Department of Mathematics									
Program: - B.Tech.									
Semester One		Course Title		ENGINEERING MATHEMA	ATICS -I	Code	TMA-101		
Course Co	omponents	Cr	edits	Conto et Herrer	L	Т	Р		
Discipline Specific Course (DSC)		03		Contact Hours	02	01	00		
Examination		Theory	Practical	WEIGHTAGE:	CWA	MSE	ESE		
Duration (Irration (Hrs) 03 00 EVALUATION 25 25 a-requisite Basic Knowledge of Mathematics								
Tre-requis	site Dasie	Kilowicug		natics					
Course Ou	urse Outcomes								
COl	Understand the concept of Matrices.								
CO2	Solve the system of linear equations.								
CO3	Implement	Implement the concept of differential calculus in various discipline of Engineering.							
CO4	Analyze the maxima / minima values of function of two or more variables with its application to Engineering.								
CO5	Apply the	multiple in	tegrals to fi	nd the area and volume.					
CO6	Utilize the	vector cal	culus in diff	erent Engineering systems.					
Unit No.	Content						Contact Hours		
Unit -1	Determinants, Inverse of a matrix, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian and orthogonal matrices; Rank of a Matrix; Rank-Nullity theorem; System of linear equations; Characteristic equation, Eigenvalues and Eigenvectors; Orthogonal transformation; Diagonalization of matrices; Cayley- Hamilton Theorem.								
Unit -2	Basic Calculus: Rolle's Theorem, Mean value theorem and its applications; Extreme value of functions, Indeterminate forms and L'Hospital's rule, Linear approximation, Taylor's and Maclaurin's theorems with remainders.					8			
Unit -3	Multivariable Calculus-I: Successive differentiation, Leibnitz's theorem, Limits, continuity and differentiability of function of two variables, Partial Differentiation, Total derivative; Homogeneous function, Euler's theorem. Directional derivatives, Gradient, Tangent plane and normal line; Curvature, Evolutes and involutes; Extrema (Maxima/ Minima) of functions of several variables and saddle points; Method of Lagrange's multipliers; Introduction of Jacobian and its properties.					8			
Unit -4	Multivariable Calculus-II: Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and gravity (constant and variable densities); Triple integrals (Cartesian), Orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.						10		
Unit -5	Vector Calculus: Introduction to vectors; Scalar line integrals, Vector line integrals, Scalar surface integrals, Vector surface integrals; Gradient, Curl and divergence, Green, Gauss and Stokes theorems (without proof).						8		
	Total Hours					45			

Text Books:

Authors Name	Title	Edition	Publisher,	Year
			Country	
C. B. Gupta, S. R.	Engineering Mathematics for	1^{st}	McGraw Hill	2015
Singh and Mukesh	Semesters I and II		Education	
Kumar				
N.P. Bali and Manish	A text book of Engineering	9 th	Laxmi	2016
Goyal	Mathematics		Publications,	
			Reprint, 2008	
Gorakh Prasad and	Textbook of differential calculus	11 th	Pothishala Pvt	1968
Chandrika Prasad			Ltd, Allahabad	
R. K. Jain and S. R.	Advanced Engineering	5 th	Narosa	2019
K. Iyengar	Mathematics		Publication	
Erwin Kreyszig	Advanced Engineering	9 th	Wiley Publications	2014
	Mathematics			
G. B. Thomas and R.	Calculus and Analytic geometry	9 th	Addison-Wesley	2010
L. Finney			Publishing	
			Company	

Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
B. V. Ramana	Higher	6 th	Tata McGraw Hill	2006
	Engineering		publications	
	Mathematics			
B. S. Grewal	Higher	44 th	Khanna Publications,	2022
	Engineering		India	
	Mathematics			
Tom M. Apostol	Calculus-	2^{nd}	Wiley Publications	2022
	Volume 2			
Reena Garg	Advanced	1 st	Khanna Book Publishing	2022
	Engineering		Company 2021	
	Mathematics			
T. Veerarajan	Engineering	5 th	Tata McGraw-Hill, New	2008
	Mathematics		Delhi	
	(for First			
	Year)			