

(For the candidates admitted from the academic year 2018 onwards)

CORE I : RESEARCH METHODOLOGY

Semester : I

Subject Code :

Hours : 6

Credits : 4

Objectives:

1. To introduce method of research
2. To learn and teach Mathematics

UNIT I : Research Methodology : An Introduction

UNIT II : Defining the Research problem, Research Design.

UNIT III : Mathematics Classroom – Instructional style of Mathematics – Aesthetic image to Mathematics

UNIT IV : Algebra : Symbol Sense, Insight and its expectations – Research in Mathematics – Impact of Computing Technologies.

UNIT V : Math disabilities – Modern Mathematics and its Applications – Paradigm Shift in Learning and Teaching Maths.

Text Books

1. "Research Methodology " by C.R.Kothari, Wiley Eastern Limited, New – Delhi.

UNIT I : Chapter 1 - pages : 1 to 23

UNIT II : Chapters 2 and 3 - pages : 24 to 52.

2. "Learn and Teach Mathematics" by **Amit Goel**, Authors Press, Reprint 2008

UNIT III: Chapters 2,3,4 - pages :9-38

UNIT IV: Chapters 6,8,9 – pages: 44-52,61-103

UNIT V : Chapters 13,15,16 - pages : 137-142,149-167

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CORE II : FOUNDATIONS OF PURE MATHEMATICS

Semester : I
Hours : 6

Subject Code :
Credits : 4

Objectives:

1. To improve knowledge in core mathematics
2. To study noetherian rings and modules.

UNIT I : Noetherian Rings and Modules and Semi simplicity: Basic criteria for a Noetherian module – Associated Primes – Primary decomposition – Nakayama's Lemma - Matrices and linear maps over non - commutative rings – Conditions defining semi simplicity – The density theorem.

UNIT II : Binary Quadratic forms – Equivalence and Reduction of Binary Quadratic forms – Positive definite binary quadratic form - The equation $ax+by=c$ – Simultaneous linear equations – Pythagorean triangles – Assorted examples.

UNIT III : Branching Process : Properties of generating functions of Branching Process– Probability of extinction – distribution of the total number of Progeny – Conditional limit laws.

UNIT IV : Topology: Homotopy type – Homotopy – Type invariants – Homotopy of pairs. Fiber spaces – Fiber spaces for class of all spaces – The Uniformization theorem of Hurwitz – Locally trivial Fiber structures.

UNIT V : Positive Borel Measures : Vector spaces – Topological preliminaries – The Riesz representation theorem - Regularity properties of Borel measures – Lebesgue measure – continuity properties of measurable functions.

Text Books:

1. "Algebra" by Serge Lang, Addison Wesley, 3rd edition 1993.
UNIT I : Chapter X - Sections 1- 4 (Pages 413 – 426)
Chapter XVII – Sections 1 – 3 (Pages 641 – 651)
2. "Theory of Numbers" by Ivan Niven, Herbert S.Zuckermann, Hugh L.Montgomery, John Wiley Pulishers, 5th edition 2004.
UNIT II: Chapter 3- Sections: 3.4, 3.5, 3.7 (Pages : 150 – 162, 170 - 176)
Chapter 5-Sections: 5.1 – 5.4: (Pages: 211 – 239)
3. "Stochastic Processes" by J.Medhi, New Age International Publisher, 2nd edition 1984.
UNIT III: Chapter 9 – Sections : 9.1 – 9.5 (Pages 363 – 384.)
4. Topology by James Dugundji, Prentice hall of India, New Delhi 1975
UNIT IV : Chapter XVIII – Sections : 1 – 3 : (Pages : 365 – 368)
Chapter XX – Sections : 1 – 3 and 4 (4.1 – 4.3 only) (Pages : 212 – 239)
5. "Real and Complex Analysis" by Walter Rudin, Tata McGraw Hill Publications, 3rd edition 1987.
UNIT V: Chapter 2 – Sections : 2.1 – 2.25 (Pages : 33 – 57)

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CORE III : APPLIED MATHEMATICS

Semester : I

Hours : 6

Objectives:

1. To learn graph theory and fuzzy set theory
2. To study finite element methods

Subject Code :

Credits : 4

UNIT I : Labeling and Domination in Graphs: Labeling of graphs – The domination number of a graph – The independent domination number of a graph – Other domination parameters.

UNIT II : Linear systems: Uncoupled linear systems – Diagonalization – Exponential of operators – The Fundamental theorem for linear systems – Linear system in R^2 – Complex eigen values – Multiple eigen values – Jordan forms – Stability Theory.

UNIT III : Fuzzy Set Theory : Fuzzy complements - Fuzzy intersections : t – norms – Fuzzy unions : t – conforms – Combinations of Operations – Fuzzy Numbers – Arithmetic operations on Intervals – Arithmetic Operations of Fuzzy numbers.

UNIT IV : Non Linear Programming Algorithms : Unconstrained Non linear Algorithms – Direct Search Method – Gradient Method. Constrained Algorithms – Separable Programming – Quadratic programming – Geometric Programming.

UNIT V : Single step and Finite element methods : Systems of different equations – Higher order differential equations – Weighted residuals methods – Variation methods.

Text Books :

1. "Graphs and Digraphs" by G.Chartrand and L.Lesniak, Chapman and Hall CRC Press 1996.

UNIT I : Chapter 9 – Sections : 9.3 (Pages : 262 – 271.)

Chapter 10 – Sections: 1 to 3 (Pages : 273 – 290.)

2. **Differential Equations and Dynamical systems** by L.Perko, Springer – Verlag publications, New York 1991.

UNIT II : Chapter 1– Sections : 1.1 – 1.19

3. **Fuzzy set and Fuzzy Logic : Theory and Applications** by George J.Klir, Bo Yuan

UNIT III : Chapter 3 –Sections : 3.2 – 3.5 (Pages : 51 – 88)

Chapter 4 – Sections : 4.1,4.3,4.4 (Pages : 97 – 108)

4. **Operations Research –An Introduction** by Hamdy A.Taha, 6th Edition, Prentice hall of India, 6th edition, New Delhi 1997.

UNIT IV : Chapter 21 – Sections : 21.1.1; 21.1.2 , 21.2.1 – 21.2.3 (Pages : 781 – 806)

5. **Numerical Solutions of Differential Equations** by M.K.Jain,Wiley Eastern Ltd, 2nd edition 1984

UNIT V : Chapter 2 –Sections : 2.8 and 2.9 (Pages : 67 – 81)

Chapter 8 –Sections : 8.2 and 8.3 (Pages : 518 – 528)

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CORE IV : TEACHING AND LEARNING SKILLS

Semester: I

Subject Code:

Hours: 6

Credits : 4

UNIT I: COMPUTER APPLICATIONS SKILLS

Computer system: Characteristics, parts and their functions – Different generations of computer – Operation of computer switching on/off/restart, Mouse control. Use of key board and some functions of key – Information and communication technology (ICT): Definition, Meaning, Features, Trends – Integration on ICT in teaching and learning – ICT applications: Using word processors. Spread sheets, Power point slides in the classroom – ICT for Research: On-line journals- e-books. Courseware, Tutorials, Technical reports. Theses and Dissertations.

UNIT II : COMMUNICATION SKILLS

Communication Definitions – Element of Communication: Sender, Message, Channel, Receiver, Feedback and Noise. Types of communication: Spoken and Written; Non-verbal communication- Interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and writing – Methods of developing fluency in oral and written communication – Style Diction and Vocabulary – Classroom communication and dynamics.

UNIT III: COMMUNICATION TECHNOLOGY

Communication technology: Bases, Trends and Developments. Skills of using communication Technology. Computer Mediated Teaching: Multimedia, E-content Satellite-based communication: EDUSAT and ETV Channels. Communication through web; Audio and Video applications on the internet, Interpersonal communication through the web.

UNIT IV: PEDAGOGY

Instructional technology: Definitions and types – Difference between teaching and instruction. Lecture technique: steps, planning of a lecture, delivery of a lecture. Narration in tune with the nature of different disciplines – Lecture with power point presentation. Versatility of Lecture technique – Demonstration: Characteristics, principles, planning implementation and evaluation – Teaching – learning techniques: Team teaching, Group discussion, Seminar, workshop, symposium and Panel discussion – Modes of teaching: CAI, CMI and WBI.

UNIT V: TEACHING SKILLS

Teaching skill: Definition, Meaning and Nature – Types of teaching skills of set induction, skill of stimulus variation, skill of explaining, skill of probing questions, skill of black board writing and skill of closure – Integration of teaching skills – evaluation of teaching skills.

References:

1. Bela Rani Sharma (2007) , Curriculum Reforms and Teaching Methods, Sarup and sons, New-Delhi.
2. Don Skinner (2005) Teacher Training, Edinburgh University Press Ltd.Edinburgh.
3. Information and communication technology in Education : A curriculum for schools and programmer of teacher development, Jonathan Aderson and Tom Van Weart, UNESCO 2002
4. Kumar, K.L (2008) Educational Technology, New Age International Publishers, New Delhi
5. Mangal, S.K.(2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana
6. Michael, D and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York.
7. Pandey, S.K (2005) Teaching Communication, Commonwealth Publishers, New Delhi.
8. Ram Babu A and Dandapani S (2006). Microteaching (Vol 1 & 2) . Neelkammal publications.