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Other university B.E./B.Tech - G ECE Level 4 syllabus

Information Security

INFORMATION SECURITY

CREDITS - 03

1. Introduction, CRYPTO BASICS : Classic Crypto, Simple Substitution Cipher,, Cryptanalysis of a simple substitution, Double Transposition Cipher, One time Pad, Project VENONA, Codebook Cipher.

2. SYMMETRIC KEY CRYPTO : Stream Ciphers, A5/1, RC4, Block Ciphers, Feistel Cipher, DES, Triple DES, AES.

3. PUBLIC KEY CRYPTO : Knapsack, RSA, Diffie Hellman, Uses for Public Key Crypto.

4. HASH FUNCTION :

AUTHENTICATION : Authentication Methods, Keys versus Passwords, Biometrics, Two Factor Authentication.

AUTHORIZATION : Access Control Matrix, Multilevel Security Models, Firewalls, Intrusion Detection.

5. SOFTWARE FLAWS AND MALWARE : Software Flaws, Malware, Miscellaneous Software Based Attacks.

6. OPERATING SYSTEM AND SECURITY : Operating System Security Functions, Trusted Operating System, Next Generation Secure Computing Base.

Reference Books :

1. Introduction to Computer Security by Bishop and Venkatramanayya, Pearson Education.

2. Cryptography and Network Security : Principles and Practice by Stallings, PHI.

Personnel Management and Industrial Relation

PERSONNEL MANAGEMENT AND INDUSTRIAL RELATION

CREDITS - 03

1. Meaning, concept, function , & importance of personnel management, role of a personnel manager, personnel policies Need of a personnel policies, org anization of personnel Department (functional basis, service basis and chentile basis)

2. Manpower planning : Meaning & concept, need for manpower planning, types of manpower planning, meaning and concept of job analysis, job description & job specification, uses of job analysis information, Recruitment, selection meaning and steps of selection process, meaning of induction

3. Training and develop : Meaning, need & importance for training, method of training, development meaning of development, method of development.

4. Performance appraised :(a) Meaning, Objective, method of performance appraisal .

(b) Transfer : meaning objective, types.

(c) Promotion : Meaning , policies, basis of promotion.(Separation : Resignation, Discharge & Dismissal, Suspension & Retrenchment, Layoff.

5. Wages and salary administration :(a). Meaning purpose & principle of wage & salary administration, factors influencing wage & salary adminis tration.

(b). Meaning of wage & salary, minimum wage , fair wage& living , wage.

(c). Meaning of money and real wage.

(d). Methods of wage payment time rate & piece rate.

(e). Incentive Financial Incentive& non financial Incentive, method of wage paymen t based on result.

6.(a) Health, safety and welfare facilities.

(b) social security

(1) meaning and concepts, objective.

(2) form of social security social insurance & social assistance.

(c) Problem arising from diseas e , invalidity , accident, old age and unemployment.

7.(a).Industrial Relation : meaning & concept, changing concept of industrial relation, role played by the employer, trade union & government, current I. R. position in India, I.R. policies of government of India.

(b). Trade Union : Meaning and concept, objective, functions, type, method of trade union.

Reference Book :

1. Industrial relation, Trade Union & Labour Relation by G.P.Sinha & PRN Sinha, Pearson.

Mobile Communication

Mobile Communication(404189)

Unit I : Telecommunication Switching & Traffic 8L

Telecommunication switching: Message switching, Circuit switching, Manual System, Electronic Switching. Digital switching: Switching functions, Telecommunication Traffic: Unit of Traffic, Traffic measurement, A mathematical model, Lost- call systems: Theory, traffic performance, loss systems in tandem, traffic tables. Queuing systems: Erlang Distribution, probability of delay, Finite queue capacity, Systems with a single server, Queues in tandem, delay tables and application of Delay formulae.

Unit II: Switching Networks and Signaling 8L

Single Stage Networks, Gradings, Link Systems, Grades of service of link systems. Time Division Switching: Space and time switching, Time division switching networks, Synchronization, Call processing Functions, Common Control, Reliability, Availability and Security. Signaling: Customer line signaling. FDM carrier systems, PCM signaling, Inter-register signaling, Common channel signaling principles, CCITT signaling No. 6, CCITT signaling No. 7, Digital customer line signaling.

Unit III: Cellular Concepts6L

Evolution of Wireless systems, Introduction to cellular telephone system, Frequency reuse, Channel Assignment, Handoff strategies, Cell Splitting, Propagation Mechanism: Free space loss, Reflection, Diffraction, Scattering. Fading and Multipath: Small scale multipath propagation, Impulse response model of multipath channel. Multiple Access Techniques-TDMA, FDMA, CDMA

Unit IV: First and Second Generation Mobile Systems 6L

First Generation Cellular Systems, AMPS, GSM Cellular Telephony: Introduction, Basic GSM Architecture, Basic radio transmission parameters in GSM system, Logical Channels, GSM time hierarchy, GSM burst structure, Description of call setup procedure, Handover, Modifications and derivatives of GSM.

Unit V: GSM Services 8L

GSM Physical layer: Speech Coding and decoding, GMSK modulation, Data transmission in GSM: Data Services, SMS, HSCSD, GPRS, EDGE.

Unit VI : CDMA Based Mobile Systems 8L

Motivation for CDMA use, Spreading Sequences, Basic Transmitter and Receiver schemes, Rake Receiver, IS-95 system: Frequency Range, Downlink transmission, Uplink transmission, Power control, Introduction to 3G mobile systems: W-CDMA and cdma-2000.

Text Books

1. J. E. Flood , "Telecommunications Switching, Traffic and Networks", Pearson Education
2. Krzysztof Wesolowski, "Mobile Communication Systems", Wiley Student Edition.

Reference Books

1. Theodore S Rappaport, "Wireless Communications Principles and Practice" Second Edition, Pearson Education
2. John C. Bellamy, "Digital Telephony", Third Edition; Wiley Publications

3. Thiagarajan Vishwanathan, "Telecommunication Switching Systems and Networks"; PHI Publications
4. Wayne Tomasi, "Electronic Communications Systems"; 5th Edition; Pearson Education
5. Vijay K Garg, Joseph E Wilkes, "Principles and Applications of GSM" Pearson Education
6. Vijay K Garg, Joseph E Wilkes, "IS-95CDMA and CDMA 2000 Cellular/PCS Systems Implementation" Pearson Education
7. Misha Schwartz, "Mobile Wireless Communications", Cambridge University Press

Broadband Communication Systems

Broadband Communication Systems(404190)

UNIT I: Light wave System Components

Key Elements of Optical Fiber Systems, Optical Fibers as a Communication Channel: Optical Fiber Modes and Configurations , Mode Theory for Circular Waveguides , Single-mode Fibers, Graded-index Fiber Structure, Signal Degradation in Optical Fibers. Optical Sources: Basic Concepts and characteristics of LEDs and LASERs. Photodetectors: Basic Concepts, Common Photodetectors.

UNIT II: Lightwave Systems

System Architectures, Point-to-Point Links: System Considerations, Design Guidelines: Optical Power Budget, Rise Time Budget, Long-Haul Systems.

UNIT III: Multichannel Systems

Overview of WDM, WDM Components: 2 x 2 Fiber Coupler, Optical Isolators and Circulators, Multiplexers and De-multiplexers, Fiber Bragg Grating, FBG applications for multiplexing and De-multiplexing function, Diffraction Gratings, Overview of Optical Amplifiers: SOA, EDFA and RFA in brief.

UNIT IV: Orbital Mechanics and Launchers

History of Satellite Communication, Orbital Mechanics, Look angle determination, Orbital perturbations, Orbital determination, Launchers and Launch Vehicles, Orbital effects in communication system performance.

UNIT V: Satellites

Satellite Subsystems, Attitude and control systems (AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystems, Satellite antennas, Equipment Reliability and space qualification.

UNIT VI: Satellite Communication Link Design

Introduction, Basic transmission Theory, System Noise Temperature and G/T Ratio, Design of Downlinks, Satellite Systems using Small Earth Stations, Uplink Design, Design specified C/N : Combining C/N and C/I values in Satellite Links, System Design Examples

Text Books

1. Gerd Keiser, "Optical fiber Communications", Tata McGraw Hill, 4th edition.
2. Timothy Pratt, Charles Bostian, Jeremy Allnut "Satellite Communications", John Wiley & Sons.

Reference Books

1. Govind P. Agrawal, Fiber-Optic Communication Systems, Wiley, 3rd edition.
2. Dennis Roody, "Satellite Communications", McGraw Hill

VLSI Design & Technology

VLSI Design & Technology (404181)

Unit I: VHDL Modeling

Data objects, Data types, Entity, Architecture & types of modeling, Sequential statements, Concurrent statements, Packages, Sub programs, Attributes, VHDL Test bench, Test benches using text files. VHDL modeling of Combinational, Sequential logics & FSM, Meta-stability.

Unit II: PLD Architectures

PROM, PLA, PAL: Architectures and applications. Software Design Flow. CPLD Architecture, Features, Specifications, Applications. FPGA Architecture, Features, Specifications, Applications.

Unit III: SoC & Interconnect

Clock skew, Clock distribution techniques, clock jitter. Supply and

ground bounce, power distribution techniques. Power optimization. Interconnect routing techniques; wire parasitic, Signal integrity issues. I/O architecture, pad design. Architectures for low power.

Unit IV: Digital CMOS Circuits

MOS Capacitor, MOS Transistor theory, C-V characteristics, Non ideal I-V effects, Technology Scaling. CMOS inverters, DC transfer characteristics, Power components, Power delay product. Transmission gate. CMOS combo logic design. Delays: RC delay model, Effective resistance, Gate and diffusion capacitance, Equivalent RC circuits; Linear delay model, Logical effort, Parasitic delay, Delay in a logic gate, Path logical efforts.

Unit V: Analog CMOS Design

Current sink and source, Current mirror. Active load, Current source and Push-pull inverters. Common source, Common drain, Common gate amplifiers. Cascode amplifier, Differential amplifier, Operational amplifier.

Unit VI: Testability

Types of fault, Need of Design for Testability (DFT), Testability, Fault models, Path sensitizing, Sequential circuit test, BIST, Test pattern generation, JTAG & Boundary scan, TAP Controller.

Multimedia Technology and Application (Elective)

MULTIMEDIA TECHNOLOGY AND APPLICATION

CREDITS - 03

1.Introduction : Multimedia today, Impact of Multimedia, Multimedia Systems, Components and its Applications.

2.Text and Audio : Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI.

3.Image and Video : Image: Formats, Image Colour Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording formats

and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture and Computer based Animation.

4.Synchronization : Temporal relationships, synchronization accuracy specification factors, quality of service.

5.Storage models and Access Techniques : Magnetic media, optical media, file systems (traditional, multimedia)

6.Multimedia devices : Output devices, CD ROM, DVD, Scanner, CCD

7.Image and Video Database : Image representation, segmentation, similarity based retrieval, image retrieval by colour, shape and texture: Indexing k d trees, R trees, Quad trees; Case Studies : QBIC, Virage, Video Contentquerying, video segmentation, indexing.

8. Document Architecture and Content Management : Content Design and Development, general Design Principles.

9.Hypertext : Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing, Case study of Application.

10.Multimedia Application: Interactive television, Video on demand, Video Conferencing, Educational demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

Reference Books :

1. Multimedia Literacy by Fred Hoffsteller, McGraw Hill.
2. Multimedia Fundamentals : Vol. 1 Media Coding and Content Processing by Ralf Steinmetz and Klara Hahrstedt, PHI.
3. Multimedia in Practice : Technology and Application by J. Jeffcoate, PHI.
4. Multimedia Communications by Fred Halsall, Pearson Ed.

Wireless & Mobile Communication

Wireless & Mobile Communication

Evolution of mobile radio communication fundamentals.

General Model of

Wireless Communication Link, Types of Signals, Cellular

Infrastructure,

Cellular System Components, Antennas for Cellular Systems,

Operation of

Cellular Systems, Channel Assignment, Frequency reuse, Channel

Assignment

strategies, Handoff Strategies Cellular Interferences, Sectorization;

Wireless

Channel and Radio Communication, Free Space Propagation Model,

Channel

Noise and Losses, Fading in Land Mobile Systems, Multipath Fading,

Fading

Effects on Signal and Frequency, Shadowing.

Wireless Channel Modeling: AWGN Channel, Rayleigh Channel,

Rician

Fading Channel, Nakagami Fading Channel, Okumura and Hata Path

Loss

Model; Channel Modelling: Stochastic, Flat Fading, Wideband Time-

Dispersive Channel Modelling.

Theory of Vocoders, Types of Vocoders; Spread Spectrum

Modulation,

Pseudo-Noise Codes with Properties and Code Generation

Mechanisms, DSSS

and FHSS Systems, Time Hopping and Hybrid Spread Systems;

Multicarrier

Modulation Techniques. Zero Inter Symbol Interference

Communication

Techniques, Detection Strategies, Diversity Combining Techniques:

Selection

Combining, Threshold Combining, Equal Gain Combining, Maximum

Ratio Combining; Spatial Diversity and Multiplexing in MIMO

Systems, Channel

Estimation.

Equalization Techniques: Transversal Filters, Adaptive Equalizers,

Zero

Forcing Equalizers, Decision Feedback Equalizers, and related

algorithms.

Multiplexing and Multiple Access: FDMA, TDMA, CDMA, OFDMA,

SC-
FDMA, IDMA Schemes and Hybrid Method of Multiple Access Schemes,

RAKE Receiver; Multiple Access for Radio Packet Systems: Pure ALOHA, Slotted ALOHA, CSMA and their versions; Packet and Pooling Reservation Based Multiple Access Schemes.

GSM system for mobile Telecommunication, General Packet Radio Service, Edge Technology; CDMA 2000, Wireless Local Loop, IMT 2000 and UMTS, Long Term Evolution (LTE), Mobile Satellite Communication, Introduction to Mobile Adhoc Networks, Li-Fi Communication, Ultra-Wideband Communication, Mobile data networks, Wireless Standards IMT 2000, Introduction to 4G and concept of NGN.

Satellite & RADAR systems

REC083 SATELLITE & RADAR SYSTEMS

I Elements of Satellite Communication, Orbital mechanics, look angle and orbit determination, launches and launch vehicle, orbital effects, Introduction to geo- synchronous and geo-stationary satellites.

II Satellite sub-systems: Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system, Introduction to satellite link design, basic transmission theory, system noise temperature and G/T ratio, design of down link and uplink, design of satellite links for specified C/N, satellite data communication protocols.

III Direct broadcast satellite television and radio, satellite navigation and the global positioning systems, GPS position location principle, GPS receivers and codes, Satellite Signal Acquisition, GPS navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation.

IV Introduction to radar, radar block diagram and operation, radar

frequencies, Applications of radar, The Radar Equation: Detection of signals in noise , Receiver noise and the signal to noise ratio, Probabilities of detection and false alarm, Integration of Radar Pulses, Radar cross section of targets, Radar cross section fluctuations, Transmitter Power, Pulse Reception Frequency , Antenna Parameters, System Losses.

V Tracking Radar: sequential lobbing, conical scan, mono-pulse Tracking, low angle tracking, tracking in range. MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay Line cancellers, Staggered Pulse Reception Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance.

Text / Reference Books:

1. Merrill I. Skolnik "Introduction to Radar Systems", Mc Graw- Hill.
2. J.C.Toomay, Paul J. Hannen "Principles of Radar", PHI Learning.
3. B.Pratt, A.Bostian, "Satellite Communications", Wiley India.
4. D. Roddy, "Satellite Communications", McGrawhill Education.