**SYLLABUS**

**GOLAGHAT COMMERCE COLLEGE (AUTONOMOUS)**

**FOUR YEARS UNDER GRADUATE PROGRAMME (FYUGP)**
**[AS PER NEP 2020]**

# MATHEMATICS

**Recommended by B.O.S. in Mathematics in its meeting held on 29.11.2024**

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICS**

**DETAILED SYLLABUS OF 1st SEMESTER**

**Title of the Course: Statistical Method**

**Code: MATHGEC1**

**Nature of the Course: Generic Elective**

**Total Credits: 03**

**Distribution of Marks: 45 (35T + 10P) (End Sem) + 30 (In-Sem)**

| UNITS | CONTENTS | L | T | P | Total Hours |
|---|---|---|---|---|---|
| **I (8 Marks)** | **Basic Statistics:** Definition and scope of Statistics, Limitations of Statistics, concepts of statistical population and sample. **Statistical investigation and Types of Data:** Planning and execution stages, quantitative and qualitative data, primary and secondary data, Schedules and Questionnaire, Census Vs Sampling and their merits and demerits. **Tabulation and Presentation of Data:** Tabulation and graphical representation (Pie Chart, Histogram, Frequency Polygon, Frequency Curve , Ogives) | 05 | 01 | - | 06 |
| **II ( 10 Marks)** | **Measures of Central Tendency:** Mathematical averages including arithmetic mean, geometric mean, harmonic mean, Properties and applications. **Positional averages:** Median, Mode (other partition values including quartiles, deciles and percentiles) | 08 | 02 | - | 10 |
| **III (10 Marks)** | **Measures of Dispersion:** Range, quartile deviation, mean deviation, standard deviation, Properties of standard deviation/ variance, coefficient of variation. | 07 | 02 | | 09 |
| **IV (7 Marks)** | **Simple Correlation and Regression Analysis:** **Correlation Analysis:** Meaning of Correlation: simple, multiple, partial, linear, non-linear, scatter diagram, interpretation of r and rank correlation. **Regression analysis:** Simple linear regression, Principles of least squares and regression lines, Regression equations and estimation, properties of regression coefficients, Relation between correlation and regression. | 08 | 02 | | 10 |
| **V (10 Marks)** | **List of Practical: (both calculator and computer based)** 1. Graphical representation of data. 2. Problems on measures of central tendency. 3. Problems based on measures of dispersion. 4. Problems based on combined mean | | | 05 | 10 |

| | | | | | |
|---|---|---|---|---|---|
| | and variance and coefficient of variation.<br>5. Karl Pearson correlation coefficient.<br>6. Spearman rank correlation<br>7. Problems based on Fitting of Regression lines. | | | | |
| | **Total** | **28** | **7** | **5** | **45** |

***Where, L: Lectures T: Tutorials P: Practical***

**MODES OF IN-SEMESTER ASSESSMENT: (30 Marks)**

- Home Assignment
- Presentation: Oral / Poster / Power Point
- Assignments
- Group Discussion
- In Semester examination
- Attendance

**SUGGESTED READINGS:**


1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edition. The World Press, Kolkata.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edition), Pearson Education, Asia.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edition, (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
4. Barman. M. P., Hazarika. J, Bora. T (2021): Statistical Methods, Mahaveer Pub,Dibrugarh.
5. Elhance, D. N., Elhance, V., and Aggarwal, B. M. (1958). Fundamentals of Statistics, Allahabad. Kitab Mahal.
6. S.C. Gupta, V.K. Kapoor (2017): Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
7. J. Medhi (2024): Statistical Methods: An Introductory Text, New Age International Publisher.

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICS**

**DETAILED SYLLABUS OF 1st SEMESTER**

| | | |
|---|---|---|
| **Title of the Course** | **:** | **Mathematical Aptitude and Reasoning -I** |
| **Nature of the Course** | **:** | **Skill Enhancement Course** |
| **Code** | **:** | **MARSEC1** |
| **Total Credits** | **:** | **03 (L=2, T=1, P=0)** |
| **Distribution of Marks** | **:** | **45 (End Sem) + 30 (In-Sem)** |

Course Description:

The course on Aptitude and Reasoning aims to provide students with a solid foundation of Mathematical and Logical Reasoning and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning.

**Course Objectives:**

- Understand the basic concepts of quantitative ability
- Understand the basic concepts of logical reasoning Skills
- Acquire satisfactory competency in use of reasoning
- To develop the ability to apply logical reasoning to solve complex problems in mathematics and computer science, enhancing their analytical and critical thinking skills through exercises and real-world applications.
- To be proficient in formal logical reasoning and prepared to engage in further study or professional work that involves mathematical logic.

| UNITS | CONTENTS | L | T | P | Total Hours |
|---|---|---|---|---|---|
| **I (15 Marks)** | Analogy, Classification, Logical Alphabet and Number sequence, Coding Decoding, Series, Logical arrangement of words, Logical Number, Letter and Symbol series, Logical Matching, Missing Numbers, Odd Man out in series, Mathematical Operation, Blood Relations. Clock, Calendar, Sitting arrangement | 12 | 02 | - | 14 |
| **II (10 Marks)** | Number system, Factors and Multiples, LCM and HCF, average, Fraction, Decimal, Percentage, profit and Loss, ratio and Proportion | 08 | 02 | - | 10 |
| **III (10 Marks)** | Quadratic Equation , Surds and Indices, Logarithm | 09 | 01 | - | 10 |
| **IV (10 Marks)** | Data Interpretation: Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart | 10 | 01 | | 11 |
| | **Total** | **39** | **06** | **-** | **45** |

**Where, L: Lectures T: Tutorials P: Practicals**

**MODES OF IN-SEMESTER ASSESSMENT: (30 Marks)**

1. Home Assignment
2. Presentation: Oral / Poster / Power Point
3. Assignments
4. Group Discussion
5. In Semester examination
6. Attendance


7. A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
8. Analytical and Logical reasoning By Sijwali B S
9. Quantitative aptitude for Competitive examination By R S Agarwal
10. Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th edition

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICS**
**DETAILED SYLLABUS OF 2nd SEMESTER**

**Title of the Course: Fundamental Mathematics**
**Code: MATHGEC2**
**Nature of the Course: Generic Elective**
**Total Credits: 03**
**Distribution of Marks: 45 (35T + 10P) (End Sem) + 30 (In-Sem)**

| UNITS | CONTENTS | L | T | P | Total Hours |
|---|---|---|---|---|---|
| **I (8 Marks)** | **Sets and Logic** Sets, subsets, types of set, operations on sets, Classes of sets Cartesian product, Venn diagram, Power of a set, difference and symmetric difference of two sets, Set identities Statements, truth values and truth table, negation, conjunction and disjunction, Statements with quantifiers, compound statements. | 08 | 01 | - | 09 |
| **II (12 Marks)** | **Determinants and Matrices** Concept of Determinant**,** Evaluation of determinants upto order 3 (properties of determinants to be excluded) Algebra of Matrices, Matrix Operations, Determinant of a square Matrix, Adjoint of a Matrix, inverse of a matrix, Solution of system of linear equations (having unique solution and involving not more than 3 variables) using matrix inversion method and Cramer's rule | 10 | 02 | | 12 |
| **III (7 Marks)** | **Linear Programming** Formulation of Linear Programming Problem (LPP). Graphical solution to LPP. Cases of Unique and multiple optimal solutions. Unbounded Solutions. Infeasibility and redundant constraints. | 04 | | | 04 |
| **IV (8 Marks)** | **Probability** Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability. Baye's Theorem | 08 | 02 | | 10 |
| **V (10 Marks)** | **List of Practical:** (both calculator and computer based) 1. Problem based on Venn-Diagram 2. Problem based on Cramer's Rule and matrix method 3. Graphical solution of LPP 4. Problem based on Conditional Probability | | | 05 | 10 |
| | **Total** | **30** | **05** | **05** | **45** |

***Where, L: Lectures T: Tutorials P: Practical***

**MODES OF IN-SEMESTER ASSESSMENT:** **(30 Marks)**

- Home Assignment
- Presentation: Oral / Poster / Power Point
- Assignments
- Group Discussion
- In Semester examination
- Attendance

**SUGGESTED READINGS:**


1. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, 17th edition, Pearson Education, New Delhi.
2. Ross, S. M. (2014). Introduction to probability models. Academic Press Inc.
3. Johnson, R. A., Miller, I., and Freund, J. E. (2000). Probability and statistics for engineers.6th Edition, Pearson Education India.
4. Rohatgi, V. K., Saleh, A. K. M. E. (2011). An Introduction to Probability and Statistics, Germany, Wiley.
5. Kumar A., Kumaresan S., &Sarma, B.K., A Foundation Course in Mathematics, Narosa Publishing House, 2018.
6. Stewart I., Tall D., The Foundations of Mathematics. Oxford University Press, 2nd Ed., 2015.
7. Vohra N.D., Business Mathematics and Statistics, McGraw Hill Education (India) Pvt. Ltd, 2012.
8. Singh J. K., Business Mathematics, Himalaya Publishing House, 2021.

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICS**

**DETAILED SYLLABUS OF 2nd SEMESTER**

**Title of the Course : Mathematical Aptitude and Reasoning -II**
**Nature of the Course : Skill Enhancement Course**
**Code : MARSEC2**
**Total Credits : 03 (L=2, T=1, P=0)**
**Distribution of Marks : 45 (End Sem) + 30 (In-Sem)**

| UNITS | CONTENTS | L | T | P | Total Hours |
|---|---|---|---|---|---|
| **I (15 Marks)** | Direction and distance, Sitting Arrangement, Decision making, Completion of series, Completion of figures, Cubes, Dice, Formation of figures, Mirror image, Water Image, Statement and Arguments | 12 | 02 | - | 10 |
| **II (10 Marks)** | Time, Speed and Distance problem, Problems on Age, Time, Work and Wage, Boat and Stream, | 08 | 01 | - | 10 |
| **III (10 Marks)** | Perimeter, Surface Area, Volume of Solid, Mixtures and Allegation, Simple Interest and Compound Interest | 10 | 01 | - | 10 |
| **IV (10 Marks)** | Measures of Central Tendency : Arithmetic Mean, Median, Mode, Quartiles, Deciles, Percentiles, Graphical method for determination of Median and Mode | 10 | 01 | | |
| | **Total** | **40** | **05** | **-** | **45** |

**Where, L: Lectures T: Tutorials P: Practicals**

**MODES OF IN-SEMESTER ASSESSMENT: (30 Marks)**

- Home Assignment
- Presentation: Oral / Poster / Power Point
- Assignments
- Group Discussion
- In Semester examination
- Attendance

Viva-Voce

**Reference Books:**

1. A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
2. Analytical and Logical reasoning By Sijwali B S
3. Quantitative aptitude for Competitive examination By R S Agarwal
4. Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th Edition.

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICS**
**DETAILED SYLLABUS OF 3rd SEMESTER**

**Title of the Course: Business Mathematics**
**Code: MATHGEC3**
**Nature of the Course: Generic Elective**
**Total Credits: 03**
**Distribution of Marks: 45 (35T + 10P) (End Sem) + 30 (In-Sem)**

| UNITS | CONTENTS | L | T | P | Total Hours |
|---|---|---|---|---|---|
| **II (8 Marks)** | **Relation and Functions** Relation and functions, types of relation, Equivalence relation with examples. Functions, types of functions. graphs of functions, compositions of functions and invertible function. | 06 | 02 | - | 08 |
| **II (10 Marks)** | **Calculus** I Limits, continuity, Differentiability of function, Differentiations, Second order derivatives, Rate of change of quantities, Application of Differentiations, increasing and decreasing function, Maxima and Minima. | 08 | 03 | - | 11 |
| **III (7 Marks)** | **Calculus II** Partial Differentiation: Partial Differentiations upto $2^{nd}$ order, Homogeneity of Functions , Euler's theorem, Total Differentials | 05 | 01 | | 06 |
| **IV (10 Marks)** | **Finite Differences and Interpolation** Introduction, forward difference operator, Operators E & D, backward differences, central differences, Newton' forward and backward interpolation formulae, Lagrange's interpolation formula | 08 | 02 | | 10 |
| **V (10 Marks)** | **List of Practical:** (both calculator and computer based) 1. Problem based on Graph of function 2. Problem based on Maxima & Minima 3. Problem based on Interpolation formulae | | | 05 | 10 |
| | **Total** | **27** | **08** | **05** | **45** |

***Where, L: Lectures T: Tutorials P: Practical***

**MODES OF IN-SEMESTER ASSESSMENT:** **(30 Marks)**

- Home Assignment
- Presentation: Oral / Poster / Power Point
- Assignments
- Group Discussion
- In Semester examination
- Attendance

**SUGGESTED READINGS:**


1. Saxena H C, Finite Differences and Numerical analysis, S chand, 2010
2. Scheid F, Theory and Problems of Numerical Analysis, Schuam's Outline Series, Mc-Graw Hill Book Co
3. Kandasamy P., Thilagavathy K, calculus of finite Differences and Numerical Analysis, S Chand
4. Kumar C etc., Fundamentals of Calculus, sultan Chand & Sons, 2022
5. Cowards J, differential Calculus for Begginers, Classic reprint series
6. Kline M, Calculus: An Intuitive and Physical approach, Dover Publications Co, 2003
7. Kumar A., Kumaresan S., &Sarma, B.K., A Foundation Course in Mathematics, Narosa Publishing House, 2018.
8. Stewart I., Tall D., The Foundations of Mathematics. Oxford University Press, 2nd Ed., 2015.
9. Vohra N.D., Business Mathematics and Statistics, McGraw Hill Education (India) Pvt. Ltd, 2012.
10. Singh J. K., Business Mathematics, Himalaya Publishing House, 2021.

**FOUR YEARS UNDER GRADUATE PROGRAMME IN**

**MATHEMATICS**

**DETAILED SYLLABUS OF 3rd SEMESTER**

Title of the Course : **Mathematical Aptitude and Reasoning -III**

Course Code : MARSEC3

Nature of the Course : Skill Enhancement Course (SEC)

Total Credits : 03 (L=2, T=1, P=0)

Distribution of Marks : 45 (End Sem) + 30 (In-Sem)

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| UNITS | CONTENTS | L | T | P | Total Hours |
|---|---|---|---|---|---|
| I (8 Marks) | Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations. | 11 | 01 | - | 12 |
| **II (10 Marks)** | Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. . | 08 | 02 | - | 10 |
| **III (7 Marks)** | Standard set operations. Classes of sets. Power set of a set. Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. | 09 | 02 | - | 11 |
| **IV (10 Marks)** | Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations, n-array relations. Functions, types of functions. graphs of functions | 10 | 02 | - | 12 |
| | **Total** | **38** | **07** | **-** | **45** |

**MODES OF IN-SEMESTER ASSESSMENT: (30 Marks)**

- Home Assignment
- Presentation: Oral / Poster / Power Point
- Assignments
- Group Discussion
- In Semester examination
- Attendance

REFERENCE BOOKS:


1. Kumar A., Kumaresan S., Sarma B. K., A Foundation Course in Mathematics, Alpha ScienceInternational, 2017.
2. Srivastava S.M., A Course on Mathematical Logic, Springer, 2012
3. Halmos P.R., Naive Set Theory, Springer,1974.
4. Kamke E., Theory of Sets, Dover Publishers,1950.
5. Grimaldi R.P., Discrete Mathematics and Combinatorial Mathematics, PearsonEducation, 1998.
6. Kandasamy P., Thilagavathy K, calculus of finite Differences and Numerical Analysis, S Chand
7. Kumar C etc., Fundamentals of Calculus, sultan Chand & Sons, 2022
8. Cowards J, differential Calculus for Begginers, Classic reprint series
9. Kline M, Calculus: An Intuitive and Physical approach, Dover Publications Co, 2003

# FOUR YEARS UNDER GRADUATE

# PROGRAMME IN MATHEMATICS

# DETAILED SYLLABUS OF 3rd SEMESTER

| | | |
|---|---|---|
| **Title of the Course** | **:** | **Mathematical ability** |
| **Course Code** | **:** | **MATHVAC3** |
| Nature of the Course | : | Value Added Course |
| Total Credits | : | 02 (L=2, T=0, P=0) |
| **Distribution of Marks** | **:** | **30 (End Sem) + 20 (In-Sem)** |

| UNITS | CONTENTS | L | T | P | Total Hours |
|---|---|---|---|---|---|
| I (10 Marks) | Number, Letter and Symbol series, Coding-Decoding, Logical Sequence, Logical Matching, Missing Numbers, Odd Man out in series, Graphical representation of data (Bar Chart, Histogram, table chart, Pi Diagram) | 08 | 02 | - | 10 |
| **II (10 Marks)** | Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Standard set operations. Classes of sets. Power set of a set, cross product and relation of set, equivalence relation. | 08 | 02 | - | 10 |
| **III (10 Marks)** | Number system, average, Percentage, profit and Loss, ratio and Proportion, Simple Interest and Compound Interest, Mensuration, volume, surface Area and Perimeter | 09 | 01 | - | 10 |
| | **Total** | **25** | **05** | **-** | **30** |

L: Lectures T: Tutorials P: Practicals

**MODES OF IN-SEMESTER ASSESSMENT: (20 Marks)**

- Home Assignment
- Presentation: Oral / Poster / Power Point
- Assignments
- Group Discussion
- In Semester examination
- Attendance

**LEARNING OUTCOMES:**

After the completion of this course, the learner will be able to:

- Analyze the truth and falsity of a logical statement.
- Differentiate between a logical statement and an ordinary statement.
- Define and describe various properties of sets.

**TEXTBOOK:**

1. Kumar A., Kumaresan S., Sarma B. K., A Foundation Course in Mathematics, Alpha Science International, 2017.

**REFERENCE BOOKS:**

10. Srivastava S.M., A Course on Mathematical Logic, Springer, 2012
11. Halmos P.R., Naive Set Theory, Springer,1974.
12. Kamke E., Theory of Sets, Dover Publishers,1950.
13. Grimaldi R.P., Discrete Mathematics and Combinatorial Mathematics, PearsonEducation, 1998.