

PG DEPARTMENT OF MATHEMATICS

VISION

To be a centre of excellence for creation and dissemination of knowledge in the field of Mathematics for the nation and beyond.

MISSION

- To provide quality education and research through effective teaching and learning process
- To develop innovative, competent, ingenious and disciplined Women Mathematician
- To impart basic knowledge of Pure and Applied Mathematics to cater the needs of the student community
- To imbibe logical and analytical skills to the students

M.Sc., MATHEMATICS

PROGRAMME EDUCATIONAL OBJECTIVES

- To train the students in spades in the methods of Analysis and Algebra with computational skills to solve problems
- To promote mathematical skills and knowledge for their intrinsic beauty, effectiveness in developing proficiency in analytical reasoning, and utility in modeling and solving real world problems
- To develop oral and written communication skills that allow students to present logical information effectively
- To expose specific skills in independently comprehending, analyzing, modeling, and solving given problems at a high level of abstraction based on logical and structured reasoning
- To prepare students for life - long learning and successful career using their Mathematical skills and abilities

PROGRAMME OUTCOMES

The programme aids the graduates to

PO1 Innovate and design complex Mathematical problems and solutions using pure and applied Mathematics

PO2 Equip the students to think in critical and logical manner

PO3 Analyze the contemporary issues in the field of Mathematics and applied sciences

PO4 Opportunity of employment in schools and colleges as Mathematical Teachers and Professors, Analysts in Software Industries, Research and Development Organizations

PO5 Crack lectureship and fellowship exams approved by CSIR - NET and SET

| Vellalar College for Women (Autonomous), Erode - 12. | | | | | | | | |
|---|--------------|--|------------------|-----------------|------------|-----|------------|-----------|
| Master of Science in Mathematics | | | | | | | | |
| Course Content and Scheme of Examinations(CBCS & OBE Pattern) | | | | | | | | |
| 2018 - 19 and onwards | | | | | | | | |
| Semester I | | | | | | | | |
| Study Components | Subject Code | Title of the Paper | Inst. Hrs./ Week | Exam. Dur. Hrs. | Max. Marks | | | Credits |
| | | | | | CIA | ESE | Total | |
| Core | 18MSPC101 | Linear Algebra | 5 | 3 | 25 | 75 | 100 | 3 |
| | 18MSPC102 | Real Analysis | 6 | 3 | 25 | 75 | 100 | 4 |
| | 18MSPC103 | Ordinary Differential Equations | 6 | 3 | 25 | 75 | 100 | 4 |
| | 18MSPC104 | Number Theory | 5 | 3 | 20 | 55 | 75 | 3 |
| | 18MSPC105 | Mathematical Programming | 5 | 3 | 20 | 55 | 75 | 3 |
| Non- Major Elective | 18MSPN101 | Numerical Aptitude and Reasoning | 3 | 3 | 25 | 75 | 100 | 5 |
| Total | | | | | | | 550 | 22 |
| Semester II | | | | | | | | |
| Study Components | Subject Code | Title of the Paper | Inst. Hrs./ Week | Exam. Dur. Hrs. | Max. Marks | | | Credits |
| | | | | | CIA | ESE | Total | |
| Core | 18MSPC206 | Algebra | 6 | 3 | 25 | 75 | 100 | 4 |
| | 18MSPC207 | Complex Analysis | 6 | 3 | 25 | 75 | 100 | 4 |
| | 18MSPC208 | Partial Differential Equations | 6 | 3 | 25 | 75 | 100 | 4 |
| | 18MSPC209 | Mathematical Statistics | 6 | 3 | 25 | 75 | 100 | 4 |
| | 18MSPCP01 | Practical - Programming in PYTHON | 3 | 3 | - | 50 | 50 | 2 |
| Skill Based Subject I | 18MSPS201 | Advanced Multi-Skill Development Paper | 3 | 1 | 40 | 60 | 100 | 5 |
| Total | | | | | | | 550 | 23 |

Bloom's Taxonomy Based Assessment Pattern**Components of CIA Marks**

| Tests (I & II) | Assignment / Seminar / Subject Viva | Model Examination | Total |
|----------------|-------------------------------------|-------------------|-------|
| 10 | 5 | 10 | 25 |
| 8 | 4 | 8 | 20 |

CIA-Tests (I & II)

| Bloom's Category | Section | Choice | Marks | Total |
|------------------|---------|-------------|-------------------|-------|
| K2 | A | Compulsory | $2 \times 2 = 4$ | 30 |
| K3, K4 | B | Either / Or | $2 \times 5 = 10$ | |
| K4, K5 | C | Either / Or | $2 \times 8 = 16$ | |

Model and End Semester Examination

| Bloom's Category | Section | Choice | Marks | Total |
|------------------|---------|-------------|-------------------|-------|
| K2 | A | Compulsory | $5 \times 2 = 10$ | 75 |
| K3, K4 | B | Either / Or | $5 \times 5 = 25$ | |
| K4, K5 | C | Either / Or | $5 \times 8 = 40$ | |

PRACTICALS**Duration: 3.00 hrs****Max Marks -50**

External Practical Examination (90% of the Maximum Marks) : 45 Marks

Record Notebook (10% of the Maximum Marks) :05 Marks

SKILL BASED SUBJECT I**Marks: 100**

The distribution of marks is as follows

Internal : 40 Marks (Group Discussion - 10, Interview Techniques - 10, Written - 20)

External : 60 Marks(Online Examination)

NON MAJOR ELECTIVE

Max Marks -75

Section-A

(25 x 1 = 25 marks)

Multiple Choice Questions – 25 (five from each unit)

(Q. No 1-25)

Section-B

(10 x 5 = 50 marks)

Answer Ten out of Fifteen Questions (Three from each unit)

(Q. No 26-40)

SEMESTER I

| CODE | COURSE TITLE |
|-----------|----------------|
| 18MSPC101 | LINEAR ALGEBRA |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 25 | 75 | 72 | 3 | - | 3 |

Preamble

To develop the capability among students for handling the concepts of Algebra of linear transformations, polynomials and to prepare students to learn about bilinear forms.

Prerequisite

- Knowledge in transformation, determinants, characteristic functions and polynomials

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Understand the concepts of linear transformations and its representation by matrices | K2 |
| CO2 | Discuss the concepts of polynomials and prime factorization of a polynomial | K2 |
| CO3 | Demonstrate the properties of determinants and characteristics values | K3 |
| CO4 | Analyze the concept of triangulation, diagonalization and decomposition | K4 |
| CO5 | Evaluate the concepts of various bilinear forms | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S | S | M | M | S |
| CO2 | S | S | M | S | M |
| CO3 | S | S | M | M | S |
| CO4 | S | S | S | M | S |
| CO5 | S | M | M | S | M |

S – Strong; M – Medium; L-Low

Syllabus

UNIT I

(15 hrs.)

Linear transformations: linear transformations –the algebra of linear transformations – isomorphism – representation of transformations by matrices – linear functionals.

UNIT II

(15 hrs.)

Polynomials: Algebras – The Algebra of Polynomials – Lagrange Interpolation – Polynomial Ideals – The Prime Factorization of a Polynomial.

UNIT III

(15 hrs.)

Determinants: Commutative Rings – Determinant Functions – Permutations and the Uniqueness of Determinants – Additional Properties of Determinants. **Elementary Canonical Forms:** Introduction - Characteristic Values – Annihilating Polynomials – Invariant Subspaces.

UNIT IV

(15 hrs.)

Elementary Canonical Forms: Simultaneous Triangulation and Simultaneous Diagonalization – Direct Sum Decompositions - Invariant Direct Sums – The Primary Decomposition Theorem. **The Rational and Jordan Forms:** Cyclic Subspaces and Annihilators – Cyclic Decompositions and The Rational Form – The Jordan Form.

UNIT V

(15 hrs.)

Bilinear Forms: Bilinear Forms – Symmetric Bilinear Forms – Skew-Symmetric Forms – Groups Preserving Bilinear Forms.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|--------------------------------|-------------------|---|-------------------------------|
| 1. | Kenneth Hoffman and Ray Kunze. | Linear Algebra | Prentice Hall of India Private Limited, New Delhi | 1971, 2 nd Edition |

| Unit | Chapter | Sections |
|------|---------|--------------|
| I | 3 | 3.1 to 3.5 |
| II | 4 | 4.1 to 4.5 |
| III | 5 | 5.1 to 5.4 |
| | 6 | 6.1 to 6.4 |
| IV | 6 | 6.5 to 6.8 |
| | 7 | 7.1 to 7.3 |
| V | 10 | 10.1 to 10.4 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|----------------|-------------------|---------------------------------------|-------------------------------|
| 1. | Gilbert Strang | Linear Algebra | Wellesley – Cambridge Press | 2009, 4 th Edition |
| 2. | Kumaresan. S | Linear Algebra | Prentice Hall of India Ltd, New Delhi | 2000, 1 st Edition |
| 3. | I. N. Herstein | Topics in Algebra | John Wiley & Sons, New York | 2007, 2 nd Edition |

Web Resources

1. <http://faculty.atu.edu/mfinan/algebra2.pdf>
2. <http://joshua.smcvt.edu/linearalgebra/book.pdf>

3. <https://www.math.ucdavis.edu/~linear/linear-guest.pdf>
4. <http://nptel.ac.in/courses/111108098/>
5. <http://nptel.ac.in/courses/111106051/>
6. <https://ocw.mit.edu/courses/mathematics/18-06sc-linear-algebra-fall-2011/>

Pedagogy

Lecture, PPT, Group Discussion, Seminar and Viva-Voce

- Question Paper Setters Confine to the above Text Book only.

SEMESTER I

| CODE | COURSE TITLE |
|-----------|---------------|
| 18MSPC102 | REAL ANALYSIS |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 25 | 75 | 86 | 4 | - | 4 |

Preamble

To introduce the concept of Riemann Stieltjes integral, Lebesgue Measure, Lebesgue Integral, uniform convergence and also to work comfortably with continuity, Integration and differentiation. To make the students to understand the concept and notion of pure Mathematics in a logical fashion.

Prerequisite

- Knowledge in real fields, Euclidean space, continuity and connectedness

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Acquire the knowledge of countable sets, uncountable sets and compact sets in metric spaces | K2 |
| CO2 | Apply the concept of continuity and compactness in metric spaces | K3 |
| CO3 | Demonstrate Riemann Stieltjes integral and examine the properties of integration and differentiation | K4 |
| CO4 | Analyze the convergence in sequences and series | K4 |
| CO5 | Evaluate the concepts of linear transformation in vector spaces | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | M | S | M | M | S |
| CO2 | S | S | M | S | M |
| CO3 | M | S | S | M | S |
| CO4 | S | M | M | M | S |
| CO5 | M | S | S | S | M |

S – Strong; M – Medium; L–Low

Syllabus

UNIT I (18hrs.)

Basic Topology: Finite, Countable and Uncountable Sets – Metric Spaces – Compact Sets.

UNIT II (18 hrs.)

Continuity: Limits of Functions – Continuous Functions – Continuity and Compactness – Continuity and Connectedness – Discontinuities – Monotonic Functions – Infinite Limits and Limits at Infinity.

UNIT III (18 hrs.)

Riemann Stieltjes Integral: Definition and Existence of the Integral – Properties of the Integral – Integration and Differentiation – Integration of Vector-Valued Functions – Rectifiable Curves.

UNIT IV (18 hrs.)

Sequences and Series of Functions: Uniform Convergence and Continuity – Uniform Convergence and Integration – Uniform Convergence and Differentiation – Equicontinuous Families of Functions – The Stone Weierstrass Theorem.

UNIT V (18 hrs.)

Functions of Several Variables: Linear Transformations – Differentiation – The Contraction Principle – The Inverse Function Theorem – The Implicit Function Theorem.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|--------------|-------------------------------------|---|--------------------------------|
| 1. | Walter Rudin | Principles of Mathematical Analysis | McGraw-Hill Education (India) Private Limited | 2013, 3 rd Edition, |

| Unit | Chapter | Sections |
|------|---------|-------------------|
| I | 2 | Page no 24 – 40 |
| II | 4 | Page no 83 – 98 |
| III | 6 | Page no 120 – 137 |
| IV | 7 | Page no 147 – 165 |
| V | 9 | Page no 204– 227 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|----------------|---------------------------|-------------------------------|-------------------------------|
| 1. | Bartle R.G | Elements of Real Analysis | John wiley and sons, New York | 1976, 2 nd Edition |
| 2. | Rudin W. | Real and complex Analysis | McGraw- Hill, New York | 1986, 3 rd Edition |
| 3. | Tom M. Apostol | Mathematical Analysis | Narosa Publishing House | 2002, 2 nd Edition |

Web Resources

1. http://ramanujan.math.trinity.edu/wtrench/texts/TRENCH_REAL_ANALYSIS.PDF
2. http://nptel.ac.in/courses/nptel_download.php?subjectid=111105069
3. <http://npteldownloads.nptel.ac.in/downloads/download3gp.php?subjectId=111105069&filename=mod01lec39.3gp&subjectName=Riemann/Riemann%20Stieltjes%20Integral>
4. <http://www.ddegjust.ac.in/studymaterial/msc-math/mal-512.pdf>

Pedagogy

Lecture, PPT, Quiz, Group Discussion and Seminar

- Question Paper Setters Confine to the above Text Book only.

SEMESTER I

| CODE | COURSE TITLE |
|-----------|---------------------------------|
| 18MSPC103 | ORDINARY DIFFERENTIAL EQUATIONS |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 25 | 75 | 87 | 3 | - | 4 |

Preamble

To equip the students to study in-depth concepts and applications of differential equations. Differential Equations play a very important role in all modern scientific and engineering studies.

Prerequisite

- Knowledge in differential equations and initial value problems

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|------------|---|-----------------|
| CO1 | Obtain series solutions for second order ordinary differential equations both at ordinary and regular singular points | K2 |
| CO2 | Construct systems of linear differential equations and identify the uniqueness | K3 |
| CO3 | Demonstrate the solution of non-homogeneous linear systems and the properties linear system with constant and periodic coefficients | K3 |
| CO4 | Analyze the existence and uniqueness solution of initial value problems | K4 |
| CO5 | Determine the oscillations of second order equations | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|------------|-----|-----|-----|-----|-----|
| CO1 | S | S | S | M | S |
| CO2 | S | M | S | M | S |
| CO3 | S | S | M | S | S |
| CO4 | S | S | S | S | M |
| CO5 | S | S | S | S | M |

S – Strong; M – Medium; L – Low

Syllabus

UNIT I (18 hrs.)

Solutions in Power Series: Second Order Linear Equations with Ordinary Points – Legendre Equation and Legendre Polynomials – Second Order Equations with Regular Singular Points- Bessel Functions.

UNIT II (18 hrs.)

Systems of Linear Differential Equations: Systems of First Order Equations – Existence and Uniqueness Theorem –Fundamental Matrix.

UNIT III (18 hrs.)

Systems of Linear Differential Equations: Non-homogeneous Linear Systems – Linear Systems with Constant Coefficients - Linear Systems with Periodic Coefficients.

UNIT IV (18 hrs.)

Existence and Uniqueness of Solutions: Picard's Successive Approximations – Picard's Theorem – Some Examples– Continuation and Dependence on Initial Conditions–Existence of Solutions in the Large – Existence and Uniqueness for Systems.

UNIT V (18 hrs.)

Oscillations of Second Order Equations:Introduction – Sturm's Comparison Theorem – Elementary Linear Oscillations. Comparison Theorem of Hille-Winter – Oscillations of $x'' + a(t)x = 0$.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---|--|--|-------------------------------|
| 1. | Deo S.G., Raghavendra V., RasmitaKar, Lakshmikanthan V. | Textbook of Ordinary Differential Equations | Tata McGraw – Hill Publishing company Limited, New Delhi | 2015, 3 rd Edition |

| Unit | Chapter | Sections |
|------|---------|---------------|
| I | 6 | 6.2 - 6.5 |
| II | 5 | 5.2, 5.4, 5.5 |
| III | 5 | 5.6 - 5.8 |
| IV | 2 | 2.3 - 2.8 |
| V | 7 | 7.1 - 7.5 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|--|---|-------------------------------|-------------------------------|
| 1. | Coddington E.A. Levinson N. | Theory of Ordinary Differential Equations | McGraw Hill | 1955, 1 st Edition |
| 2. | Sanchez D.A. | Ordinary Differential Equations and Stability Theory | W.H.Free man and co | 1968, 1 st Edition |
| 3. | Nandhakumaran A.K Datti P.S Raju K. George | Ordinary Differential Equations Principles and Applications | Cambridge University Press | 2017, 1 st Edition |

Web Resources

1. <https://www.khanacademy.org/math/differential-equations/first-order-differential-equations>
2. <http://mathworld.wolfram.com/OrdinaryDifferentialEquation.html>
3. <http://www.math.psu.edu/tseng/class/Math251/Notes-2nd%20order%20ODE%20pt1.pdf>
4. <http://nptel.ac.in/courses/111105038/>

Pedagogy

Lecture, PPT, Quiz, Group Discussion, Seminar and Case Study

- Question Paper Setters Confine to the above Text Book only.

SEMESTER I

| CODE | COURSE TITLE |
|-----------|---------------|
| 18MSPC104 | NUMBER THEORY |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 20 | 55 | 72 | 3 | - | 3 |

Preamble

Introduction to elementary Number Theory has been introduced to show how certain number theoretical theorems can be applied to solve perfect numbers and to enable the students to learn the detailed aspects of theory of numbers and identify certain number theoretic functions & their properties.

Prerequisite

- Knowledge in divisibility, groups, rings and greatest integer function

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Understand the concepts of divisibility and primes | K2 |
| CO2 | Solve the congruences of different degrees | K2 |
| CO3 | Demonstrate about power residue, multiplicative groups, rings and fields | K3 |
| CO4 | Discuss the ideas about quadratic residues and Jacobi symbol | K4 |
| CO5 | Analyze the concepts of greatest integer function and recurrence functions | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S | S | S | S | S |
| CO2 | S | M | S | M | S |
| CO3 | S | S | M | M | S |
| CO4 | S | S | S | S | S |
| CO5 | S | S | S | S | S |

S – Strong; M – Medium; L–Low

Syllabus

UNIT I (15 hrs.)

Divisibility: Introduction, Divisibility, Primes.

UNIT II (15 hrs.)

Congruences: Solutions of Congruences -Congruences of Degree 1 - The function $\phi(n)$ - Congruences of Higher Degree - Prime Power Moduli–Prime Modulus.

UNIT III (15 hrs.)

Congruences: Congruences of Degree 2- Prime Modulus - Power Residues - Number Theory from an Algebraic View Point - Multiplicative Groups - Rings and Fields - Quadratic Residues.

UNIT IV (15 hrs.)

Quadratic Reciprocity: Quadratic Reciprocity - The Jacobi Symbol - Greatest Integer Function.

UNIT V (15 hrs.)

Some Functions of Number Theory: Arithmetic Functions-The Moebius Inversion Formula - The Multiplication of Arithmetic Function - Recurrence Functions.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|----------------------------------|--|-------------------------|------------------|
| 1. | Herbert Zucherman, Ivan Nivan | An Introduction to Theory of Numbers | John Wiley, New York | 1972 |

| Unit | Chapter | Sections |
|------|---------|-------------------|
| I | 1 | 1.1 to 1.3 |
| II | 2 | 2.1 to 2.7 |
| III | 2,3 | 2.8 to 2.11 & 3.1 |
| IV | 3,4 | 3.2, 3.3 & 4.1 |
| V | 4 | 4.2 to 4.5 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|----------------------|--|--|------------------|
| 1. | Apostol T.M. | Introduction to Analytic number Theory | Springer Verlag | 1976 |
| 2. | George E. Andrews | Number Theory | Hindustan Publishing Corporation New Delhi | 1989 |
| 3. | Kennath, Rosan | Elementary Number Theory and Its Application Linear Algebra | Addision Wesley Publishing Company | 1968 |

Web Resources

1. <https://freevideolectures.com/course/3027/cryptography-and-network-security/3>
2. https://books.google.co.in/books?id=eVwvwwZeBf4C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. <https://www.khanacademy.org/computing/computer-science/cryptography/modarithmetic/a/congruence-modulo>
4. https://ocw.mit.edu/courses/mathematics/18-785-number-theory-i-fall-2017/lecture-notes/MIT18_785F17_lec27.pdf

Pedagogy

Lecture, PPT, Quiz, Group Discussion, Seminar and Case Study

- Question Paper Setters Confine to the above Text Book only.

SEMESTER I

| CODE | COURSE TITLE |
|-----------|--------------------------|
| 18MSPC105 | MATHEMATICAL PROGRAMMING |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 20 | 55 | 72 | 3 | - | 3 |

Preamble

To study about the different methods of solving optimization problems in the area of Linear and Non-Linear Programming and helps to know the methods of using Operations Research techniques in decision making. It plays a very important role in all modern scientific and engineering studies.

Prerequisite

- Knowledge in Linear and Non-Linear Programming

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Understand the concepts of Graphical, Simplex and Dual methods. | K2 |
| CO2 | Obtain solutions for Integer Programming and Gomory cutting plane Algorithm. | K2 |
| CO3 | Solve integer linear programming and dynamic programming problems. | K3 |
| CO4 | Analyze the concepts of constrained and unconstrained problems. | K4 |
| CO5 | Compare the algorithms of constrained and unconstrained in non-linear programming problems. | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S | S | M | S | S |
| CO2 | S | S | S | M | M |
| CO3 | S | M | S | S | M |
| CO4 | S | S | S | S | M |
| CO5 | S | M | S | S | M |

S – Strong; M – Medium; L – Low

Syllabus

UNIT I

(15 hrs.)

Modeling with Linear Programming: Introduction to L.P- Graphical L.P.Solution- Simplex Method.**The Simplex Method And Sensitive Analysis:** L.P.Solution Space in Equation Form-Transition from Graphical to Algebra Solution-The Simplex Method-Artificial Starting Solution-Special Cases in Simplex Method Applications. **Duality and Post Optimal Analysis:** - Primal and Dual-Relationships-Additional Simplex Algorithm for L.P.

UNIT II**(15 hrs.)**

Advanced Linear Programming: Generalized Simplex Table in Matrix Form–Matrix Definition of Dual Problem- Optimal Dual Solution. **Integer Linear Programming:-**Integer Programming Algorithm-Gomory Cutting Plane Algorithm.

UNIT III**(15 hrs.)**

Integer Linear Programming: Branch and Bound Algorithm- Solution of the Traveling Sales Person Problem-**Deterministic Dynamic Programming:** Recursive Nature of Computation in D.P.-Forward and Backward Recursion.

UNIT IV**(15 hrs.)**

Classical Optimization Theory: Unconstrained Problems-Necessary and Sufficient Conditions-The Newton-Raphson Method-Constrained Problems-Equality Constraints (Jacobi Method and Lagrangian Method).

UNIT V**(15 hrs.)**

Non-Linear Programming: Unconstrained Algorithms-Direct Search Method-Gradient Method-Constrained Algorithms-Separable Programming-Quadratic Programming.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---------------|---------------------|--|-------------------------------|
| 1. | Hamdy A. Taha | Operations Research | Prentice Hall of India Pvt.Ltd., New Delhi | 2006, 8 th Edition |

| Unit | Chapter | Sections |
|------|---------|---------------------------------|
| I | 2 | 2.2 |
| | 3 | 3.1 to 3.5, Omit 3.3.3 |
| | 4 | 4.2 & 4.4 |
| II | 7 | 7.1.2, 7.4 |
| | 9 | 9.2.2. |
| III | 9 | 9.2.1 & 9.3 Omit 9.3.1 – 9.3.3. |
| | 10 | 10.1 & 10.2 |
| IV | 18 | 18.1, 18.2.1. Omit 18.2.2 |
| V | 19 | 19.1, 19.2.1, 19.2.2 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---|------------------------------------|--|--------------------------------|
| 1. | Hiller F.S., Lieberman J. | Introduction to Operation Research | Tata – McGraw Hill Publishing Company, New Delhi | 2001, 7 th Edition |
| 2. | Kanti Swarup, Gupta P.K., Man Mohan | Operations Research | Sultan Chand and sons Publishers, New Delhi | 2005, 12 th Edition |

Web Resources

1. www.nptel.ac.in/courses/111105039/
2. <https://www.pdfdrive.net/operations-research-e26549089.html>
3. <https://ocw.mit.edu/courses/sloan-school-of-management/15-053-optimization-methods-in-management-science-spring-2013/lecture-notes/>
4. <https://www.khanacademy.org/math/multivariable-calculus/applications-of-multivariable-derivatives/lagrange-multipliers-and-constrained-optimization/v/lagrange-multipliers-using-tangency-to-solve-constrained-optimization>

Pedagogy

Lecture, PPT, Quiz, Group Discussion and Seminar

- Question Paper Setters Confine to the above Text Book only.

SEMESTER I

Non Major Elective Paper - 1

NUMERICAL APTITUDE AND REASONING

Instructional Hrs: 45

Sub.Code:18MSPN101

Max. Marks : CIA 25; ESE 75

Credits: 5

Objective: To Introduce the Concepts of Mathematics with Emphasis on Analytical Ability and Computational Skills Needed in Competitive Examinations.

UNIT I (9 hrs.)

Numbers – Problems on Numbers – Surds & Indices – Partnership – Problems.

UNIT II (9 hrs.)

Time & Work - Time and Distance – Problems on Trains –Problems.

UNIT III (9 hrs.)

Calendar – Clocks – Stocks and Shares – Problems.

UNIT IV (9 hrs.)

Permutations and Combination – Probability – True Discount –Problems.

UNIT V (9 hrs.)

Odd Man Out and Series – Analytical Reasoning – Problems.

TEXT BOOK

FOR UNIT I – IV

Aggarwal R.S., *Quantitative Aptitude*, S Chand& company Ltd, New Delhi, 2007.

Unit I : Pg.No. 3 – 29, 161 – 178, 195 – 207, 311 – 321

Unit II : Pg No. 341 – 365, 384 – 401, 405 - 417

Unit III : Pg. No. 593 – 612

Unit IV : Pg.No. 613 – 636

FOR UNIT V

1. **Aggarwal R.S.,** *Quantitative Aptitude*, S Chand& company Ltd, New Delhi, 2007.

2. **Aggarwal R.S.,** *A Modern Approach to Non Verbal Reasoning*, S Chand& company Ltd, New Delhi.

Unit V : Pg.No. 649 – 657

Pg.No. 241 – 266

REFERENCE BOOKS

1. **Abhijit Guha,** *Quantitative Aptitude for Competitive Examinations*, Tata McGraw – Hill Publishing Company Ltd, New Delhi, 3rd Edition , 2008.
2. **Bharat Jhunjunwala,** *Quantitative Aptitude*, S. Chand & Company Ltd, New Delhi, 2008.
3. **Trishna,** *Quantitative Aptitude*, Pearson Education, New Delhi, 2nd Edition, 2009.
 - Data Sufficiency Type Questions should be omitted.

SEMESTER II

| CODE | COURSE TITLE |
|-----------|--------------|
| 18MSPC206 | ALGEBRA |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 25 | 75 | 86 | 4 | - | 4 |

Preamble

To develop the capability among students for handling abstract concepts and to provide the students with experience in Axiomatic Mathematics while keeping in close touch with the computational aspects of the subject and to prepare students to understand principles, concepts necessary to formulate, solve and analyze Algebra.

Prerequisite

- Acquire basic knowledge in groups, rings and fields

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Identify the basic ideas of algebra including the concepts of groups and direct products. | K2 |
| CO2 | Understand the concept of a particular Euclidean ring and other forms of polynomial rings. | K2 |
| CO3 | Demonstrate knowledge of the structures of fields and extension fields | K3 |
| CO4 | Appreciate the concept of Galois theory and finite fields | K4 |
| CO5 | Compose clear and accurate proofs using the concepts of linear transformations | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S | S | M | S | S |
| CO2 | S | S | S | S | S |
| CO3 | S | S | M | M | S |
| CO4 | S | M | S | S | S |
| CO5 | S | S | S | S | S |

S – Strong; M – Medium; L - Low

Syllabus

UNIT I

(18 hrs.)

Group Theory: Another Counting Principle – Sylow's Theorem - *Direct Products*.

Unit II

(18 hrs.)

Ring Theory: Euclidean Rings –A Particular Euclidean Ring –*Polynomial Rings* – Polynomials Over the Rational Field.

Unit III (18 hrs.)

Fields: Extension Fields –*Roots of Polynomials* – More About Roots.

Unit IV (18 hrs.)

Fields: Elements of Galois Theory - *Finite Fields*.

Unit V (18 hrs.)

Linear Transformations: Canonical Forms: Triangular Form – *Trace and Transpose* – Hermitian, Unitary and Normal Transformations.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---------------|-------------------|---------------------------------|-------------------------------|
| 1. | Herstein I.N. | Topics in Algebra | John Wiley & Sons , New York | 2007, 2 nd Edition |

| Unit | Chapter | Sections |
|------|---------|-------------------|
| I | 2 | 2.11 to 2.13 |
| II | 3 | 3.7 to 3.10 |
| III | 5 | 5.1, 5.3 and 5.5 |
| IV | 5 | 5.6 |
| | 7 | 7.1 |
| V | 6 | 6.4, 6.8 and 6.10 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---------------|---------------------------------------|---------------------------------------|-------------------------------|
| 1. | Artin M. | Algebra | Prentice – Hall , Englewood Cliff | 1991, 1 st Edition |
| 2. | Fraleigh J.B. | A First Course in Abstract Algebra | Narosa Publishing House, New Delhi | 1988 |
| 3. | Herstein I.N. | Abstract Algebra | Prentice - Hall, New Delhi | 1996, 3 rd Edition |

Web Resources

1. https://ocw.mit.edu/courses/mathematics/18-703-modern-algebra-spring-2013/lecture-notes/MIT18_703S13_pra_1_1.pdf
2. <http://math.umaine.edu/~weiss/NotesonAbstractAlgebra2013.pdf>
3. <http://www.cs.cmu.edu/~elaw/files/grouptheory.pdf>
4. <http://nptel.ac.in/courses/106104149/2>
5. <https://www.khanacademy.org/math/algebra/introduction-to-algebra/overview-hist-alg/v/origins-of-algebra>

Pedagogy

Lecture, PPT, Quiz, Group Discussion, Seminar and Viva-Voce

- Question Paper Setters Confine to the above Text Book only.

SEMESTER II

| CODE | COURSE TITLE |
|-----------|------------------|
| 18MSPC207 | COMPLEX ANALYSIS |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 25 | 75 | 86 | 4 | - | 4 |

Preamble

To study Cauchy's integral formula, local properties of analytic functions and harmonic functions and to introduce the concepts and to develop working knowledge on conformality, series and product developments and conformal mapping of polygons.

Prerequisite

- Basic knowledge in analysis, Cauchy's Integral formulas and skill to solve definite integrals

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Understand analytic functions, rational functions and elementary Riemann surfaces. | K2 |
| CO2 | Apply Cauchy's theorem for a rectangle and disk. | K2 |
| CO3 | Derive the calculus of residues and harmonic functions. | K3 |
| CO4 | Determine series and product development, partial fractions and factorization. | K4 |
| CO5 | Evaluate Riemann mapping, conformal mapping of polygons and rectangle. | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S | S | M | M | S |
| CO2 | M | S | M | S | M |
| CO3 | S | S | M | M | S |
| CO4 | S | S | S | M | S |
| CO5 | S | M | M | S | M |

S – Strong; M – Medium; L - Low

Syllabus

UNIT I

(18 hrs.)

Introduction to the Concept of Analytic Function: Limits and Continuity – Analytic Functions – Polynomials – Rational Functions – **Conformality:** Arcs and Closed Curves – Analytic Functions in Regions – Conformal Mapping – Length and Area – **Linear Transformations :** The Linear Group – The Cross Ratio – Elementary Riemann Surfaces.

UNIT II

(18 hrs.)

Complex Integration: Line Integrals - Rectifiable Arcs – Line Integrals as Functions of Arcs – Cauchy's Theorem for a Rectangle – Cauchy's Theorem in a Disk. **Cauchy's Integral Formula:** The Index of a Point with Respect to a Closed Curve – The Integral Formula – Higher Derivatives- Removable Singularities, Taylor's Theorem – Zeros and Poles – The Local Mapping – The Maximum Principle.

UNIT III

(18 hrs.)

The Calculus of Residues: The Residue Theorem – The Argument Principle – Evaluation of Definite Integrals. **Harmonic Functions:** The Definitions and Basic Properties – Mean Value Property – Poisson's Formula.

UNIT IV

(18 hrs.)

Series and Product Developments: Weierstrass Theorem – The Taylor Series – The Laurent Series – **Partial Fractions and Factorization:** Partial Fractions – Infinite Products – Canonical Products.

UNIT V

(18 hrs.)

The Riemann Mapping Theorem: Statement and Proof – Boundary Behaviour – Use of The Reflection Principle – Analytic Arcs – **Conformal Mapping of Polygons:** The Behaviour at an Angle – The Schwarz – Christoffel Formula – Mapping on a Rectangle.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|--------------|-------------------|-------------|-------------------------------|
| 1. | Ahlfors L.V. | Complex Analysis | McGraw Hill | 2006, 3 rd Edition |

| Unit | Chapter | Sections |
|------|---------|---|
| I | 2 | 1.1 – 1.4 |
| | 3 | 2.1 – 2.4, 3.1, 3.2 and 4.3 |
| II | 4 | 1.1 – 1.5, 2.1 – 2.3, 3.1 – 3.4 and 4.1 |
| III | 4 | 5.1 – 5.3, 6.1 – 6.3 |
| IV | 5 | 1.1 – 1.3, 2.1 – 2.3 |
| V | 6 | 1.1 – 1.4, 2.1 – 2.3 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---------------------|---------------------------------|------------------------------------|-------------------------------|
| 1. | Ponnusamy S. | Foundations of Complex Analysis | Narosa publishing house | 2002 |
| 2. | Rudin W. | Real and Complex Analysis | McGraw Hill International Editions | 1987, 3 rd Edition |
| 3. | Theodore W. Gamelin | Complex Analysis | Springer, New York | 2006 |

Web Resources

1. <https://www.khanacademy.org/math/linear-algebra/matrix-transformations/linear-transformations/v/linear-transformations>
2. <https://ocw.mit.edu/courses/mathematics/18-305-advanced-analytic-methods-in-science-and-engineering-fall-2004/lecture-notes/second1.pdf>
3. <http://www.freebookcentre.net/maths-books-download/Introduction-To-Complex-Analysis.html>
4. <http://www.nptel.ac.in/courses/111103070/>

Pedagogy

Lecture, PPT, Quiz, Group Discussion and Seminar

- Question Paper Setters Confine to the above Text Book only.

SEMESTER II

| CODE | COURSE TITLE |
|-----------|--------------------------------|
| 18MSPC208 | PARTIAL DIFFERENTIAL EQUATIONS |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 25 | 75 | 86 | 4 | - | 4 |

Preamble

Partial Differential Equations arise in every field of Science and Engineering and so the solutions of the partial differential equations are of great interest in understanding various physical phenomena and to study non-linear partial differential equations of first order, Equations with variable coefficients.

Prerequisite

- Knowledge in partial differential equations with initial and boundary conditions

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Obtain solutions for non-linear partial differential equations using Cauchy's, Charpit's and Jacobi's Method. | K2 |
| CO2 | Understand the concept of differential equations with constant and variable coefficients and solve them. | K2 |
| CO3 | Demonstrate the knowledge of linear hyperbolic equations and the method of integral transforms. | K3 |
| CO4 | Analyze the boundary value problems and solve them by using separation of variables. | K4 |
| CO5 | Compose clear and accurate proofs using the concepts of Partial Differential Equations | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | M | S | S | M | S |
| CO2 | M | S | S | S | S |
| CO3 | S | M | S | S | S |
| CO4 | S | S | S | M | S |
| CO5 | S | S | M | S | S |

S – Strong; M – Medium; L – Low

Syllabus

UNIT I

(18 hrs.)

Partial Differential Equations of the First Order: Nonlinear Partial Differential Equations of the First Order – Cauchy’s Method of Characteristics - Compatible Systems of First Order Equations – Charpit’s Method – Special Types of First Order Equations – Jacobi’s Method.

UNIT II

(18 hrs.)

Partial Differential Equations of Second Order: The Origin of Second-Order Equations – Linear Partial Differential Equations with Constant Coefficients – Equations with Variable Coefficients – Characteristic Curves of Second-Order Equations – Characteristics of Equations in Three Variables.

UNIT III

(18 hrs.)

Partial Differential Equations of the Second Order: The Solution of Linear Hyperbolic Equations – Separation of Variables – The Method of Integral Transforms.

UNIT IV

(18 hrs.)

Laplace’s Equation: The Occurrence of Laplace’s Equation in Physics- Elementary Solutions of Laplace’s Equation – Families of Equipotential Surfaces – Boundary Value Problems – Separation of Variables – Problems with Axial Symmetry.

UNIT V

(18 hrs.)

The Wave Equation: The Occurrence of Wave Equation in Physics – Elementary Solutions of the One-Dimensional Wave Equation. **The Diffusion Equation:** Elementary Solutions of Diffusion Equation – Separations of Variables.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|----------------|--|----------------------------|-------------------------------|
| 1. | Ian Sneddon N. | Elements of Partial Differential Equations | McGraw - Hill book company | 1957, 1 st Edition |

| Unit | Chapter | Sections |
|------|---------|--------------------|
| I | 2 | 7,8,9,10,11 and 13 |
| II | 3 | 1,4,5,6 and 7 |
| III | 3 | 8, 9 and 10 |
| IV | 4 | 1, 2,3,4,5 and 6 |
| V | 5 | 1 and 2 |
| | 6 | 3 and 4 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|-------------------------|---|-------------------------|--------------------------------|
| 1. | Raisinghania M.D. | Ordinary and Partial Differential Equations | S.Chand& company Ltd. | 2013, 18 th Edition |
| 2. | Evans C. | ParitalDifferential Equations | Ams, Providence RI | 2003, 2 nd Edition |
| 3. | Sharma, Keharsingh J.N. | Differential Equations for Engineers and Scientists | Narosa Publishing house | 2000, 1 st Edition |

Web Resources

1. www.nptel.ac.in/courses/111103021/
2. <https://www.pdfdrive.net/partial-differential-equations-e20521421.html>
3. <https://ocw.mit.edu/courses/mathematics/18-152-introduction-to-partial-differential-equations-fall-2011/>
4. <https://www.khanacademy.org/math/differential-equations/second-order-differential-equations/linear-homogeneous-2nd-order/v/2nd-order-linear-homogeneous-differential-equations-1>

Pedagogy

Lecture, PPT, Quiz, Group Discussion, Seminar and Case Study

- Question Paper Setters Confine to the above Text Book only.

SEMESTER II

| CODE | COURSE TITLE |
|-----------|-------------------------|
| 18MSPC209 | MATHEMATICAL STATISTICS |

| Category | CIA | ESE | L | T | P | Credit |
|----------|-----|-----|----|---|---|--------|
| Core | 25 | 75 | 86 | 4 | - | 4 |

Preamble

To enable the students to learn the different aspects of Statistics that provides them a systematic knowledge to analyze, organize and it helps to interpret different statistical methods.

Prerequisite

- Knowledge in Random variables and distributions

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Understand the concepts of marginal and conditional distributions | K2 |
| CO2 | Apply the ideas of mathematical expectation and chebyshev's inequality to solve problems | K3 |
| CO3 | Determine the Poisson, Binomial, Normal and Gamma distributions | K4 |
| CO4 | Analyze chi-square, t distributions and their applications | K4 |
| CO5 | Evaluate significance test and theory of estimation | K5 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | M | M | S | S | S |
| CO2 | M | S | M | S | S |
| CO3 | S | M | S | M | S |
| CO4 | S | S | S | S | S |
| CO5 | S | M | S | S | M |

S – Strong; M – Medium; L– Low

Syllabus

UNIT I

(18 hrs.)

Random Events: Preliminary Remarks- Random Events and Operations Performed on them- The System of Axioms of the Theory of Probability-Conditional Probability- Bayes Theorem- Independent Events-**Random Variables:** The Concept of a Random Variables – The Distribution Function- Random Variables of the Discrete Type and Continuous Type- Functions of Random Variables-Multidimensional Random Variables- Marginal Distributions – Conditional Distributions-Independent Random Variables-Functions of Multidimensional Random Variables.

UNIT II

(18 hrs.)

Parameters of The Distribution of A Random Variable: Expected Values- Moments- The Chebyshev Inequality- Absolute Moments. **Characteristic Functions:** Properties of Characteristic Functions- The Characteristic Function and Moments. Semi-Invariants- The Characteristic Function of the Sum of Independent Random Variables - Determination of the Distribution Function by the Characteristic Function – Probability - Generating Functions.

UNIT III

(18 hrs.)

Some Probability Distributions: One Point and Two Point Distributions- The Bernoulli Scheme. The Binomial Distribution- The Poisson Distribution- The Uniform Distribution- The Normal Distribution- The Gamma Distribution-The Beta Distribution-The Cauchy and Laplace Distributions- **Limit Theorems:** Preliminary Remarks- Stochastic Convergence- Bernoulli's Law of Large Numbers - The Levy-Crammer Theorem.

UNIT IV

(18 hrs.)

Some Probability Distributions: The De Moivre Laplace Theorem-The Lindeberg- Levy Theorem. **Sample Moments And Their Functions:** The Notion of a Sample- The Notion of a Statistic- The Distribution of the Arithmetic Mean of Independent Normally Distributed Random Variables- The χ^2 Distribution- The Distribution of The Statistic (X, S) – Student's t-Distribution.

UNIT V

(18 hrs.)

Significance Test: The Concept of Statistical Tests- Parametric Tests for Small Samples- Parametric Tests for Large Samples- The χ^2 test- Independent Test By Contingency Tables- **The Theory of Estimation:** The Preliminary Notions- Consistent Estimates- Unbiased Estimates- The Sufficiency of an Estimate- The Efficiency of an Estimate- Asymptotically-Most Efficient Estimates- Methods of Finding Estimates.

Text Book

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|-------------|--|----------------------|------------------|
| 1. | MarekFisz | Probability Theory and Mathematical Statistics | John Wiley, New York | 1980 |

| Unit | Chapter | Sections |
|------|---------|-------------------|
| I | 1 | 1.1-1.3, 1.5-1.7 |
| | 2 | 2.1-2.9 |
| II | 3 | 3.1-3.4 |
| | 4 | 4.1-4.5, 4.7 |
| III | 5 | 5.1-5.2, 5.5-5.10 |
| | 6 | 6.1-6.3, 6.6 |
| IV | 6 | 6.7, 6.8 |
| | 9 | 9.1-9.6 |
| V | 12 | 12.1-12.4, 12.7 |
| | 13 | 13.1-13.7 |

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---------------------|---|-----------------------|-------------------------------|
| 1. | Anderson T.W., | Introduction to Multivariate Statistical Analysis | John Wiley, New York | 2003, 3 rd Edition |
| 2. | Bharucha-Reid A.T., | Elements of the Theory of Markov Processes and their Applications | McGraw Hill, New York | 1997, 4 th Edition |
| 3. | Deming W.E., | Some Theory of Sampling, | John Wiley, New York | 1966, 7 th Edition |

Web Resources

1. http://nptel.ac.in/courses/nptel_download.php?subjectid=111105041
2. <https://www.khanacademy.org/math/ap-statistics>
3. <https://ocw.mit.edu/courses/mathematics/18-655-mathematical-statistics-spring-2016/>
4. [https://www.researchgate.net/publication/272237355_Probability and Mathematical_Statistics](https://www.researchgate.net/publication/272237355_Probability_and_Mathematical_Statistics)

Pedagogy

Lecture, PPT, Quiz, Group Discussion, Seminar and Case Study

- Question Paper Setters Confine to the above Text Book only.

SEMESTER II

| CODE | COURSE TITLE |
|-----------|-----------------------|
| 18MSPCP01 | PROGRAMMING IN PYTHON |

| Category | CIA | ESE | L | T | P | Credit |
|----------------|-----|-----|---|---|----|--------|
| Core Practical | - | 50 | - | - | 45 | 2 |

Preamble

To enable the students to understand the concepts of Python Programming to gain practical knowledge in Sets and Probability, Statistics and Data with graphs. Also Python uses dynamic typing and the combination of reference counting and a cycle-detecting garbage collection for memory management.

Prerequisite

Knowledge in C and C++.

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Formulate the program for differential equations | K2 |
| CO2 | Visualize Statistics with graphs | K3 |
| CO3 | Show the pictorial results from sets and probability | K4 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S | S | S | M | M |
| CO2 | S | M | S | S | M |
| CO3 | S | S | M | S | M |

S – Strong; M – Medium; L –Low

List of Programs

1. Write a program to create a class and object in Python.
2. Write a program to create Probabilistic graphical method.
3. Write a program to calculate mean, median and mode.
4. Write a program to find the variance and standard deviation.

5. Write a program to find the correlation coefficient.
6. Write a program to find the probability of a prime number appearing when a 20 sided die is rolled.
7. Write a program for conversion from temperature Celsius to Fahrenheit.
8. Write a program to draw a graph which shows the relationship between gravitational force and distance between two bodies.
9. Write a program to draw the trajectory of a body in projectile motion.
10. Write a program for finding the roots of quadratic function.
11. Write a program to solve a system of two equations.
12. Write a program to solve the initial value problem using Runge - Kutta method.
13. Write a program to solve ordinary differential equation using Python.
14. Write a program to solve partial differential equation using Python.

SEMESTER II

| CODE | COURSE TITLE |
|-----------|--|
| 18MSPS201 | ADVANCED MULTI – SKILL DEVELOPMENT PAPER |

| Category | CIA | ESE | L | T | P | Credit |
|---------------------|-----|-----|----|---|---|--------|
| Skill Based Subject | 40 | 60 | 43 | 2 | - | 5 |

Preamble

To equip the students with knowledge on all topics as desirable from the point of view of brilliant success in the competitive examinations and to familiarize the students with Interpersonal skills, Group Discussion and Interview Techniques.

Prerequisite

- Knowledge about general awareness, numerical aptitude and logical reasoning

Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Understand the concepts of General Awareness and Scientific Aptitude. | K2 |
| CO2 | Apply Logical Reasoning | K3 |
| CO3 | Analyze Numerical Reasoning and Quantitative Aptitude | K4 |
| CO4 | Identify and improve the skills in PPT, interview, abstract writing and counseling | K3 |
| CO5 | Discuss the movement and gestures to be avoided in Group Discussion and study about online services. | K4 |

Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | M | S | S | M | M |
| CO2 | M | S | S | M | S |
| CO3 | S | S | M | M | S |
| CO4 | S | S | M | S | M |
| CO5 | S | S | M | S | S |

S – Strong; M – Medium; L – Low

Syllabus

UNIT I

(9 hrs.)

Communication: Question tags - Gerund and Infinitives - Spotting the errors - Synonyms - Antonyms - One word substitution - Sentence completion - Prepositions - Articles.

General Awareness and Scientific Aptitude: Socio - Economic - Banking - Basic Sciences. People and Environment, Politics and Current Affairs, Higher Education, Information and Communication Technology, Teaching Aptitude, Research Aptitude.

UNIT II

(9 hrs.)

Logical Reasoning : Syllogism - Statement Conclusions - Statement Arguments - Statement Assumptions - Statement Courses of Action - Inference - Cause and Effect - Visual Reasoning - Direction Sense Test - Blood Relation - Coding and Decoding - Deductive Reasoning.

UNIT III

(9 hrs.)

Numerical Reasoning and Quantitative Aptitude: Age - speed - Heights and Distance - Time and Distance - Ratio and Proportion - Percentage - Fraction - Profit and Loss - Interest - Average - Calendar - Clocks - Probability - Series - Venn Diagram - Data Interpretation.

UNIT IV

(9 hrs.)

Self Introduction- Presentation Skills - Presentation through Power point - Soft Skills - Interpersonal Skills - Employability Skills Training - Resume Preparation - Preparation for interview.**Interview Techniques:** Meaning of Interview - Types of Interview - Advantages - Limitations - Unstructured interview - merits & Demerits of Interview - How to make interview successful.

UNIT V

(9 hrs.)

Group Discussion - Importance - Types of GD - GD Skills - GD Etiquette (do's and don'ts) - Essential elements of a GD - Movements and gestures to be avoided in a GD - Online Services.

Reference Books

| Sl.No. | Author Name | Title of the Book | Publisher | Year and Edition |
|--------|---|---|--|------------------|
| 1. | Agarwal.R.S | Quantitative Aptitude | S. Chand and Company | 2012, Reprint |
| 2. | Chopra.J.K | Bank Probationary Officers' Examination | Unique Publishers | 2010 |
| 3. | Datson. R.P, Manish Arora and Gulati.SW.L | Clerical Cadre Recruitment in State Bank of India | Newlight Publishers | 2013 |
| 4. | DavinderKaur Bright | Railway Recruitment Board | Bright Publications | 2010 |
| 5. | Lal, Jain and Vashishtha, K.C | UGC NET/JRF/SET Teaching and Research Aptitude | Upkar Prakashan Publishers | 2012 |
| 6. | PratyogitaDarpan | UGC NET/JRF/SET Teaching and Research Aptitude | Upkar Prakashan Publishers | 2012 |
| 7. | Sharma.J.K | IBPS Recruitment of Bank Clerical Cadre Examination | Unique Publishers | 2013 |
| 8. | Tara Chand | General Studies for Civil Services Preliminary Examinations, Paper -I | TataMcGraw Hill Education Private Ltd | 2013 |

| | | | | |
|-----|--------------------------------------|--|--|------|
| 9. | Hari Mohan Prasad and Uma Rani Sinha | Objective English for Competitive Examinations | Tata McGraw Hill Education Private Ltd | 2011 |
| 10. | Jain T.S. | Upkar's SBI Clerical Cadre Recruitment Examination | UpkarPrakashan | 2010 |
| 11. | R.Pannerselvam | Research Methodology | Prentice Hall of India, Private Limited, New Delhi | 2005 |
| 12. | Dr.P.Ravilochanan | Research Methodology with Business Correspondence and Report Writing | Margham Publications, Chennai | 2002 |

Web Resources

1. <http://www.write.com/writing-guides/research-writing/research-process/primary-research-methods-interviewing-techniques-and-tips/>
2. <http://howtogiveselfintroductionininterview.blogspot.in/2012/03/how-to-give-self-introduction-in.html>
3. <https://www.softwaretestinghelp.com/how-to-crack-the-gd/>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion and Seminar

- Question Paper Setters Confine to the above Text Book only.