BS-135A	Multivariable Calculus and Linear Algebra						
L	T	P	Credit	Major Test	Minor Test	Total	Time
3	1	-	4	75	25	100	3 h
Purpose	To familiarize the prospective engineers with techniques in calculus, sequence & series, multivariable calculus, and linear algebra.						
Course Outcomes							
CO1	To introduce the idea of applying differential and integral calculus to notions of improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.						
CO 2	To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.						
CO 3	To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.						
CO 4	To familiarize the student with functions of several variables that is essential in most branches of engineering.						
CO 5	To develop the essential tool of matrices and linear algebra in a comprehensive manner.						

UNIT-I   (12 hrs)
Calculus: Evaluation of definite and improper integrals: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.
Rolle's Theorem, Mean value theorems, Indeterminate forms and L'Hospital's rule.
UNIT-II   (12 hrs)
Sequence and Series: Convergence of sequence and series, tests for convergence (Comparison test, D'Alembert's Ratio test, Logarithmic test, Cauchy root test, Raabe's test); Power series.
Fourier series: Introduction, Fourier-Euler Formula, Dirichlet's conditions, Change of intervals, Fourier series for even and odd functions, Half range sine and cosine series.
UNIT-III   (09 hrs)
Multivariable Calculus (differentiation): Taylor's series (for one and more variables), series for exponential, trigonometric and logarithm functions.
Partial derivatives, Total differential, Chain rule for differentiation, Homogeneous functions, Euler's theorem, Jacobian, Maxima, minima and saddle points; Method of Lagrange multipliers.
UNIT-IV   (07 hrs)
Matrices: Rank of a matrix, elementary transformations, elementary matrices, Gauss Jordon method to find inverse using elementary transformations, normal form of a matrix, linear dependence and independence of vectors, consistency of linear system of equations, linear and orthogonal transformations, eigenvalues and eigenvectors, properties of eigenvalues, Cayley – Hamilton theorem and its applications.
Suggested Books:
1.ErwinKreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Erwin Kreyszig and Sanjeev Ahuja, Applied Mathematics- I, Wiley India Publication, Reprint 2015.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
6. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Note: The paper setter will set the paper as per the question paper templates provided.