JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. ECM-II Sem

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(A80545) INFORMATION SYSTEMS
(Elective-III)

UNIT I:

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital Libraries and Data Warehouses, Information Retrieval System Capabilities - Search, Browse, Miscellaneous.

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UNIT II:

Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction, Data Structures: Introduction, Stemming Algorithms, Inverted File Structures, N-Gram Data Structure, PAT Data Structure, Signature File Structure, Hypertext Data Structure - Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages.

UNIT III:

Document and Term Clustering: Introduction, Thesaurus Generation, Item Clustering, Hierarchy of Clusters - User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective

UNIT IV:

Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the Internet and Hypertext - Information Visualization: Introduction, Cognition and Perception, Information Visualization Technologies.

UNIT V:

Text Search Algorithms: Introduction, Software Text Search Algorithms, Hardware Text Search Systems, Information System Evaluation: Introduction, Measures used in System Evaluation, Measurement Example – TREC Results.

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TEXT BOOKS:

1. Information Storage and Retrieval Systems: Theory and Implementation by Kowalski, Gerald, Mark T Maybury, Springer.

2. Modern Information Retrieval by Ricardo Baeza-Yates, Pearson Education, 2007.

3. Information Retrieval: Algorithms and Heuristics by David A Grossman and Ophir Frieder, 2nd Edition, Springer, 2004.

REFERENCES:

1. Information Retrieval Data Structures and Algorithms by William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.

2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.

3. Introduction to Information Retrieval by Christopher D. Manning and Prabhakar Raghavan, Cambridge University Press, 2008.

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(A80453) TELECOMMUNICATION SWITCHING SYSTEMS

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Objectives:

- To learn Switching, Signaling and traffic in the context of telecommunication network.
- To expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems.
- To study signaling, packet switching.

UNIT -I:

Switching Systems: Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point Technology; Crossbar Exchange Organization; A General Trunking; Electronic Switching; Digital Switching Systems.

UNIT -II:

Telecommunications Traffic: Introduction; The Unit of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems-Theory; Traffic Performance; Loss Systems in Tandem; Use of Traffic Tables; Queuing Systems-The Second Erlang Distribution; Probability of Delay; Finite Queue Capacity; Some Other Useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications of Delay Formulae.

UNIT -III:

Switching Networks: Single Stage Networks; Gradings-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks

Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching.

Control of Switching Systems: Call Processing Functions-Sequence of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability and Security; Stored Program Control.

UNIT -IV:

Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems-Outband Signaling; Inband (VF) Signaling; PCM Signaling; Inter Register Signaling; Common Channel

Signaling Principles-General Signaling Networks; CCITT Signaling System Number 6; CCITT Signaling System Number 7; The High Level Data Link Control Protocol; Signal Units; The Signaling Information Field.

UNIT -V:

Packet Switching: Introduction; Statistical Multiplexing; Local Area And Wide Area Networks-Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Large Scale Networks-General; Datagrams and Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

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TEXT BOOKS:

1. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education, 2006.

2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks," Prentice Hall of India Pvt. Ltd., 2006.

REFERENCE BOOKS:

1. John C Bellamy, "Digital Telephony," John Wiley International Student Edition, 3rd Edition, 2000.

2. Behrouz A. Forouzan, "Data Communications and Networking," TMH, 2nd Edition, 2002.

3. Tomasi," Introduonction to Data Communication and Networking," Pearson Education, 1st Edition, 2007.

Outcomes:

On completion of this course, it is expected that the student will be able to:

*   Analyze and evaluate fundamental telecommunication traffic models.
*   Understand basic modern signaling system.
*   Solve traditional interconnection switching system design problems.
*   Understand the concept of packet switching.

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(A80543) DATABASE SECURITY
(Elective-IV)

Objectives:

- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design

UNIT- I

Introduction: Introduction to Databases Security Problems in Databases Security Controls Conclusions

Security Models -1: Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

UNIT- II

Security Models -2: Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion

Security Mechanisms : Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

UNIT- III

Security Software Design : Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design

Statistical Database Protection & Intrusion Detection Systems: Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery

UNIT- IV

Models For The Protection Of New Generation Database Systems -1: Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases

UNIT- V

Models For The Protection Of New Generation Database Systems -2: A

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Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

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TEXT BOOKS:

1. Database Security by Castano *Pearson Edition (1/e)*
2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

REFERENCE BOOK:

1. Database security by alfred basta, melissa zgola, CENGAGE learning.

Outcomes:

- Ability to carry out a risk analysis for large database.
- Ability to set up, and maintain the accounts with privileges and roles.

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(A80444) OPTICAL COMMUNICATIONS
(Elective-IV)

Objectives:

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The objectives of the course are:

- To realize the significance of optical fibre communications.
- To understand the construction and characteristics of optical fibre cable.
- To develop the knowledge of optical signal sources and power launching.
- To identify and understand the operation of various optical detectors.
- To understand the design of optical systems and WDM.

UNIT -I:

Overview of Optical Fiber Communication: - Historical development, The general system, Advantages of Optical Fiber Communications, Optical Fiber Wave Guides- Introduction, Ray Theory Transmission, Total Internal Reflection, Acceptance Angle, Numerical Aperture, Skew Rays, Cylindrical Fibers- Modes, V number, Mode Coupling, Step Index Fibers, Graded Index Fibers.

Single Mode Fibers- Cut Off Wavelength, Mode Field Diameter, Effective Refractive Index, Fiber Materials Glass, Halide, Active Glass, Chalgenide Glass, Plastic Optical Fibers.

UNIT -II:

Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses, Information Capacity Determination, Group Delay, Types of Dispersion - Material Dispersion, Wave-Guide Dispersion, Polarization Mode Dispersion, Intermodal Dispersion, Pulse Broadening, Optical Fiber Connectors- Connector Types, Single Mode Fiber Connectors, Connector Return Loss. www.universityupdates.in

UNIT -III:

Fiber Splicing: Splicing Techniques, Splicing Single Mode Fibers, Fiber Alignment and Joint Loss- Multimode Fiber Joints, Single Mode Fiber Joints, Optical Sources- LEDs, Structures, Materials, Quantum Efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes- Modes, Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Resonant Frequencies, Reliability of LED & ILD.

Source to Fiber Power Launching: - Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.

UNIT -IV:

Optical Detectors: Physical Principles of PIN and APD, Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors, Optical Receiver Operation- Fundamental Receiver Operation, Digital Signal Transmission, Error Sources, Receiver Configuration, Digital Receiver Performance, Probability of Error, Quantum Limit, Analog Receivers.

UNIT -V:

Optical System Design: Considerations, Component Choice, Multiplexing, Point-to- Point Links, System Considerations, Link Power Budget with Examples, Overall Fiber Dispersion in Multi-Mode and Single Mode Fibers, Rise Time Budget with Examples.

Transmission Distance, Line Coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, TMH, 4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education, 3rd Edition, 2009.

REFERENCE BOOKS:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Introduction to Fiber Optics by Donald J.Sterling Jr. – Cengage learning, 2004.
5. Optical Communication Systems – John Gowar, 2nd Edition, PHI, 2001.

Outcomes:

At the end of the course, the student will be able to:

- Understand and analyze the constructional parameters of optical fibres.
- Be able to design an optical system.
- Estimate the losses due to attenuation, absorption, scattering and bending.
- Compare various optical detectors and choose suitable one for different applications.

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(A80455) WIRELESS SENSOR NETWORKS

(Elective-IV)

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Unit I

Introduction: Unique constraints and challenges, advantages of Sensor Networks, Sensor Network Applications, Collaborative Processing, Overview and applications of Wireless Sensor Networks, Basic Wireless Sensor Technology-Sensor Node Technology, Sensor Taxonomy, WN operating Environment, WN trends. Radio Propagation primer.

Unit II

MAC protocols for Wireless Sensor Networks: Introduction, Background, Fundamentals of MAC protocols, MAC protocols for WSNs, Sensor-MAC case study, IEEE 802.15.4 LR-WPANs standard case study.

Unit III

Routing protocols for Wireless Sensor Networks: Introduction, background, Data dissemination and gathering, routing challenges and design issues, routing strategies in wireless sensor networks.

Networking Sensors: Key assumptions, Medium Access Control, General Issues, Geographic, Energy-Aware Routing, Attribute-based Routing.

Unit IV

Transport Control protocols for Wireless Sensor Networks: Traditional Transport control protocols, Transport protocol design issues, Examples of existing transport control protocols, performance of transport control protocols.

Performance and Traffic Management: Introduction, background, WSN Design Issues, Performance Modeling of WSNs, Case Study-Simple computation of the system life span.

Unit V

Network Management for Wireless Sensor Networks: Introduction, Network management requirements, traditional network management models, network management design issues, MANNA, Naming and Localization.

Operating Systems for Wireless Sensor Networks: Introduction, operating system design issues, Examples of operating systems-TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS, SenOS, EMERALDS, PicOS.

TEXT BOOKS:

1. Wireless Sensor Networks- Technology, protocols and applications, Kazem Sohraby, Daniel Minoli and Taieb Znati, Wiley Student Edition.

2. Wireless Sensor Networks-An Information processing approach, Feng Zhao, Leonidas Guibas, Morgan Kaufmann publications, 2004.

REFERENCE BOOKS:

1. Adhoc Mobile Wireless Networks-Principles, Protocols and Applications, Subir kumar Sarkar, T G Basavaraju and C Puttamadappa, Auerbach Publications, Taylor & Francis group.

2. Adhoc Wireless Networks-Architectures and Protocols, C. Siva Ram Murthy and B.S. Manoj, Pearson Education.

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(A80549) REAL TIME OPERATING SYSTEMS
(Elective-IV)

UNIT-I:

Introduction: Introduction to UNIX, Overview of Commands, File I/O, (Open, Create, Close, Lseek, Read, Write), Process Control (Fork, Vfork, Exit, Wait, Waitpid, Exec), Signals, Interprocess Communication,(pipes, FIFOs, Message Queues, Semaphores, Shared Memory)

UNIT-II:

Real Time Systems: Typical Real Time Applications, Hard Vs Soft Real-Time Systems, A Reference Model of Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Work Load, Periodic Task Model Precedence Constraints and Data Dependency Functional Parameters, Resource Parameters of Jobs and Parameters of Resources.

UNIT-III:

Scheduling: Commonly Used Approaches to Real Time Scheduling Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs State Systems, Effective Release Time and Dead Lines, Offline Vs Online Scheduling.

UNIT-IV:

Real Time Operating Systems & Programming Tools: Operating Systems Services, I/O Subsystems, RTOS, Interrupt Routine in RTOS Environment. Micro C/OS-II- Need of a Well Tested & Debugged RTOS, Use of µCOS-II.

UNIT-V:

VX Works & Case Studies: Memory Managements Task State Transition Diagram, Pre-Emptive Priority, Scheduling Context Switches- Semaphore-Binary Mutex, Counting Watch Dugs, I/O System

Case Studies of Programming with RTOS- Case Study of Automatic Chocolate Vending M/C Using µCOS RTOS, Case Study of Sending Application Layer Byte Streams on a TCP/IP Network.

TEXT BOOKS:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, TMH.
2. Real Time Systems- Jane W. S. Liu- Pearson Education

3. Real Time Systems- C. M.V. Krishna, KANG G. Shin- TMH

REFERENCES:

1. Advanced UNIX Programming, Richard Stevens

2. VX Works Programmers Guide

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(A80449) NETWORK SECURITY
(Elective-IV)

Objectives:

The main objectives are:

- To acquire an understanding of network security and its changing character.
- To understand how network security is conceptualized and carried out.
- To examine conventional encryption and cryptography techniques.
- To articulate informed opinion about issues related to network IP security.
- To identify and investigate web security requirements.
- To appreciate the concepts of SNMP and design principles of firewall.

UNIT –I:

Security Attacks: (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT –II:

Conventional Encryption: Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT –III:

Public Key Cryptography: principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT –IV:

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Web Security Requirements: Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT –V:

Basic Concepts of SNMP: SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats.

Firewall: Design principles, Trusted Systems, Intrusion Detection Systems.

TEXT BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, wiley Dreamtech

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)

2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.

3. Cryptography and network Security, Third Edition, Stallings, PHI/Pearson

4. Principles of Information Security, Whitman, Thomson.

5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH

6. Introduction to Cryptography, Buchmann, Springer.

7. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

8. Information Systems Security,Godbole,Wiley Student Edition.

9. Cryptography and network Security, B.A.Forouzan, D.Mukhopadhyay, 2nd Edition,TMH.

Outcomes:

Upon completion of the course, the student will be able to:

- Acquire an understanding of network security and its changing character.
- Understand conventional encryption and cryptography techniques.
- Analyze issues related to network IP security.
- Identify and investigate web security requirements.
- Know the concepts of SNMP and design principles of firewall.

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(A80087) INDUSTRY ORIENTED MINI PROJECT

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(A80089) SEMINAR

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(A80088) WORK PROJECT

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(A80090) COMPREHENSIVE VIVA