MATRICES

A project report submitted in partial fulfilment for the award of **Bachelor of Science (B.Sc.)**

6th Semester end examination

March 2022.

Submitted by

VASUPILLI KONDA

HALL TICKET No.719130805113

Under the supervision of

Smt. Ch. MALLIKA

(M.Sc., M.Phil.,(Ph.D.)

Lecturer in Mathematics

Mrs. AVN College, Visakhapatnam.

DEPARTMENT OF MATHEMATICS & STATISTICS

Mrs. AVN College, Visakhapatnam.

March, 2022

CERTIFICATE

This is to certified that the project entitled **"MATRICES"** submitted by **VASUPILLI KONDA** for the award of Bachelor of Science (B.S.C.), Andhra University, Visakhapatnam, during the year 2021-22 is genuine record of the work done by him my supervision.

Place: Visakhapatnam

Date: 05-04-22

Project Director

(Smt. Ch. MALLIKA)

P. GANDHI, M.Sc.,M.Phil.
Lecturer in Statistics
Mrs. AVN COLLEGE
VISAKHAPATNAM-530 001
Chairman Board of Studies, A.U.

DECLARATION

I, hereby declare that project entitled **"MATRICES"** is an original work done by me and submitted to the Department of mathematics and Statistics, Mrs. AVN College, Visakhapatnam, for the fulfillment of the 6th Semester end examination. I also declare, that this or part of it has not been submitted to any other college for the award of degree.

V. Konda

(VASUPILLI KONDA)

Reg.No. 719130805113

Place: Visakhapatnam

Date: 05-04-22

ACKNOWLEDGEMENTS

A successful project report is not the result of sole effort of an individual. The present study has been carried out with the co-operation and contribution of many. To whom I am very much grateful.

Firstly, I acknowledge with a deep sense of gratitude, the inspiration, guidance and help I received from my Project Director Smt. Ch. Mallika , **Lecturer in** Mathematics, Mrs. AVN College, Visakhapatnam, for his stimulating and inspiring guidance and encouragement throughout the progress of this project work.

It is my duty to express my thanks to Mr.P.Gandhi, Head of the Department Lecturer in Mathematics, Sri Sk.Sharukh, Lecturer in Mathematics, Mrs.AVN College for their valuable comments, suggestions which are very useful for the preparation of this project work.

I am also thankful to Central library, Mrs. AVN College to permitting me to go through and collect relevant information from books and research articles.

I am also extending my thanks to co-students who are doing project work under my project Director for their co-operation.

KASARAPU AKHILA
HALL TICKET No.719130805044

CONTENTS

chapter – 1

Introdution:

An rectangular array for elements which can be expressed in rows and columns

In this topic we deal with higher order matrices in general and 3x3 matrices in

Arthur cayley [1821
– 1895]*was a british mathematician. Cayley worked as a lawyer for* 14 *years.*
– *hamilton theorem*
– *that every square matrix is a root of its own characteristics polynomial.*

Chapter-2

Priliminaries:

Special matrices:

1)*row matrix*

2)*column matrix*

3)*zero matrix (or) null matrix*

4)*identity matrix (or)unit matrix*

5)*square matrix*

1)*Row matrix:*

A matrix with only one row is called a row matrix (or row vector).

$Eg: [1\ 3\ \ -2]1x3$

2)*Column matrix :*

A matrix with only one column is called a column matrix(or column vector).

$Eg: \begin{bmatrix}2\\1\end{bmatrix} 2X1$

3)*zero matrix (or) null matrix :*

A matrix is said to be null matrix if every element of matrix is equal to zero the

$$Eg: \begin{bmatrix}0 & 0\\0 & 0\end{bmatrix} 2x2$$

4)*Identity matrix (or) unit matrix:*

If each non
− diagonal element of a square matrix is equal to zero and each diagonal eleme

$$Eg:\ I2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \quad I3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

5) *square matrix* :

A matrix in which the number of rows is equal to the number of columns , is cal

$$Eg: \begin{bmatrix} 1 & -1 \\ 0 & 4 \end{bmatrix}, \quad \begin{bmatrix} 2 & 0 & 1 \\ 4 & -1 & 2 \\ 7 & 6 & 9 \end{bmatrix}$$

Types of matrices:

1) *rectangular matrix*:

Any matrix Ais said to be rectangular matrix. If the number of rows and numb

$$Eg: A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} 2X3$$

2) *square matrix* :

Any matrix A is said to be square matrix , If the number of the rows and numbe

$$Eg: A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} 3x3$$

3) *principal diagonal matrix* :

If a is square matrix then the diagonal in A from the first element of the first

$$Eg: \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

4) *trace of a matrix* :

If a is a square matrix then the some of elements in the principal diagonal of

$$Eg: p = \begin{bmatrix} 2 & 6 & 1 \\ 0 & 5 & 3 \end{bmatrix}, \quad Q = \begin{bmatrix} 2 & 6 & 1 \\ 0 & 5 & 3 \end{bmatrix}$$

Matrices P and Q are equal.

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

Matrices A and B are not equal because their dimensions or order is different.

Eg: given that the following matrices are equal, find the values of x, y and z.

$$\begin{bmatrix} x+3 & -1 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 6 & y \\ z-3 & 5 \end{bmatrix}$$

Sol: equate the corresponding elements and solve for the variables

$$X + 3 = 6$$

$$X = 3$$

$$Y = -1$$

$$z - 3 = 4$$

$$z = 7$$

Sum of two matrices :

Let A and B be matrices of the same order, then the sum of a and B, denoted by + B, is defined as the matrix of the same order in which each element i the sum

$$Eg: A = \begin{bmatrix} 3 & 2 & -1 \\ 4 & -3 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & -2 & 7 \\ 3 & 2 & -1 \end{bmatrix} \text{ then}$$

$$A + B = \begin{bmatrix} 3+1 & 2+(-2) & -1+7 \\ 4+3 & -3+2 & 1-1 \end{bmatrix} = \begin{bmatrix} 4 & 0 & 6 \\ 7 & -1 & 0 \end{bmatrix}$$

Matrix Operations :

Addition and subtracting matrices :

A matrix can only be added to [or subtracted from] another matrix if the two m

$$Eg: A = \begin{bmatrix} 1 & 5 \\ -4 & 3 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 \\ 4 & -1 \end{bmatrix}$$

$$A + B = \begin{bmatrix} 1 & 5 \\ -4 & 3 \end{bmatrix} + \begin{bmatrix} 2 & -1 \\ 4 & -1 \end{bmatrix}$$

$$= \begin{bmatrix} 1+2 & 5-1 \\ -4+4 & 3-1 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 4 \\ 0 & 2 \end{bmatrix}$$

Eg: 2:

$$A = \begin{bmatrix} 4 & 5 & 6 \\ 2 & 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 2 & 4 & 6 \\ 1 & 2 & 3 \end{bmatrix}$$

$$A - B = \begin{bmatrix} 4 & 5 & 6 \\ 2 & 3 & 4 \end{bmatrix} - \begin{bmatrix} 2 & 4 & 6 \\ 1 & 2 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} 4-2 & 5-4 & 6-6 \\ 2-1 & 3-2 & 4-3 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

Multiplication matrices:

We can only multiply matrices if the number of columns in the first matrix is t

$$Eg: A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 0 & 1 \end{bmatrix}, B = \begin{bmatrix} 3 & 1 \\ 0 & -1 \\ -2 & 3 \end{bmatrix}$$

$$C = A X B$$

$$C = \begin{bmatrix} 1X3 + 2X0 - 1X - 2 & 1X1 + 2X - 1 - 1X3 \\ 2X3 + 0X0 + 1X - 2 & 2X1 + 0X - 1 + 1X3 \end{bmatrix}$$