



Course Syllabus  
Gyanmanjari Science College  
Semester-1 (B.Sc.)

**Subject :** Mathematics-BSCMA11305

**Type of course :** Minor

**Prerequisite :** Detail of Matrix and its Application

**Rationale:** Matrices provide a concise and efficient way to represent and solve systems of linear equations. By organizing the coefficients and variables into matrices, the Gaussian elimination method and other matrix-based techniques can be employed to solve these systems.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks			Total Marks
CI	T	P		C	SEE	CCE	
			Theory		MSE	ALA	
4	0	0	4	100	30	70	200

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.*



**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1.	<b>Assignment:</b> Unit wise assignments will be given and students will prepare assignments and upload to Moodle.	10
2.	<b>Quiz :</b> Faculty will assign Unit wise 10 MCQs and students need to solve MCQs and select right answer in Moodle.	10
3.	<b>Presentation</b> Faculty will assign topics and students will prepare Presentations(Slideshow/video) and upload them to Moodle.	10
4.	<b>Puzzle :</b> Various problems based on series, geometry, clock, calendar, etc.will be assigned to the students. Students need to submit Mathematical logic and Solution via moodle.	10
5.	<b>Problem Solving:</b> Faculty will Provide a problem definition that students have to prepare a chart form in hard copy and upload it to moodle.	10
6.	<b>Theme based poster :</b> Faculty will provide specific theme to students and students will prepare specific theme based poster.	10
7.	<b>Brain writing :</b> Faculty will provide a picture, text passage or video clip, student observe,analyze and write about it.	10
Total		70



**Course Content:**

Unit No.	Course content	Hrs	% Weightage
1.	<b>Chapter - 1 : Introduction to Matrix</b> <ul style="list-style-type: none"> <li>• Special types of matrices: Null, Identity, Diagonal, Triangular, Symmetric , Skew-Symmetric , Hermitian, Skew- Hermitian.</li> <li>• Matrix Operations : Addition , Multiplication , Transpose.</li> </ul>	10	25
2.	<b>Chapter - 2 : Rank of Matrix</b> <ul style="list-style-type: none"> <li>• Adjoin and their properties.</li> <li>• Solution of the matrix Equation <math>Ax = b</math>.</li> <li>• Row reduced Echelon form of matrix and Matrix inversion using it.</li> <li>• Linear dependence and independence of rows and columns of a matrix.</li> <li>• Row rank , column rank and rank of a matrix.</li> </ul>	13	25
3.	<b>Chapter – 3 : Application of matrix</b> <ul style="list-style-type: none"> <li>• Eigenvalues, eigenvectors and the characteristics equation of a matrix.</li> <li>• Cayley- Hamilton theorem and its use in finding the inverse of a matrix.</li> <li>• Application of matrices to a system of a linear equation.</li> <li>• Theorems on the system of consistency of linear equations.</li> </ul>	12	25
4.	<b>Chapter – 4 : Reduction Formulae</b> <ul style="list-style-type: none"> <li>• Solution of system linear equation in three variables by Cramer's rule.</li> <li>• Reduction Formulas : <math>\int \sin^n x dx</math> , <math>\int \sin^n x \cos^n x dx</math></li> <li>• <math>\int_0^{\frac{\pi}{2}} \sin^n x dx</math> , <math>\int_0^{\frac{\pi}{2}} \cos^n x dx</math> , <math>\int_0^{\frac{\pi}{2}} \sin^n x \cos^n x dx</math></li> </ul>	10	25



**Suggested Specification table with Marks (Theory) : 100**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcome:**

After learning the course the students should be able to:	
CO1	understanding the Special types of matrices and Row reduced Echelon form of matrix.
CO2	Proofs of Cayley- Hamilton theorem and characteristics equation of a matrix.
CO3	Solution of a system linear equation in three variables by Cramer's rule.
CO4	The real-world applications where determinants play a significant role.

**Instructional Method :**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

**Reference Books:**

- [1] Matrix and linear algebra by K. B. Dutta Prentice Hall
- [2] Matrix computations by galub and C van loan
- [3] Matrix Computations , Gene H. Golub

