COURSE INFORMATION SHEET

Course code:	**MA 104**
Course title:	**MATHEMATICS FOR ARCHITECTS**
Pre-requisite(s):	Basic Algebra, Basic Calculus
Co- requisite(s):	**None**
Credits: 3	**L: 3 T:0 P:0**
Class schedule per week:	**03**
Class:	**B. Arch**
Semester / Level:	**I**
Branch:	**Architecture**
Name of Teacher:	**Mathematics Department**

Course Objectives: This course enables the students:

1.	basics concepts of matrices, including rank, eigenvalues and eigenvectors of the matrix
2.	determination of consistency and inconsistency of system of linear equations using rank of matrices
3.	application of single variable derivatives and integrals in determining different properties of a curve
4.	introduction to multi variable functions, partial derivatives and different properties associated with them their
5.	applications of multi variable calculus in determining maxima – minima and double integrals for two variable functions
6.	analysis of data using different statistical techniques

Course Outcomes: After the completion of this course, students will be:

CO1.	to understand the basics of matrices, statistics, differential and integral calculus
CO2.	to apply the mathematical skills to specific problems arising in architecture
CO3.	to demonstrate the usage of calculus in determining shape, symmetry, pattern etc. of architectural designs
CO4.	to gain an understanding to establish connectivity between mathematics and architecture.

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Matrices** Real and Complex Matrices, Elementary Transformations, Rank of a Matrix, Row – reduced Echelon form, Consistency and inconsistency for system of linear equations using rank method, Characteristic equation, Eigenvalues and Eigen vectors, Cayley – Hamilton Theorem.	**8**
Module – II **Single Variable Calculus** Successive differentiation, Leibnitz's Theorem, Indeterminate forms, Concavity, Convexity, Point of Inflection, Taylor and Maclaurin series for functions of one variable, Maxima and Minima for functions of one variable. Definite Integrals, Reduction Formula, Applications of definite integrals in finding length of curves, area between curves, area of the surfaces of revolution.	**8**
Module – III **Multi Variable Calculus - I** Function of several variables, Limit and Continuity for functions of two variables, Partial derivatives, Euler's Theorem for Homogeneous functions, Chain Rules, Total Differential Coefficient, Change of variables.	**8**
	8

Module – IV **Multi Variable Calculus -II** Jacobian, Properties of Jacobians, Taylors and Maclaurin series for function of two variables, Maxima - Minima for function of two variables, Lagrange's method of multipliers.	
Module – V **Statistics** Measures of Central Tendency, Measures of Dispersion, Moments, Skewness, Kurtosis Correlation, Methods to find Coefficient of Correlation, Regression, Linear Regression, Lines of Regression, Regression coefficients, Nonlinear Regression, Curve fitting, Method of Least Squares.	**8**

Text Books:

1. M.D. Weir, J. Hass and F. R. Giordano: Thomas' Calculus, 12th edition, Pearson Educations, 2008.
2. E. Kreyszig, Advanced Engineering Mathematics, Wiley International, 9th edition, 2006.
3. S.C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand Publications, 11th Edition, 2014.

Reference books:

1. M.R. Spiegel and L.R. Stephens, Schaum's outline of Statistics, 5th Edition, 2010.
2. H. Anton, I Brivens, S. Davis, Calculus, 10th Edition, John Wiley and Sons, Singapore Pvt. Ltd., 2013.
3. H. Schneider and G.P. Barker, Matrices and Linear Algebra, Dover's Publications, New York, 1973.

Gaps in the syllabus (to meet Industry/Profession requirements):

1. Making students solve engineering problems using the studied concepts.
2. Experimentally visualising the analytical concepts.
3. Difficult to produce extensive proves of the state of the art definitions and theorems.

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: NA

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Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (02 nos. of 10 marks each)	20
Assignment / Quiz (s)	05

Assessment Compoents	CO1	CO2	CO3	CO4
Mid Sem Examination Marks	√	√	√	√
End Sem Examination Marks	√	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty

2. Student Feedback on Course Outcome

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	2	3	2	1	2	2	1	1	1	1	1	2	2	2	2
CO2	3	3	2	1	2	2	1	1	1	1	1	2	2	2	2
CO3	3	2	2	2	2	2	1	1	1	1	1	2	2	2	2
CO4	3	2	3	3	2	2	1	1	2	2	1	3	2	2	2

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If satisfying< 34%=1, 34-66% =2, > 66% = 3

Mapping Between COs and Course Delivery (CD) methods				
CD	**Course Delivery methods**		**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors		CO1	CD1
CD2	Tutorials/Assignments		CO2	CD1
CD3	Seminars		CO3	CD1 and CD2
CD4	Mini projects/Projects			
CD5	Laboratory experiments/teaching aids			
CD6	Industrial/guest lectures			
CD7	Industrial visits/in-plant training			
CD8	Self- learning such as use of NPTEL materials and internets			
CD9	Simulation			