APPLIED MATHEMATICS (CODE NO. 840)
SESSION 2019-2020

Syllabus of Applied Mathematics has been designed with an intention to orient the students towards the mathematical tools relevant in life. Special efforts has been made in order to connect it's application in various fields, so that, students who are opting for Social Science based subjects or Commerce based subjects or skill based subjects at senior secondary level can also fulfill their urge of learning mathematics joyfully.

OBJECTIVES:

a. To develop an understanding of basic mathematical and statistical tools and its application in Science, Business, Finance, Economics and other fields

b. To develop logical reasoning skills and enhancing problem solving abilities.

ASSESSMENT PATTERN FOR CLASSES XI & XII:

Theory	70 marks
Practical	30 marks
Total	**100 marks**

CLASS XI - SESSION: 2019-2020

UNIT	MARKS
1. a. Number Theory: **Prime Numbers:** Intersecting properties of prime number without proof, Ramanujan's work on Prime number, Encryption and prime number **b. Ratio, Proportion and Logarithms:** Business Application related to Ratio and Proportion. Practical Applications of Logarithms and Anti Logarithms	8
2. Interpretation of Data: Interpretation of Data represented in the form of charts, graphs, Frequency distribution, Histogram, Pie-chart etc.	8
3. Analysis of Data: Arithmetic Mean, Median, Mode, Geometric and Harmonic Mean, Range, Mean deviation, Standard Deviation, Variance, coefficient of variation, skewness.	10
4. Commercial Mathematics: Profit and Loss, Simple interest, compound interest, depreciation, Effective rate of interest, present value, net present value, future value, annuities.	12
5. Set Theory: Set and their representations, Empty set, Finite and Infinite sets, Equal sets, subsets, power set, universal set, Venn diagrams, union and intersections of sets, complement of set.	8
6. Relation and Function: Pictorial representation of a function, domain, co-domain and range of function, Function as special type of Relation, it's Domain and range.	5
7. Algebra: **a.** Complex Number: Concept of iota, imaginary numbers, arithmetic operation on complex number. **b.** Sequence and Series: Introduction of sequences, series, Arithmetic and Geometric Progression. Relationship between AM and GM, sum of n terms etc. **c.** Permutations and Combinations: Basic concepts of Permutations and Combinations, Factorial, permutations, results, combinations with standard results, Binomial Theorem (statement only).	14
8. Trigonometry: Trigonometric identities, calculation of Height and distance involving angles of all degrees till 90.	5
TOTAL MARKS (THEORY)	**70**

CLASS XII - SESSION: 2019-2020

UNIT	MARKS
1. Fundamentals of Calculus Basics of Limits & continuity, differentiation of non-trigonometric functions, Basic applications of derivatives in finding Marginal cost, Marginal Revenues etc. Increasing and Decreasing Functions, Maxima / Minima. Integration as reverse process of differentiation, integration of simple algebraic functions.	14
2. Algebra Introduction of Matrices, Algebra of Matrices, Determinants of Square matrices (Application only).	7
3. Logical Reasoning Number series, Coding, decoding and odd man out, direction tests, blood relations, syllogism, Binary numbers, logical operations and truth table.	8
4. Commercial Mathematics Calculating EMI, calculations of Returns, Compound annual growth rate (CAGR), Stocks, Shares, Debenture, valuation of Bonds, GST, Concept of Banking.	10
5. Probability Introduction to probability of an event, Mutually exclusive events, conditional probability, Law of Total probability. Basic application of Probability Distribution (Binomial Distribution, Poisson Distribution and Normal Distribution).	10
6. Two dimensional Geometry Slope of a line, equation of a line in point slope form, slope intercept form and two point form.	4
7. Linear Programming Introduction, related terminology such as constraints, objective function, optimization, different types of LP, mathematical formulation of LP problem, graphical method of solution for problems in two variables.	10
8. Analysis of time based Data a. Index numbers: meaning and uses of index number, construction of index numbers, construction of consumer price indices. b. Time series & trend analysis: Component of time series, additive models, Finding trend by moving average method.	7
TOTAL MARKS (THEORY)	**70**

SUGGESTIVE PROJECTS (FOR 30 MARKS)

- Algorithmic approach of Sieve of Erastosthene's.
- Ramanujan's theory of prime numbers: Use of prime numbers in coding and decoding of messages.
- Bertrnad's postulate
- Download http://pib.nic.in/prs/2011/latest31mar.pdf. Analyse various information that have been extracted from the Census, 2011. Understand as to how these information have been presented.
- Visit the census site of India http://www.censusindia.gov.in/Census_Data_2001/Census_Data_Online/Language/State_ment3.htm. Depict the information given there in a pictorial form.
- Prepare a questionnaire to collect information about money spent by your friends in a month on activities like traveling, movies, recharging of the mobiles, etc. and draw interesting conclusions.
- 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.
- Analysis of population migration data – positive and negative influence on urbanization.
- 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.
- Draw a 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.
- Share market data analysis – correlation and extreme fluctuation.
- Vehicle registration data – correlating with pollution and number of accidents.
- Visit a village near Delhi and collect data of various crops over 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.
- How safe are privately owned public transport versus government owned public transport? Collect the data from archives about accidents of Blue Line buses and compare with those of DTC buses. Verify whether DTC buses are significantly safer.

- Visit Kirana shops near your home and collect the data of sale 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 maximize the profit.
- Mendelian Genetics: Genes are molecular units of heredity and carry certain information. They occur in pairs. Gregor Mendel studied about the inheritance in pea plants. One of the characteristics about their inheritance is smooth (S) and wrinkled (W). Suppose a plant has a heterogeneous gene that contains both the characteristic S and W. Find the probability of having a heterogeneous offspring (SW) or a homogeneous offspring (SS or WW) in the first generation, second generation, third generation, ….
- Choose any week of your ongoing session. Collect data for the past 10 – 15 years for the amount of rainfall received in Delhi during that week. Predict amount of rainfall for the current year.
- Stock price movement using the Binomial Distribution.
- Weather prediction (prediction of monsoon from past data).
- Risk assessments by insurance firms from data.
- Predicting stock market crash.
- Predicting outcome of election – exit polls.
- Predicting mortality of infants.
- Studying various games that use the concept of Probability – Lotto, Throwing dice, Khul Ja Sim Sim, etc.
- Data from iterative map for population growth – dynamics from plots.
- Statistical analysis of alphabets/ words appearing in a given text.
- Statistical methods for drug testing.
- Modelling population growth through data.
- Modelling spread of disease through data.
- Validation of existing models through data.