

KENDRIYA VIDYALAYA SANGATHAN, AHMEDABAD REGION

SESSION: 2022 – 23

CLASS – XII ,APPLIED MATHEMATICS

SPLIT – UP SYLLABUS

MONTH	UNIT	CONTENT	LEARNING OUTCOME
APRIL-JUNE	UNIT-1 NUMBERS, QUANTIFICATION AND NUMERICAL APPLICATIONS	Modulo Arithmetic	<ul style="list-style-type: none"> Define modulus of an integer Apply arithmetic operations using modular arithmetic rules
		Congruence Modulo	<ul style="list-style-type: none"> Define congruence modulo Apply the definition in various problems
		Alligation and Mixture	<ul style="list-style-type: none"> Understand the rule of alligation to produce a mixture at a given price Determine the mean price of a mixture Apply rule of alligation
		Numerical Problems	Solve real life problems mathematically
		Boats and Streams (upstream and downstream)	<ul style="list-style-type: none"> Distinguish between upstream and downstream Express the problem in the form of an equation
		Pipes and Cisterns	<ul style="list-style-type: none"> Determine the time taken by two or more pipes to fill or empty the tank
		Races and Games	<ul style="list-style-type: none"> Compare the performance of two players w.r.t. time, distance
		Numerical Inequalities	Describe the basic concepts of numerical inequalities. Understand and write numerical inequalities
		Matrices and types of matrices	<ul style="list-style-type: none"> Define matrix Identify different kinds of matrices Find the size / order of matrices
		Equality of matrices, Transpose of a matrix, Symmetric and Skew symmetric matrix	<ul style="list-style-type: none"> Determine equality of two matrices Write transpose of given matrix Define symmetric and skew symmetric matrix
		<ul style="list-style-type: none"> Perform operations like addition & subtraction on matrices of same order 	

	UNIT-2 ALGEBRA	Algebra of Matrices	<ul style="list-style-type: none"> • Perform multiplication of two matrices of appropriate order • Perform multiplication of a scalar with matrix
		Determinants	<ul style="list-style-type: none"> • Find determinant of a square matrix • Use elementary properties of determinants
		Inverse of a matrix	<ul style="list-style-type: none"> • Define the inverse of a square matrix • Apply properties of inverse of matrices
		Solving system of simultaneous equations using matrix method, Cramer's rule	<ul style="list-style-type: none"> • Solve the system of simultaneous equations using <ol style="list-style-type: none"> Cramer's Rule Inverse of coefficient matrix • Formulate real life problems into a system of simultaneous linear equations and solve it using these methods
JULY	UNIT- 3 CALCULUS Differentiation and its Applications	Higher Order Derivatives	<ul style="list-style-type: none"> • Determine second and higher order derivatives • Understand differentiation of parametric functions and implicit functions
		Application of Derivatives	<ul style="list-style-type: none"> • Determine the rate of change of various quantities • Understand the gradient of tangent and normal to a curve at a given point • Write the equation of tangents and normal to a curve at a given point
		Marginal Cost and Marginal Revenue using derivatives	<ul style="list-style-type: none"> • Define marginal cost and marginal revenue • Find marginal cost and marginal revenue
		Increasing /Decreasing Functions	<ul style="list-style-type: none"> • Determine whether a function is increasing or decreasing • Determine the conditions for a function to be increasing or decreasing
		Maxima and Minima	<ul style="list-style-type: none"> • Determine critical points of the function • Find the point(s) of local maxima and local minima and corresponding local maximum and local minimum values • Find the absolute maximum and absolute minimum value of a function • Solve applied problems
	Integration	<ul style="list-style-type: none"> • Understand and determine indefinite integrals of simple functions as anti-derivative 	
		<ul style="list-style-type: none"> • Evaluate indefinite integrals of simple algebraic functions by method of: 	

	UNIT- 3 CALCULUS Integration and its Applications	Indefinite Integrals as family of curves	<ul style="list-style-type: none"> i) substitution ii) partial fraction iii) by parts
		Definite Integrals as area under the curve	<ul style="list-style-type: none"> • Define definite integral as area under the curve • Understand fundamental theorem of Integral calculus and apply it to evaluate the definite integral • Apply properties of definite integrals to solve the problems
		Application of Integration	<ul style="list-style-type: none"> • Identify the region representing C.S. and P.S. graphically • Apply the definite integral to find consumer surplus-producer surplus
AUGUST	UNIT-3 (continued) Differential Equations and Modeling	Differential Equations	<ul style="list-style-type: none"> • Recognize a differential equation • Find the order and degree of a differential equation
		Formulating and Solving Differential Equations	<ul style="list-style-type: none"> • Formulate differential equation • Verify the solution of differential equation • Solve simple differential equation
		Application of Differential Equations	<ul style="list-style-type: none"> • Define Growth and Decay Model • Apply the differential equations to solve Growth and Decay Models
	UNIT-4 Probability Distribution	Probability Distribution	<ul style="list-style-type: none"> • Understand the concept of Random Variables and its Probability Distributions • Find probability distribution of discrete random variable
		Mathematical Expectation	<ul style="list-style-type: none"> • Apply arithmetic mean of frequency distribution to find the expected value of a random variable
		Variance	<ul style="list-style-type: none"> • Calculate the Variance and S.D. of a random variable
		Binomial Distribution	<ul style="list-style-type: none"> • Identify the Bernoulli Trials and apply Binomial Distribution • Evaluate Mean, Variance and S.D of a binomial distribution
		Poisson Distribution	<ul style="list-style-type: none"> • Understand the Conditions of Poisson Distribution • Evaluate the Mean and Variance of Poisson distribution
		Normal Distribution	<ul style="list-style-type: none"> • Understand normal distribution is a Continuous distribution • Evaluate value of Standard normal variate

• Area relationship between Mean and Standard Deviation

SEPTEMBER	UNIT - 5 INFERENCEAL STATISTICS	Population and Sample	<ul style="list-style-type: none"> • Define Population and Sample • Differentiate between population and sample • Define a representative sample from a population • Differentiate between a representative and non- representative sample • Draw a representative sample using simple random sampling • Draw a representative sample using and systematic random sampling
		Parameter and Statistics and Statistical Interferences	<ul style="list-style-type: none"> • Define Parameter with reference to Population • Define Statistics with reference to Sample • Explain the relation between Parameter and Statistic • Explain the limitation of Statistic to generalize the estimation for population • Interpret the concept of Statistical Significance and Statistical Inferences • State Central Limit Theorem • Explain the relation between Population-Sampling Distribution-Sample
		t-Test (one sample t-test and two independent groups t-test)	<ul style="list-style-type: none"> • Define a hypothesis • Differentiate between Null and Alternate hypothesis • Define and calculate degree of freedom • Test Null hypothesis and make inferences using t-test statistic for one group / two independent groups
	UNIT – 6 INDEX NUMBERS AND TIME BASED DATA	Time Series	<ul style="list-style-type: none"> • Identify time series as chronological data
		Components of Time Series	<ul style="list-style-type: none"> • Distinguish between different components of time series
		Time Series analysis for univariate data	<ul style="list-style-type: none"> • Solve practical problems based on statistical data and Interpret the result
		Secular Trend	<ul style="list-style-type: none"> • Understand the long term tendency
		Methods of Measuring trend	<ul style="list-style-type: none"> • Demonstrate the techniques of finding trend by different methods

OCTOBER	UNIT - 7 FINANCIAL MATHEMATICS	Perpetuity, Sinking Funds	<ul style="list-style-type: none"> • Explain the concept of perpetuity and sinking fund • Calculate perpetuity • Differentiate between sinking fund and saving account
		Calculation of EMI	<ul style="list-style-type: none"> • Explain the concept of EMI • Calculate EMI using various methods
		Calculation of Returns, Nominal Rate of Return	<ul style="list-style-type: none"> • Explain the concept of rate of return and nominal rate of return • Calculate rate of return and nominal rate of return
		Compound Annual Growth Rate	<ul style="list-style-type: none"> • Understand the concept of Compound Annual Growth Rate • Differentiate between Compound Annual Growth Rate and Annual Growth Rate • Calculate Compound Annual Growth Rate
		Linear method of Depreciation	<ul style="list-style-type: none"> • Define the concept of linear method of Depreciation • Interpret cost, residual value and useful life of an asset from the given information • Calculate depreciation
NOVEMBER	UNIT - 8 LINEAR PROGRAMMING	Introduction and related terminology	<ul style="list-style-type: none"> • Familiarize with terms related to Linear Programming Problem
		Mathematical formulation of Linear Programming Problem	<ul style="list-style-type: none"> • Formulate Linear Programming Problem
		Different types of Linear Programming Problems	<ul style="list-style-type: none"> • Identify and formulate different types of LPP
		Graphical method of solution for problems in two variables	<ul style="list-style-type: none"> • Draw the Graph for a system of linear inequalities involving two variables and to find its solution graphically
		Feasible and Infeasible Regions	<ul style="list-style-type: none"> • Identify feasible, infeasible, bounded and unbounded regions
		Feasible and infeasible solutions, optimal feasible solution	<ul style="list-style-type: none"> • Understand feasible and infeasible solutions • Find optimal feasible solution

DECEMBER	REVISION/ PRE-BOARD
Jan-23	REVISION/ PRE-BOARD
Feb-23	REVISION/ PRE-BOARD

Practical: Use of spreadsheet

Graphs of an exponential function, demand and supply functions on Excel and study the nature of function at various points, maxima/minima, Matrix operations using Excel

Suggested practical using the spreadsheet

- i) Plot the graphs of functions on excel and study the graph to find out the point of maxima/minima
- ii) Probability and dice roll simulation
- ii) Matrix multiplication and the inverse of a matrix
- iv) Stock Market data sheet on excel
- v) Collect the data on weather, price, inflation, and pollution analyze the data and make meaningful inferences
- vi) Collect data from newspapers on traffic, sports activities and market trends and use excel to study future

List of Suggested projects (Class XI /XII)

- i) Use of prime numbers in coding and decoding of messages
- ii) Prime numbers and divisibility rules
- ii) Logarithms for financial calculations such as interest, present value, future value, profit/loss etc. with large values)
- iv) The cardinality of a set and orders of infinity
- v) Comparing sets of Natural numbers, rational numbers, real numbers and others
- vi) Use of Venn diagram in solving practical problems

- vii) Fibonacci sequence: Its' history and presence in nature

- viii) Testing the validity of mathematical statements and framing truth tables

- ix) Investigating Graphs of functions for their properties

- x) http://www.censusindia.gov.in/Census_Data_2001/Census_Data_Online/Language/State_ment3.htm Depict the information given there in a pictorial form
- xi) Prepare a questionnaire to collect information about money spent by your friends in a month on activities like travelling, movies, recharging of the mobiles, etc. and draw interesting conclusions

- xii) Check out the local newspaper and cut out examples of information depicted by graphs. Draw your own conclusions from the graph and compare it with the analysis given in the report
- xiii) Analysis of population migration data - positive and negative influence on urbanization
- xiv) Each day newspaper tells us about the maximum temperature, minimum temperature, and humidity. Collect the data for a period of 30 days and represent it graphically. Compare it with the data available for the same time period for the previous year
- xv) Analysis of career graph of a cricketer (batting average for a batsman and bowling average for a bowler). Conclude the best year of his career. It may be extended for other players also - tennis, badminton, athlete
- xvi) Vehicle registration data - correlating with pollution and the number of accidents
- xvii) Visit a village near Delhi and collect data of various crops over the past few years from the farmers. Also, collect data about temperature variation and rain over the period for a particular crop. Try to find the effect of temperature and rain variations on various crops
- xviii) Choose any week of your ongoing semester. Collect data for the past 10 - 15 years for the amount of rainfall received in Delhi during that week. Predict the amount of rainfall for the current year
- xix) Weather prediction (prediction of monsoon from past data)
- xx) Visit Kirana shops near your home and collect the data regarding the sales of certain commodities over a month. Try to figure out the stock of a particular commodity which should be in the store in order to
- xxi) Stock price movement
- xxii) Risk assessments by insurance firms from data
- xxiii) Predicting stock market crash
- xxiv) Predicting the outcome of an election – exit polls
- xxv) Predicting mortality of infants