

## **Core Course I – Research Methodology**

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### **Unit I**

Thesis Writing: Research types - objectives and approaches - Literature collection, Web browsing - Software tools - Writing review and journal articles - manuscript publication

Planning a thesis - general format - page and chapter format - footnotes - tables and figures - references and appendices

### **Unit II**

Analysis of algorithm: The role of algorithm in computing - Insertion sort - Analyzing and designing algorithms - growth of functions - introduction to NP - completeness

### **Unit III**

Formal Languages and Finite Automata: Context free grammars - Derivation trees - Simplification of context free Grammars - Chomsky normal form - Greiback normal form - The pumping lemma for context free languages - Finite state systems - Basic definitions - Non deterministic finite automata - Finite automata with epsilon moves - Regular expressions - Applications of finite Automata (Stress on theorem statement and problems only)

### **Unit IV**

Probability and Statistical Analysis: Probability - Fail time data analysis - Hazard models - Conditional probability - Bayes rule - System reliability - Stochastic process.

### **Unit V**

Logics - Relations and Functions: Propositions - Precedence rules for operators - Laws of equivalence - Natural deduction system - Developing natural deduction system proofs

Relation properties - Matrix and Graph - Graph Notations for relations - Partition and covering - Equivalence relation - Compatibility relations - Partial ordering Functions - Components - Composition of function - Inverse functions Binary and n-ary operations.

### **Text Books:**

1. Kothari C. R. Research<sup>1</sup> Methodology - methods and techniques, 2<sup>nd</sup> Edition, Wishwa Prakashjan New Delhi 1999

2. Elis Horowitz and Sartaj Sahni, 'Fundamentals of Computer algorithms', Galgotia Publications, New Delhi 2000
3. John E. Hopcroft, Jeffrey D. Ullman, 'Introduction to Automata Theory Language and Computation', Narosa Publishing House, 1979
4. L.S. Srinath, 'Reliability Engineering', Third Edition, Affiliated East, West press pvt. Ltd, New Delhi, 2005
5. David Gries, 'The Science of Programming' Narosa Publishing House, 1981

**Reference Books:**

1. Berny H. Durston, M. Poole, 'Thesis and Assignment writing', Wiley Eastern Ltd. ND 1970
  2. Misra R.P. Research Methodology - A Hand Book, Concept publishing Company, New Delhi 1988
  3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest 'Introduction to Algorithms', Prentice Hall of India, 1998
  4. E. Balagurusamy, 'Reliability Engineering', Tata Mc Graw Hill Publishing Ltd., New Delhi 2003
  5. Leon S. Levy, 'Discrete structures of Computer Science', Wiley Eastern Ltd., 1980
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### **Unit I**

Security problems in Computing - Cryptography - program security -Database security - Security in Networks

### **Unit II**

**Grid Computing:** Grid Computing organization and their role - Grid computing anatomy -Merging the Grid service architecture with web services architecture

### **Unit III**

**Digital Image Processing:** Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations.

Image Enhancement in the spatial domain:- Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.

### **Unit IV**

**Distributed Databases:** Homogeneous and Heterogeneous databases -Distributed data storage - distributed transactions - commit protocols -concurrent control - availability -- Distributed theory processing Heterogeneous distributed databases - Directory systems

### **Unit V**

**Cloud Computing:** Introduction to cloud computing-surveying the Role of Cloud Computing, developing the cloud services-Advantage of Auxiliary Cloud Services- Deploying Application and Services to the Azure Cloud. Understanding Windows Azure Platform Architecture: The Lifecycle- Securing and Isolating Services and Data,-Assuring Fabric Controller Availability-Virtualizing Windows Server for Azure.

### **Text Books:**

1. Chapter 1,2,3,6 & 7 - (Security in Computing, Charles P. Pfleeger, & Shani Lawrence Pfeeger)
  2. Joshy Joseph, Graig Felenstern 'Grid Computing' - Pearsons 2004
  3. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Third Edition, PHI/Pearson Education,2008
  4. Abraham fiberschatz & Hendry F. Korthis "Data base systems concepts" Mc Graw Hill International fifth edition, 2006
  5. . Roger Jennings “Cloud Computing with the Windows Azure Platform”, Wiley,2009, and Michael Miller, “Cloud Computing”, Pearson Education,2008.
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## **Core Course III – Teaching and Learning Skills**

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### **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 of 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 – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and Written; Non-verbal Communication – Intrapersonal, 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: Definition, Objectives 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: Skill 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 Programme of Teacher development, Jonathan Anderson and Tom Van Weert, 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, Hyderabad.
  9. Singh V.K. and Sudarshan K.N. (1996), Computer Education, Discover Publishing Company, New York.
  10. Sharma, R.A (2006) Fundamentals of Educational Technology, Surya Publications, Meerut
  11. Vanaja, M and Rajasekar, S (2006), Computer Education, Neelkamal Publications, Hyderabad.
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**Objective:**

In this course students shall learn the mathematical & algorithmic details of various data association techniques to discover patterns in underlying data (namely mining data), also learn how to consolidate huge volume of data in one place efficiently.

**UNIT 1**

**Data mining and data preprocessing:** Data Mining – Motivation – Definition –Data mining on kind of data – Functionalities – Classification – Data Mining Task Primitives– Major issues in Data Mining – Data Preprocessing – Definition – Data Clearing –Integration and Transformation – Data Reduction.

**UNIT 2**

**Data warehousing:** Introduction – Multidimensional Data Model – Data WarehouseArchitecture – Data Warehouse Implementation – From data warehousing to DataMining –On Line Analytical Processing – On Line Analytical Mining.

**UNIT-III:**

**Mining Frequent patterns:**The Apriori algorithm-Generating Association Rules from Frequent Itemsets:Efficiency of Apriori-Mining various kinds of Association Rules:Mining Multilevel Assosiation Rules-Mining Multidimensional Assosiation Rules from Relational Databases and Datawarehouse.

**Classification and Prediction:**Decision Tree Induction-Bayesian-Rules Based classification-Classification by back propogation-Other classification methods.

**UNIT-IV:**

**Cluster Analysis:**Types of Data in Cluster analysis:(a)Interval-(b)Scaled variables-(c)Binary-(d)Categorical-(e)Ordinary-(f)Ratio\_Scaled-(g)Vector objects.Categorization of major method:K-Means-K-Medoids Method-CLARANS.

**Hierarachical Methods:**Agglomerative and divisive Hierarachical clustring-Birch-ROCK-Chameleon-Grid Based methods:String-Wave Cluster.

**UNIT-V:**

Spatial DM - Multimedia DM - Text Mining - WWWeb Mining - **DM Application:** Finance - Retail Industry – Telecommunication – Biological - Intrusion Detection - Social impacts of DM - Trends in DM.

**Text Book:**

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 2nd Ed.,Morgan Kaufmann, 2006.

**Reference Books:**

1. Margaret H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2003.

2. Arun K.Pujari, “ Data Mining Techniques”, University Press, 2001.