

MST-1.5 (b): NUMBER THEORY**UNIT I****15 Hours**

Congruences: Basic properties, Residue Systems, Linear congruences, The Theorem of Fermat and Wilson (Revisited). The Chinese Remainder Theorem, Polynomial congruences, Diophantine equations. Arithmetic Functions – $\phi(n)$, $d(n)$ and $\sigma(n)$, their multiplicative properties, Mobius Inversion formulas.

UNIT II**15 Hours**

Primitive root - Properties of reduced residue systems, primitive root modulo P . Prime numbers – Elementary properties of $T(x)$, Tchebychev's Theorem, some unsolved problems.

UNIT III**15 Hours**

Quadratic congruences - Eulers Criterion, the Legendre symbol, the quadratic reciprocity law and its applications.

UNIT IV**13 Hours**

Partition theory- Euler's partition theorem, generating functions, Identities between infinite series and products.

Geometric Number Theory - Lattice points, Gauss's circle problem, Dirichlet's Division Problem.

Reference Books:

1. George E. Andrews: Number Theory, Hindustan publishing Corporation (India) (1989)
2. G.H. Hardy and Little wood: Number Theory, CUP.

MST-2.5 (b): RELATIVITY

UNIT I

15 Hours

Special Theory of relativity, Lorentz transformations. Representation of Lorentz group. Time dilation. Space contraction. Relativistic mechanics and particle dynamics.

UNIT II

15 Hours

Covariant, contravariant vectors and tensors. Tensor algebra. Transformation laws. Contraction Symmetric and Skew symmetric tensors.

UNIT III

15 Hours

Space-time as a differentiable manifold Tensor algebra and calculus in curved space-time. Parallel transport, covariant derivative, Connection coefficient. Geodesics, geodesic deviation. Riemann curvature tensor. The Bianchi identities.

UNIT IV

15 Hours

The general Theory of Relativity. Principle of equivalence. The Newtonian limit. Derivation of Einstein field equation.

References:

1. S. Weinberg: Gravitation on Cosmology, Principles and applications of the general theory of Relativity. John Wiley and Sons, Inc. (1972)
2. J. V. Narlikar: Introduction to cosmology Cambridge University Press (1993)
3. L. D. Landau & E. M. Lifshitz: The classical theory of fields, Pergamon Press (1980)
4. R. K. Sachs & H. Wu: General Relativity for Mathematicians (1977)

MHP-3.4: NUMERICAL METHODS USING C PROGRAMMING LAB

1. Finding smallest and largest of three numbers
2. Searching for the smallest in a list
3. Sorting a list of integers in ascending/descending order
4. Finding the roots of quadratic equation
5. Difference table
6. Interpolation
7. Finding whether a year is leap year or not?
8. To find whether a number is positive, negative or zero.
9. Bisection method
10. Newton-Raphson method
11. Gauss elimination method
12. Gauss –Seidal iteration method
13. Computation of eigen values, eigen vector & inverse of matrices
14. Difference tables
15. Interpolation for equal and unequal intervals
16. Curve fitting, Least square method

Note: Any new Programs can be introduced by the staff member.

MOE-3.6: FOUNDATIONS OF MATHEMATICS

- UNIT I** **10 Hours**
Brief history of Mathematics. Life history of world known Mathematicians and their works and contributions.
- UNIT II** **15 Hours**
Set Theory and Functions, Number Theory Partial fractions, Co-ordinate Geometry, Trigonometry and Calculus.
- UNIT III** **15 Hours**
Matrices and determinants, Roots of equations, Vectors, Algebraic systems, Groups, Mathematical Logic, Counting Principles, Algorithms, Interpolation, Numerical Calculus.
- UNIT IV** **12 Hours**
Quantitative Aptitude and Data interpretation, Percentage, Profit and Loss, Ratio and Proportion partnership, Time and Work, Simple and Compound Interest, Races and Game skills, Socks and Shares, Bankers Discount, Heights and distance, Odd man out Tabulation, Bar graph, Pie graph, Line graphs.

Reference Books:

1. Foundations of Mathematics – N. Vijayarangan, Scitech Pub. (India) Pvt. Ltd.
2. A Text book of Mathematics I & II – B.G. and P.G. Umarani
3. A Text book of Mathematics I & II – B. M. Sreenivas Rao, Excellent Publication
4. Discrete Mathematics – Kolman and Busby, PHI.
5. Computer Fundamentals – Rajaraman
6. Quantitative Aptitude – R. S. Agarawala, S. Chand & Co.

MOE-4.5: BUSINESS MATHEMATICS

UNIT I

16 Hours

Linear Equations: algebra, graphs of linear equations, intersection of linear equations, modeling of supply and demand analysis, national income determination.
Non Linear Equations: quadratic, exponential and logarithmic equations, modeling of revenue, cost and profit.

UNIT II

08 Hours

Mathematics of Finance: percentages and interests, compound interest, investment appraisal.

UNIT III

16 Hours

Differentiation: rules of differentiation, marginal functions and elasticity, optimization of economic functions.
Partial Differentiation: functions of several variables, partial marginal functions and elasticity, Lagrange multipliers.

UNIT IV

12 Hours

Integration: indefinite integration, definite integration.

Reference Book:

Mathematics for Economics and Business by Ian Jacques, Financial Times/Prentice Hall.