Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA1	Research Methodology	6	4	English

UNIT I: Learning in higher education: Learning Hierarchy – Information Processing – Learning Events – Learning Outcomes – Motivation. Teaching technology –Designs: Technology – Teaching Technology – Instructional Technology and Education Technology – Instructional Designs – Combination of Teaching Strategies and Instructional Designs.

UNIT II: Teaching technology large groups: Psycho – Dynamics of Group Learning – Lecture Method – Modified Forms of Lecture – Seminar – Symposium – Panel Discussion – Team Teaching – Project Approach – Workshop. Teaching in small groups: Small Group Instruction – Group Discussions – Simulation Approach – Role Playing - Buzz Group Technique – Brainstorming – Case Discussions – Assignment.

UNIT III: Class room management: Teacher and Class Room Management – Class Room Management: A Conceptual Analysis – Discipline – A component of Class Room Management – Strategies for Class Room Management – Behavior Problems of Students in Colleges – Human Relations in Educational Institutions. Professional Growth: Need and Importance of Professional Growth – Professional Ethics.

UNIT IV: Communication skills: Introduction to life skills – Communication – Emotional – Functional – Personality skills. Public speaking – Welcome speech- Introducing guests – Vote of Thanks – Speech on current topics like use of cell phones, beauty contests, pollution etc., Personality Development Soft skills – Body language – Goal setting – Positive attitude – Emotional intelligence, leadership qualities – Problem solving Conversation in selected context – Introduction, permission, request, offer, greetings, sympathy, apology, suggestion, permission, telephonic conversation, compliant, warning, gratitude. Communication for career – Preparation – Resume- Group Discussion - Interview – standard, Panel, walk-in, group, stress, mock interview (practice)

UNIT V: Introduction – Bibliographies and catalogues – Journals for the history of Mathematics- Books and editions –Libraries and catalogues – Manuscripts and Archives Societies – the open.

Text Books

1. E .C. Vedanayagam, Teaching Technology For College Teachers, Striling Publishers Private Limited (1988).
UNIT I: Chapter 2 and 3
UNIT II: Chapter 4 and 5
UNIT III: Chapter 8 and 12

2. K. Alex, Soft Skills, S. Chand & company Ltd., New Delhi, First Edition (2009).
UNIT IV: Chapter 1 (Sec 1.1 - 1.4, 1.6 - 1.6.5)

3. A.R.Darling, Use of mathematical Literature, Butter worth's and Co-London (1977).
Unit V: Chapter 5 (page no.60 to 75)

Signature of the HOD

References

1. Cheryl Hamilton, Communicating for results, Wads Worth cenage learning, Ninth Edition, USA (2005).

2. LeenaSen, Verbal and non verbal communication, Eastern Economy Editions, Prentice Hall of India Learning, SecondEdition (2011).

3. S.A.W.Bukari, Soft Skills Competencies for Success, Sanjee Book House, Trichy (2009).

Question Paper Pattern

Maximum Marks: 60 Examination Duration: 3 Hours

Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)

Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of instruction
I	S1MMA2	Advanced Mathematics	6	4	English

UNIT I: Galois theory: independence of characters- Galois Extensions- The Fundamental Theorem of Galois Theory- Applications- Galois's Great Theorem

UNIT II: Spaces of Maps: The space Map(X, Y) – Admissible topologies-Maps on topological products- Injection and Projections – Topology of Uniform convergence.

UNIT III: Fundamental Groups: Equivalence classes of paths – Groupoids – Fundamental Groupoids – Induced homomorphisms - Fundamental groups of spheres - Higher homotopy groups.

UNIT IV: Branching Processes – properties of Generating Functions of Branching Processes – Probability of extinction – Distribution of the Total Number of Progeny – conditional limit Laws- generalisations of the Classical Galton –Watson Process.

UNIT V: Graph Coloring: Vertex Colorings- Critical Graphs- Triangle-Free Graphs, Edge Colorings of Graphs – Chromatic Polynomials

Text Books

1. Joseph Rotman, Galois theory, second edition, Springer(1998).

Unit I: (Sec 14 – 18)

2. Elements of General Topology,Sze-Tsen Hu, Holden – Day,Inc

Unit II: Chapter 5 (Sec 1 - 5)
Unit III: Chapter 6 (Sec 1 - 6)
3. Stochastic Processes, J.Medhi, New Age International Publishers, New Delhi, - Second Edition.
Unit IV: Chapter 9 (Sec 9.1- 9.6)
4. A Text Book of Graph Theory, R. Balakrishnan and K. Ranganathan, Springer, New Delhi.
Unit V: Chapter 7 (Sec 7.1-7.4, 7.7)

References

1. I. N .Herstein, Topics in Algebra, John Wiley & Sons, 2^{nd} Edition.
2. George L. Cain, Introduction to General Topology, Addison – Wesley Publishing Company.
3. Oliver Knill, Probability and Stochastic processes with Applications, Overseas Press, 2009.

4. V.K. Balakrishnan, Theory and problems of Graph Theory, Schaum's outline series, McGraw Hill, New Delhi.

5. Introduction to Graph Theory, Douglas B. West, PHI Learning Private Limited, New Delhi.

Question Paper Pattern

Maximum Marks: 60 Examination Duration : 3 Hours

Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA4A	Queuing and Reliability Modeling	6	4	English

UNIT I: Queueing Systems: Queueing Processes – Poission Arrivals, Exponential Service Times – General Services Times Distributions – Variations and Extensions – Open Acyclic Queneing Networks – General Open Networks.

UNIT II: Component Reliability and Hazard Models: Introduction – Component Reliability From Test Data – Mean Time to Failure Time – Dependent Hazard Models – Filed – Data Curves – Constant – Hazard Model – Linear Hazard Model – Non-Linear Hazard Model – Gamma Model – Other Model – Stress – Depend Hazard Models.

UNIT III: System Reliability Models: Introduction – System with Components in series – System with Parallel Components – K-Out – of – M System – Non series – Parallel Systems.

UNIT IV: Maintainability and Availability Concepts: Introduction – Maintainability Function – Availability Function – Frequency of Failure – Two – Unit Parallel System with Repair – System Reliability – System Availability.

UNIT V: Human and Medical Device Reliability: Introduction – Human and Medical Device Reliability Terms and Definitions – Human Stress – Performance Effectiveness , Human Error Types , and Causes of Human Error – Human Reliability Analysis Methods – Probability Tree Method – Fault Tree Method – Markov Method – Human Unreliability Data Source – Medical Device Reliability Related facts and Figures – Medical Device Recalls and Equipment Classification – Human Error in Medical Devices – Tools for Medical Device Reliability Assurance – General Method – Failure Models and Effect Analysis – Fault Tree Method – Markov Method – Data Sources for Performing Medical Device Reliability Studies – Guidelines for Reliability Engineers with respect to Medical Devices

Text Books

1. Howard M. Taylor , Samuel Karlin , " An Introduction to Stochastic Modeling" Third Edition, Academic Press – San Diego London Boston – New York Sydney Tokyo Toronto.
2. Balagurusamy E, " Reliability Engineering" , Tata Mc Gram Hill Publishing Company Limited , New Delhi, 1984.

Question Paper Pattern

Maximum Marks: 60 Examination Duration: 3 Hours
Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit).

Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA4B	Modern Topology	6	4	English

UNIT I: Sequences- Sequences and Compact Spaces - Nets.

UNIT II: Complete Pseudometric Spaces: Cauchy Sequences and Complete Spaces - Baire Category Theorem – uniform Continuity – Completion of a pseudometric Space – Banach Fixed Point Theorem.

UNIT III: Euclidean Spaces: Euclidean n- spaces – Space-Filling Curves - Pseudonorms – Spheres.

UNIT IV: Hyperspaces and Multifunctions: Hyperspaces –Quotient Spaces and Hyperspaces – The Hausdorff Metric – Multifunctions – Functions Induced by Multifunctions.

UNIT V: Dimension: Topological Dimension – Dimension of Subspaces – Dimension in R^n – Hausdorff Dimension.

Text Book

George L. Cain, Introduction to General Topology, Addison – Wesley Publishing Company.
Unit I: Chapter 7 (Sec 7.1 to 7.3)
Unit II: Chapter 8 (Sec 8.1 to 8.5)
Unit III: Chapter 9 (Sec 9.1 to 9.4)
Unit IV: Chapter 11 (Sec 11.1 to 11.5)
Unit V: Chapter 12 (Sec 12.1 to 12.4)

Question Paper Pattern

Maximum Marks: 60 Examination Duration : 3 Hours

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Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA4C	Advanced Graph Theory	6	4	English

UNIT I: Matchings – System of Distinct Representatives and Marriage Problem – Covering – 1 – Factor – Stable Matchings.

UNIT II: Independence: Independence and Covering- Edge colouring –Vizing's Theorem - Vertex colouring –uniquely colourable Graphs- critical Graphs.

UNIT III: Planar Graphs: Planar Embedding - Euler's Formula – Maximal Planar Graphs – Geometric Dual – Characterisations of Planar Graphs.

UNIT IV: Labelings: Predecessor and Successor – Algorithm – Gracefullabeling – Sequential Functions – Application- Magic graphs – Conservative graphs.

UNIT V: Domination: Domination Number –Minimal Dominating Sets – Independent Dominating Sets – Bounds for the Domination Number – Global Dominating Sets – Total Domination – Connected Domination.

Text Book

Topics in Graph Theory and Algorithms,M.Murugan, Muthali Publishing House, Chennai.

Unit I: Chapter 6 (Sec 6.1 – 6.5)
Unit II: Chapter 7 (Sec 7.1, 7.2, 7.4 – 7.7)
Unit III: Chapter 8 (Sec 8.1 – 8.5)
Unit IV: Chapter 10 (Sec 10.1 – 10.7)
Unit V: Chapter 11 (Sec 11.1 – 11.7)

Reference

Introduction to Graph Theory, Douglas B. West , PHI Learning Private Limited, New Delhi.

Question Paper Pattern

Maximum Marks: 60 Examination Duration : 3 Hours

Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA4D	Metric Topology	6	4	English

UNIT I: Metric Contraction Principles - Banach's Contraction Principle- Further extensions of Banach's Principle - The Caristi-Ekeland Principle - Equivalents of the Caristi-Ekeland Principle.

UNIT II: Set-valued contractions -Generalized contractions - HyperconvexSpaces - Introduction – Hyperconvexity- Properties of hyperconvex spaces.

UNIT III: A fixed point theorem - Structure of the fixed point set - Uniform normal structure- Uniform relative normal structure-Quasi-normal structure - Stability and normal structure.

UNIT IV: Continuous Mappings in Banach Spaces - Brouwer's Theorem - Further comments on Brouwer's Theorem - Schauder's Theorem - Stability of Schauder's Theorem.

UNIT V: Banach algebras: Stone Weierstrass Theorem - Leray-Schauder degree - Condensing mappings - Continuous mappings in hyperconvex spaces.

Text Book

Mohamed A. Khamsi, W.A. Kirk., An introduction to metric spaces and fixed point theory, John Wiley & Sons, 2001.

References

1. Ravi P. Agarwal, Maria Meehan, DonalO'Regan, Fixed point theory and applications, Cambridge University Press 2004.
2. Kim C. Border, Fixed point theorems with applications to economics and game theory,

Signature of the HOD

Cambridge University Press, 1999.

Question Paper Pattern

Maximum Marks:60 Examination Duration: 3 Hours

Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA4E	Fuzzy Mathematics	6	4	English

UNIT I : Fuzzy sets- Height of Fuzzy set – Nomal and Subnormal fuzzy sets- Support level sets – Fuzzy points - Cuts

UNIT II: Standard fuzzy operations- Union, intersection and complement – Properties – DeMargan's Laws

UNIT III: α cuts of fuzzy operations – Representations of fuzzy sets – Image and inverse of fuzzy sets

UNIT IV: Various definitions of fuzzy operations – Generalizations – Fuzzy relations – α cuts of fuzzy relations

UNIT V: Fuzzy sub groups- Intersection and α cuts of fuzzy subgroups

Text Book

M.Mrugalingam, S.Palaniammal, Fuzzy Algebra, Sivam Publications, Vickramasingapuram (2006).

Reference

George J.Klir and Bo Yuan, Fuzzy Sets and fuzzy Logic Theory and Applications, Prentice Hall of India (2004).

Question Paper Pattern

Maximum Marks: 60 Examination Duration : 3 Hours

Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA4F	Mathematical Modeling And its Applications	6	4	English

UNIT I: Continuous population models for single species: Continuous growth models – Insect outbreak model: spruce budworm – delay models –linear analysis of delay population models: Periodic solutions – delay models in physiology: Periodic dynamic diseases: Harvesting a single natural population – Population model with age distribution.

UNIT II: Models for Interacting Populations : Predator – Prey models : Lotka – volterra systems – complexity and stability – realistic predator – prey models –analysis of predator – prey model with limit cycle periodic behavior: Parameter domains of stability – competition models : Competitive exclusion principle – mutualism of symbiosis – general models cautionary remarks – threshold phenomena – discrete growth models for interacting populations –predator prey models :Detailed analysis.

UNIT III: Production Planning and Inventory: The model – viscosity solutions of the HJB equations – classical solutions – optimal production planning .

UNIT IV: Optimal consumption / Investment Models: The model HARA utility –HJB equations – optimal policies.

UNIT V: Optimal exploitation of renewable resources: The model – viscosity solutions of HJB equations – concavity and regularity – optimal exploitation - examples.

Text Books

1. J .D. Murray, Mathematical Biology 1 An introduction, Third Edition , Springer, 2001.

2. Hiroaki Morimoto, Stochastic control and mathematical modeling, First Edition, Cambridge University Press, 2010.

References

1. J.D. Murray, Mathematical Biology 2 Spatial Models and Bio Medical Applications, Third Edition, Springer, 2003.
2. J.P. Aubin, Mathematical methods of Game and Economic Theory, Amsterdam: North Holland, 1979.

Question Paper Pattern

Maximum Marks: 60 Examination Duration : 3 Hours

Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

Semester	Subject Code	Title of the Paper	Hours/ Week	No.of Credits	Medium of instruction
I	S1MMA4G	Fuzzy Algebra and its Applications	6	4	English

UNIT I: Fuzzy Set Theory: Fuzzy sets - Fuzzy set: definition - Different Types of Fuzzy sets - General Definitions and Properties of Fuzzy Sets – Other Important Operations - General Properties: Fuzzy Vs Crisp.

UNIT-II: Operations on Fuzzy Sets: Introduction - Some Important Theorems - Extension Principle for Fuzzy Sets - Fuzzy Compliments – Further Operations on Fuzzy Sets.

Unit III: Regular Matrices – Semi-Inverse – Minimum Norm g-inverses, Least Square g-Inverses and Moore-Penrose Inversse – Characterization of set of g-inverses – Spectral Inverses.

Unit IV: Schur Complements in Block Fuzzy Matrices – Regular Block Fuzzy Matrix – Generalized Inverse Formulae for Block Fuzzy Matrices.

Unit V: Applications of Fuzzy Matrices: Document Retrieval System – Medical Diagnosis – Decision Making.

Text Books

1. Pundir and Pundir, Fuzzy sets and their Applications, A Pragati Edition, (2006).
2. H. J. Zimmermann, Fuzzy set theory and its applications, Springer Fourth Edition(2001).
3. AR Meenakshi, Fuzzy Matrix Theory and Application, MJP Publication (2008).

Question Paper Pattern

Maximum Marks: 60 Examination Duration: 3 Hours

Part A: $5 \times 6 = 30$ (Either/Or type – One question from each unit)
Part B: $3 \times 10 = 30$ (Three out of Five – One question from each unit)

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