J C Bose University of Science and Technology, YMCA Faridabad
Department of Mathematics
Lesson Plan
B. Sc. (H) (Mathematics) (5th Semester)
Sequence and Series of Functions (MTU-307-V) 4L

Week	Theory	
I	**Lecture Day**	**Topic**
	I	Introduction to Pointwise Convergence
	II	Introduction to Pointwise Convergence (Cont.)
	III	Introduction to Pointwise Convergence (Examples)
	IV	Definition of Uniform Convergence of a Sequence of Functions
II	I	Uniform Convergence of a Sequence of Functions (Examples)
	II	Uniform Convergence of a Sequence of Functions (Excercise)
	III	Uniform Convergence of a Sequence of Functions (Excercise) (Cont.)
	IV	Uniform Convergence of a Sequence of Functions (Excercise) (Cont.)
III	I	Cauchy Criterion for Uniform Convergence of Sequences
	II	Continuity of the Limit Function (Theorem Proof)
	III	Continuity of the Limit Function (Examples)
	IV	Continuity of the Limit Function (Examples) (Cont.)
IV	I	Continuity of the Limit Function (Exercise)
	II	Continuity of the Limit Function (Exercise) (Cont.)
	III	Interchange of the Limit and Derivative of a Sequence
	IV	Interchange of the Limit and Derivative of a Sequence (Examples)
V	I	Interchange of the Limit and Integral of a Sequence
	II	Interchange of the Limit and Integral of a Sequence (Examples)
	III	Bounded Convergence Theorem (Statement and implications)
	IV	Pointwise and Uniform Convergence of Series of Functions (Definition)

VI	I	Pointwise and Uniform Convergence of Series of Functions (Examples)
	II	Pointwise and Uniform Convergence of Series of Functions (Examples) (Cont.)
	III	Pointwise and Uniform Convergence of Series of Functions (Examples) (Cont.)
	IV	Related Doubts
VII	I	Theorem on Continuity of the Sum Function of a Series
	II	Theorem on Differentiability of the Sum Function of a Series
	III	Detailed examples of all three theorems (Continuity, Differentiability, Integrability)
	IV	Detailed examples of all three theorems (Continuity, Differentiability, Integrability) (Cont.)
VIII	I	Review of conditions for interchange of operations for Series
	II	Related Doubts session on Integrability/Differentiability
	III	Cauchy Criterion for Uniform Convergence of Series
	IV	Weierstrass M-test for Uniform Convergence (Statement and Proof)
IX	I	Weierstrass M-test for Uniform Convergence (Examples)
	II	Weierstrass M-test for Uniform Convergence (Examples) (Cont.)
	III	Dini's Theorem (Statement and proof outline)
	IV	Related Doubts session on M-Test and Dini's Theorem
X	I	Definition of a Power Series (examples and structure)
	II	Radius of Convergence (Definition and Formula)
	III	Absolute Convergence of Power Series
	IV	Cauchy-Hadamard Theorem (Proof and Application)
XI	I	Cauchy-Hadamard Theorem (Proof and Application) (Cont.)
	II	Power Series: Behavior on the Boundary of the Interval of Convergence
	III	Differentiation of Power Series (Theorem and consequences)
	IV	Integration of Power Series (Theorem and consequences)
XII	I	Applications of differentiation/integration: finding new series
	II	Abel's Theorem for Power Series (Statement and Significance and Examples)
	III	Weierstrass's Approximation Theorem (Statement, Proof and significance)

	IV	Related Problems on Abel's Theorem
XIII	**I**	Approximation of continuous functions on closed intervals by polynomials
	II	Applications of polynomial approximation (Cont.)
	III	Full Unit IV Review and Wrap-up
	IV	Conclusion and Feedback

J C Bose University of Science and Technology, YMCA Faridabad
Department of Mathematics
Lesson Plan
B. Tech. (Robotics and Artificial Engineering) (5th Semester)
Probability and Statistics (BSC-501 RAI) 4L

Week	Theory	
I	**Lecture Day**	**Topic**
	I	Basic concepts of Probability: Random experiments, Sample space, Events, Axioms of probability
	II	Addition and Multiplication Theorems on Probability
	III	Conditional Probability, Bayes' Theorem and its applications
	IV	Independent and Dependent event
II	**I**	Discrete random variables, Probability mass function
	II	Cumulative distribution function and properties
	III	Continuous random variables and Probability density function
	IV	Mathematical expectation and properties
III	**I**	Introduction to Moments
	II	Variance and Standard Deviation
	III	Moment generating functions and their applications ,Chebyshev's inequality
	IV	Practice and revision of Unit I
IV	**I**	Discrete distributions: Binomial distribution and properties
	II	Poisson distribution and its relation to Binomial
	III	Geometric distribution and examples
	IV	Continuous distributions: Uniform and Exponential
V	**I**	Normal distribution and its properties,
	II	Standard normal variate and applications
	III	Applications of Normal distribution in real data
	IV	Practice and revision of Unit II
VI	**I**	Introduction to Bivariate Distributions
	II	Joint probability distributions

	III	Marginal and conditional distributions
	IV	Covariance and Correlation coefficien
VII	**I**	Measures of Central Tendency: Mean, Median, Mode
	II	Measures of Dispersion: Range, Quartile deviation
	III	Mean deviation and Standard deviation
	IV	Coefficient of variation and examples
VIII	**I**	Moments
	II	Skewness and Kurtosis
	III	Karl Pearson's coefficient of skewness
	IV	Moments-based measures of skewness and kurtosis
IX	**I**	Correlation: Types and methods
	II	Karl Pearson's correlation coefficient and examples
	III	Spearman's rank correlation, Regression lines
	IV	Regression coefficients
X	**I**	Curve fitting by Method of Least Squares
	II	Linear and Parabolic curve fitting
	III	Principles of Least Squares and error analysis
	IV	Examples and problem solving
XI	**I**	Introduction to Sampling and Sampling Distributions
	II	Chi-square distribution and applications
	III	t and F distributions with examples
	IV	Confidence intervals and Hypothesis testing basics
XII	**I**	Large sample tests: z-test and applications
	II	Small sample tests: t-test for single and two means
	III	F-test for equality of variances
	IV	Chi-square test for independence
XIII	**I**	Practice session on all tests
	II	Revision of complete syllabus
	III	Doubt clearing and remedial session
	IV	Feedback and conclusion

J C Bose University of Science and Technology, YMCA Faridabad
Department of Mathematics
Lesson Plan
B. Tech. (Robotics and Artificial Engineering) (1st Semester)
MATHEMATICS-I (BSC-103 RAI) 4L

Week	**Theory**	
I	**Lecture Day**	**Topic**
	I	Curvature and Radius of Curvature
	II	Evolutes and Involutes
	III	Evaluation of Definite and Improper Integrals
	IV	Beta and Gamma Functions
II	**I**	Properties of Beta and Gamma Functions
	II	Rolle's Theorem and its geometrical interpretation
	III	Mean Value Theorems (Lagrange's and Cauchy's)
	IV	Taylor's and Maclaurin's Theorems with Remainders
III	**I**	Indeterminate Forms
	II	L'Hospital's Rule
	III	Maxima and Minima for single variable functions
	IV	Functions of Several Variables: Limit and Continuity
IV	**I**	Related Problems on L'Hospital's Rule
	II	Differentiability and Partial Derivatives
	III	Directional Derivatives
	IV	Total Derivative
V	**I**	Tangent Plane and Normal Line
	II	Maxima, Minima, and Saddle Points (Two Variables)
	III	Maxima, Minima, and Saddle Points (Cont.)
	IV	Method of Lagrange Multipliers
VI	**I**	Method of Lagrange Multipliers (Cont.)
	II	Convergence of Sequences (Definition and Tests)
	III	Convergence of Infinite Series (Introduction)
	IV	Tests for Convergence (Comparison Test, Ratio Test)

VII	**I**	Tests for Convergence (Root Test, Cauchy Integral Test)
	II	Tests for Convergence (Rabbie’s Test, Leibnitz Test)
	III	Power Series and Radius of Convergence
	IV	Power Series and Radius of Convergence (Cont.)
VIII	**I**	Taylor Series for functions of a real variable
	II	Taylor Series for functions of a real variable (Cont.)
	III	Introduction to Fourier Series
	IV	Introduction to Fourier Series (Cont.)
IX	**I**	Half Range Sine and Cosine Series
	II	Introduction to Matrices: Inverse and Rank
	III	Introduction to Matrices: Inverse and Rank (Cont.)
	IV	System of Linear Equations (Consistency and Solution)
X	**I**	System of Linear Equations (Cont.)
	II	Rank-Nullity Theorem
	III	Symmetric and Skew-Symmetric Matrices
	IV	Orthogonal Matrices and their properties
XI	**I**	Orthogonal Matrices and their properties (Cont.)
	II	Determinants and their properties
	III	Properties of Eigenvalues and Eigenvectors
	IV	Properties of Eigenvalues and Eigenvectors (Cont.)
XII	**I**	Related Problems
	II	Diagonalization of Matrices
	III	Diagonalization of Matrices (Cont.)
	IV	Cayley-Hamilton Theorem
XIII	**I**	Cayley-Hamilton Theorem (Cont.)
	II	Revision of complete syllabus
	III	Doubt clearing and remedial session
	IV	Feedback and conclusion