Study or Career**: Students will be prepared for further study in advanced mathematics, engineering, computer science, or related fields, or for careers where matrix techniques are essential, such as data analysis, machine learning, and financial modeling.

.

Suggested Readings (Reference books):

1**"Matrix Analysis and Applied Linear Algebra" by Carl D. Meyer** - This text covers both the theoretical aspects of matrix analysis and its applications in various fields. It's suitable for advanced

undergraduate or graduate students and includes numerous exercises and examples.

2.Applied Linear Algebra and Matrix Analysis" by Thomas S. Shores - This book emphasizes the practical applications of linear algebra, including topics such as data analysis, optimization, and differential equations. It's suitable for students in engineering, physics, and other applied sciences.

Signature of Course Coordinator

1.
2.

Signatures of Department In charge

QUESTION BANK

1. **Define a matrix and explain its components.**
2. **What is the order of a matrix? Provide an example.**
3. **Differentiate between a row matrix and a column matrix.**
4. **What are square matrices? Give an example.**
5. **Explain the concept of a symmetric matrix.**
6. **Define the transpose of a matrix.**
7. **What is the identity matrix? Give its properties.**
8. **Discuss the concept of a diagonal matrix.**

Eigenvalues and Eigenvectors:

1. **Define eigenvalues and eigenvectors of a matrix.**
2. **Explain the geometric interpretation of eigenvalues and eigenvectors.**
3. **Discuss the applications of eigenvalues and eigenvectors in real-world problems.**

Applications of Matrices:

1. **Discuss the role of matrices in computer graphics.**
2. **Explain how matrices are used in solving optimization problems.**
3. **Describe the application of matrices in data analysis and machine learning.**
4. **Discuss a real-world application where matrices are utilized extensively.**

This is just a sample of the types of questions that could be included in a question bank for a matrices course. Additional questions can be tailored to specific topics covered and the level of the course.

Attendance Sheet

S.No	Name of the student													
1	E. Vamsi													
2	ERUVARAM CHARAN													
3	GOLLAPALLI PRABHU													
5	K VISHNUVARDHAN													
6	KOORIMI JAGADEESH													
7	MC VINODKUMAR													
8	MADASI JAYA KUMAR													
9	N VENKATESH													
10	P SAI PAVAN													
11	P VAMSI													
12	PALYAM SARAVANA													
13	PAMBALA GANESH													
14	PATOORU GUNASEK													
15	P ASHOK KUMAR													
16	S MANOJ KUMAR													
17	S SURYA													
18	S VISHNUVARDHAN													
19	T AMARNATH													
20	TIRUPATHI NAGARAJA													
21	V DIILI BABU													
22	R SESHADRI													
23	V HAREESH													

Model Certificate

PVKN Govt College(A), Chittoor.
Department of Mathematics

Certificate of Participation

This is certify that Mr./Mrs. _____, has successfully completed the certificate course on "APPLICATION OF MATRICES" organized by the Department of Mathematics from to

Course-Coordinator **Dept. In charge**
Principal

CRITICAL ANALYSIS REPORT

The Department of Mathematics has been conducted a certificate course (Institutional Permission) on "**APPLICATION OF MATRICES**" from to with the minimum duration of 30 hours. According to the IQAC and Principals instruction the course have been started the feasibility and convenient of the hours for this academic year. The total students 30 were registered for this course and completed as per the schedule.

Conclusion: In conclusion, matrices are a versatile mathematical tool with wide-ranging applications across various domains. While they offer powerful techniques for modeling, analyzing, and solving complex problems, their application is not without challenges. Addressing issues related to computational complexity, memory management, and model assumptions is crucial for realizing the full potential of matrices in practical applications. Moreover, ongoing research and advancements in matrix theory and computational techniques are likely to further expand the utility of matrices in diverse fields and drive innovation in mathematical modeling and problem-solving.ta and the appropriateness of model assumptions.