



Solapur University, Solapur
Computer Science & Engineering
(Faculty of Engineering & Technology)
Syllabus for Ph.D. Course Work

<i>Sr. No</i>	<i>Subject</i>	<i>Examination Scheme Theory paper</i>
1	Research Methodology & Information Communication Technology	100 Marks
2	Recent Trends in Computer Science & Engineering	100 Marks
3	Modern Topics in Computer Science & Engineering	100 Marks
4	Elective – Advanced Development in Computer Science & Engineering	100 Marks

Elective –

1. Advanced Development in Data Mining & Warehousing
2. Advanced Development in Distributed System
3. Advanced Development in Network Security

Note – 1. Candidate will select an elective in consultation with guide.

2. If required, guide may recommend an elective from-

- a) Electronics Engineering*
- b) Electronics & Telecommunication Engineering*

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Paper II– Recent Trends in Computer Science & Engineering

Examination scheme: Theory paper: 100 marks (3 hrs duration)

Unit 1 Advanced Architectures

Memory hierarchy design: Introduction, Advanced optimization of cache performance, memory technology & optimization, Protection: Virtual memory & virtual machines

Storage systems: Introduction, advanced topics in disk storage, definition & examples of real faults and failures

Unit 2 Mobile Technology

Complete review of 2G system-GSM along with its services for high data rate, Protocols for mobile computing, WAP architecture, WAP transport layer security

Unit 3 Design and Analysis of Algorithms

Parallel algorithms, Basics of Linear-Programming Algorithms, Graph Algorithms, Geometric algorithms, Approximation Algorithms

Unit 4 Compilers

Code optimization challenges, Informal compiler algorithm Notation, Automatic code , generators, Control flow, data flow dependency and alias, Code hybridization

Unit 5 Distributed databases

Homogeneous and heterogeneous databases distributed transactions and data storage, Commit protocols, concurrency control, query processing in distributed databases.

Unit 6 Data Mining

Sequence rules, intelligent e-marketing, concept clustering, mining images, Data mining with Neural Networks, Genetic algorithm approach to Data mining.

REFERENCE BOOKS:

1. Parallel computing: Theory & practice – Michael J. Quinn, McGraw Hill – II edition
2. Computer Architecture - A quantitative Approach – IV edition, Hennessey Patterson, Morgan Kaufmann Publishers
3. Advanced Computer Architectures: A design space approach – Dezso Sima, Terrence Fountain, Peter Cacsuk - Pearson Education
4. Advances in Data Mining : Applications in E- commerce, Medicine and knowledge Management -Peter Perner. Springer publications
5. Data Mining on Multimedia data –Peter Perner. Springer publications
6. Advances in Data Mining : Medical applications, e-commerce Marketing and Theoretical aspects- Peter Perner. Springer publications
7. Data Mining – Opportunities and challenges- John Wang -Publication : Idea Group Inc (IGI)
8. Data Methods and Models -By Daniel T. Larose-Publication John Wiley and Sons
9. Data Mining : Concepts, Models methods and algorithms-Mehmed Kantardzic.- Publisher– Wiley Interscience
10. Wireless & Cellular Telecommunication - William C Y Lee – IV Edition
11. Mobile communications: Jochen Schiller – II edition-Pearson Education
12. Wireless Communication Technology - Roy Blake-Delmar Cengage Learning Publishers
13. Advanced Compiler Design Implementation, Steven S. Muchnick, Courier Cooperation Academic Press.
14. A compiler Design Handbook : Optimization and Machine code generation. Y.N. Srikant, Priti Shankar CBC Press
15. Engineering a Compiler-Keith D. Cooper Linda Torczon-Morgan Kaufmann Publication
16. Modern Compiler Design-Dick Grune, Criel J.H. Jacobs Koen G. Langendoen-Wiley Publications
17. Algorithms for Compiler design- O. G. Kakde- Compiler Construction: 13th International Conference, CC 2004 Proceedings-Springer
18. Database System Concept-Silberchartz, Korth, Sudarshan, Mcgrawhill International Edition
19. T. H. Cormen, C. E. Leiserson and R. L. Rivest, Introduction to Algorithms, MIT Press.
20. V. Aho, J. E. Hopcroft and J. D. Ullman, the Design and Analysis of Algorithms, Addison-Wesley.

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Paper III– Modern Topics in Computer Science & Engineering

Examination scheme: Theory paper: 100 marks (3 hrs duration)

Unit 1 Grid Computing

Introduction – Grid versus other distributed systems, Motivation for using a grid, Grid architecture – basic concepts, some standards for grid, quick overview of grid projects.

Unit 2 Cloud Computing

Introduction, Cloud application architectures, security – data security, network security, host security, compromise response, case study - Amazon cloud computing.

Unit 3 Distributed Computing

Distributed computing systems models, Distributed shared Memory, message passing, Process Management.

Unit 4 Mobile Technology

3G Technology – UMTS- Network architecture – MAC, RLC, PDCP, BMC, RRC layers, Overview of 3GPP

4G Technology – Introduction, Objectives, approach technologies used for development

Unit 5 Data Warehousing

Data Warehouse: Multidimensional Data Model, Data Warehouse Architecture, Data Preprocessing: Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization

Unit 6 Data Mining

Descriptive Statistical Measures, Classification: Decision Trees, Bayesian Classification, Rule-based classification, Classification by Back-propagation, Association Rule Based, Cluster Analysis: K-means, Agglomerative Hierarchical Clustering, Association Rules: Apriori algorithm

REFERENCES

1. Cloud application architectures – Building application & infrastructure in the cloud
George Reese, - O Reilly Publishers
2. Introduction to grid computing (2009 I edition) – Frederic Magoules-- CRC Press
3. J. Han and M. Kamber, “Data Mining- Concepts and Techniques”, 2nd Edition, Morgan Kaufmann, 2006.
4. Margaret H. Dunham,” Data Mining Introductory and Advanced Topics”, Prentice Hall
5. P. Tan, M. Steinbach and V.,Kumar, “Introduction to Data Mining”, Addison Wesley, 2006.
6. Imhoff, Galemme, Geiger, “Mastering data warehouse design”, Wiley dreamtech
7. Distributed Operating Systems Concepts and Design: P. K. Sinha, Prentice Hall of India.
8. Wireless & Cellular Telecommunication - William C Y Lee – IV Edition
9. Mobile communications: Jochen Schiller – II edition, Pearson Education
10. Wireless Communication Technology - Roy Blake ,Delmar Cengage Learning Publishers

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PAPER – IV : Elective: Advanced Development in Data Mining & Warehousing

Examination scheme: Theory paper: 100 marks (3 hrs duration)

1) Unit 1: Introduction :

Growth of Data Mining research, Recent Research Achievements, Trends that Effect Data Mining, Research Challenges.

2) Unit 2: Data Warehousing :

From Data mining Tools to Solutions, Evolution of Data Mining Systems, Knowledge Discovery process

3) Unit 3: Data Mining Supporting Technologies Overview :

Verification Discovery, DSS, OLAP Data warehouse, Data Mining Process, Data Mining Techniques.

4) Unit 4: Data Types, Input and Output of Data Mining Algorithms :

Instances and features, concept learning and concept description, Output of Data Mining knowledge representation

5) Unit 5: Preprocessing and Post processing in Data Mining

Steps, Discretization, Features Extraction, Selection and Construction, Missing Data and Methods to deal with it , Data sets.

6) Unit 6: Mining Techniques :

Association rule mining , Machine learning , Classification and regression , cluster Analysis, Visualization of Multidimensional Data

Reference books :

Insight into Data Mining – Theory and Practice

- K.P. Soman, Shyam Diwakar V. Ajay
Prentice Hall of India Private Ltd.

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PAPER IV : Elective : Advanced Development in Distributed System

Examination scheme: Theory paper: 100 marks (3 hrs duration)

Unit 1: Fundamentals of distributed computing

Evolution, distributed computing system models, issues in designing DOS, introduction to distributed computing environment.

Unit 2: Message passing

Features, issues, synchronization, buffering, encoding and decoding, process addressing, failure handling.

Unit 3: Communication

Distributed shared memory: general architecture, design and implementation, structure of shared memory space, consistency models, RPC model: implementation, RPC messages, marshaling, unmarshaling, server management, communication protocols, RMI

Unit 4: Clock synchronization

Event ordering, mutual exclusion, deadlock, election algorithm

Unit 5: Process and Resource Management

Introduction, process migration, threads, task assignment approach, load balancing and load sharing approach.

Unit 6: Distributed File systems and security:

File models, file accessing models, file sharing semantics, file caching schemes, filereplication, fault tolerance, cryptography, authentication and access control

References:

1. Distributed operating systems, concepts and design
By P. K. Sinha, Prentice hall of India.
2. Distributed systems, principles and paradigms
By Andrew Tenenbaum, Maarten vanSteen .

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PAPER IV : Elective : Advanced Development in Network Security

Examination scheme: Theory paper: 100 marks (3 hrs duration)

Unit 1: Introduction

Security Trends, OSI security architecture, Network Threats and attacks, Security services and security mechanisms.

Unit 2 : Symmetric Ciphers

Encryption techniques, Block Ciphers, Data Encryption Standard (DES), AES

Unit 3: Public Key Encryption and Hash Function

Principles of Public Key cryptosystems, RSA Algorithm, Key Management, Diffie Hellman Key exchange, ECC, MAC, Hash functions, Security of MAC and Hash SHA, HMAC.

Unit 4 : Digital Signatures and Authentication Protocols

Digital signatures, Authentication Protocols, DSS

Unit 5 : Network Security Applications

Kerberos, X.509 Authentication Service,

Email security: PGP, S/MIME

Web Security: SSL , TLS , SET .

IP security: Authentication Headers, ESP, Security Associations

Unit 6: System Security

Intruders, Intrusion detection, Password Management, Virus and its threats, Virus countermeasures, Distributed DOS attacks, Firewall

References:

1. Cryptography and Network security
By William Stallings, Pearson Education.
2. Cryptography and Network Security
By Behrouz A. Forouzan , Tata Mcgraw-Hill
3. Network Security: The Complete reference
By Robert Bragg, Mark Rhodes, Tata Mcgraw-Hill