SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

ELECTRONICS & TELECOMMUNICATION ENGINEERING

Syllabus Structure for

M.E. (Electronics & Telecommunication Engg.-Digital Electronics & Communication System) w.e.f. Academic Year 2013-14
SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY

STRUCTURE OF M.E. (Electronics & Telecommunication Engg.-Digital Electronics & Communication System)
With Effect from Academic Year 2013-14

Four Semester Course

Semester-I

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject</th>
<th>Teaching Scheme</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1</td>
<td>Communication Networks</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>CMOS VLSI Design</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Modern Digital Signal</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Probability &amp; Random</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Elective -I</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Seminar-I</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

Note –
- Seminar-I shall be delivered on a topic related to student’s broad area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student shall deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.
Semester-II

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Subject</th>
<th>Teaching Scheme</th>
<th>Credits</th>
<th>Credits</th>
<th>Credits</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
<td>Total</td>
<td>Credits (L)</td>
</tr>
<tr>
<td>1</td>
<td>RF &amp; Microwave circuit design</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td>2</td>
<td>High Speed Digital Design</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td>3</td>
<td>Advanced Embedded Systems</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td>4</td>
<td>Wireless &amp; Mobile Networks</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>5</td>
<td>Elective – II</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>6</td>
<td>Seminar – II</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>15</td>
<td>2</td>
<td>8</td>
<td>25</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Note –
- Seminar-II shall be delivered on a topic related to student’s particular area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student shall deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

List of Elective Subjects for semester I and II

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Elective - I</th>
<th>Elective - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Multimedia Communication</td>
<td>Image &amp; Video Processing &amp; broadcasting</td>
</tr>
<tr>
<td>2</td>
<td>DSP Processors</td>
<td>Cryptography &amp; Network Security</td>
</tr>
<tr>
<td>3</td>
<td>Optical Communication &amp; Networks</td>
<td>Antenna Theory &amp; Design</td>
</tr>
</tbody>
</table>
Solapur University, Solapur  

COMMUNICATION NETWORKS

Teaching Scheme  
Lectures – 3 Hrs. /Week  
Practical – 2 Hrs. /Week

Examination Scheme  
Theory Credits – 3.0  
Practical Credit- 1.0

SECTION-I

Unit 1: Internet Technology (06 Hrs.)  
The TCP/IP Internet, Internet Services, The Internet Architecture Board, Internet Request For Comments (RFCs), Transition To IPv6, Relationship Between IPv4 And IPv6, IPv6 Migration, IP address, ARP, RARP.

Unit 2: Datagram (08 Hrs.)  
Pinging, Datagram, ICMP, UDP, DHCP and Mobile IP, Internet Routing Protocols, multicast Routing, IP V6, 8

Unit 3: DNS Techniques (06 Hrs.)  
Flat Namespace, Hierarchical Names, Delegation of Authority for names, TCP/IP Internet domain names, official and unofficial Internet Domain names, items named and syntax of names, mapping domain, names to addresses, domain names resolution, efficient translation caching. The key to efficiency, Domain mapping message format, compressed name format, abbreviation of domain names, inverse mappings, pointer queries, object types and resource record contents, obtaining authority for a sub domain

SECTION-II

Unit 4: ATM Networks (08 Hrs.)  
Need of ATM, BISDN model, ATM layer, ATM Adaptation Layer, ATM signals, PNNI Routing.

Unit 5: Advanced Network Architecture (06 Hrs.)  
IP forwarding Architecture, Overlay model MPLS, RSVP, Differentiated Services

Unit 6: Giga Bit Ethernet (06 Hrs.)  
Architecture and overview of Giga Ethernet, MAC, Physical layer, IEEE 802.32 Standard
**Term work:**

*Term work shall consist of minimum eight experiments based on above syllabus*

**Reference books:**

3. ATM by Rich Seifert
5. “Gigabit Ethernet Networking by David Cunningham”, William G. Lane, Bill Lane.(Pearson Higher Education)
6. “Data Communication & Networking”,- Behrmz Foruzan (TMH)
CMOS VLSI DESIGN

Teaching Scheme
Lectures – 3 Hrs. /Week
Practical – 2 Hrs. /Week

Examination Scheme
Theory Credits – 3.0
Practical Credit- 1.0

SECTION-I

Unit 1: MOS transistor theory:
Physical structure of MOS transistor, accumulation, depletion & inversion modes, MOS device design equations, second order effects, Technology scaling

Unit 2: CMOS inverter:
Static and dynamic behavior of CMOS inverter, power and energy delay, impact of technology scaling on inverter

Unit 3: Combinational logic design in CMOS:
Static CMOS design- complementary CMOS, Ratioed logic and pass transistor logic; dynamic CMOS design- dynamic logic basic principle, speed and power dissipation, issues in dynamic design, cascading dynamic gates, comparison of static and dynamic designs in CMOS

SECTION-II

Unit 4: Sequential logic designs in CMOS:
Static latches and registers- the bistability principle, multiplexer based latches, Master-slave edge triggered register, low voltage static latches, static SR flip flops, dynamic latches and registers- dynamic transmission-gate edge triggered registers, C2MOS- A clock- skew insensitive approach, true single-phase clocked register (TSPCR)

Unit 5: Timing issues in digital circuits:
Timing classification: synchronous interconnect, mesochronous interconnect, plesiochronous interconnect, asynchronous interconnect, synchronous design- clock skew, jitter, clock distribution, latch based clocking, synchronizers and arbiters, using PLL for clock synchronization

Unit 6: Designing arithmetic and memory building blocks:
Designing fast adders, designing fast multipliers, designing other arithmetic building blocks, designing ROMs, DRAMs & SRAMs
Term work:
- *Term work shall consist of minimum eight experiments based on above syllabus using any EDA software tool*

Reference books:

1. Digital Integrated Circuits, Rabey, Chandrakasan, Nikolic, Pearson Education
3. CMOS digital integrated circuits, Analysis and Design, Sung-Mo Kang, Yusuf Leblebici, TATA McGRAW Hill
4. CMOS VLSI design, Neil H. E. Weste, David Harris, Ayan Banerjee, Pearson Education
Solapur University, Solapur  
MODERN DIGITAL SIGNAL PROCESSING  

Teaching Scheme  
Lectures – 3 Hrs. /Week  
Practical – 2 Hrs. /Week  

Examination Scheme  
Theory Credits – 3.0  
Practical Credit- 1.0  

SECTION-I  

Unit 1: Design of digital filters: (06 Hrs.)  
Symmetric and anti-symmetric FIR filters, design of linear phase FIR filters by using Windows and frequency sampling method, Design of optimum equi-ripple linear phase FIR filters; Design of FIR differentiator, Design of Hilbert transformers, comparison of design methods.  

Unit 2: Linear prediction and optimal linear filters: (07 Hrs.)  
Forward and backward linear prediction; the optimum reflection for the forward and backward predictors; relationship of an AR process to linear prediction; the Levinson Durbin algorithm; the Schur algorithm; properties of the linear prediction –error filters, FIR Wiener filter.  

Unit 3: Power spectrum estimation: (07 Hrs.)  
Estimation of spectra from finite duration observation of signals; computation of energy density function; estimation of auto-correlation and power spectrum of random signals; the periodogram; the use of DFT in power spectrum estimation; parametric methods for power spectrum estimation; AR model parameters for power spectrum estimation.  

SECTION-II  

Unit 4: IIR filters: (07 Hrs.)  
Design of IIR filter using BLT method, Characteristics of Commonly Used Analog Filter, Design of digital filters based on least squares methods: Pade approximation method; Least squares design methods; frequency transformation.  

Unit 5: Multirate DSP: (08 Hrs.)  
Decimation by a factor of D; Interpolation by a factor of I; Sampling rate conversion by a rational factor I/D; filter design & implementation for sampling rate conversion, direct from FIR filter structure; application of Multirate DSP, Digital Filter bank.  

Unit 6: Wavelet transforms: (05 Hrs.)  
Introduction to wavelets, wavelets and wavelet expansion systems, discrete wavelet transform multi resolution formulation of wavelet systems, Haar wavelet and other wavelet representations.
Term work:

*Term work shall consist of minimum eight experiments based upon above syllabus*

Reference books:

2. Advanced DSP, Proakis, Rade, Ling, Mcmillan Publication
3. Discrete time signal processing, A.V. Oppenheim, R.W. Schafer, PHI Publication
4. Theory and application of digital signal processing, I.R. Rabiner, Gold
5. Introduction to digital signal processing, Johnny R Johnson. PHI Publication
6. Introduction to DSP, Roman Kuc, McGRAW Hill Publication
Solapur University, Solapur

PROBABILITY & RANDOM PROCESS

Teaching Scheme
Lectures – 3 Hrs. /Week
Tutorial – 1 Hrs. /Week

Examination Scheme
Theory Credits – 3.0
Tutorial Credit- 1.0

SECTION- I

Unit 1: Introduction to Probability Theory: (04 Hrs.)

Unit 2: Random Variables, Distributions, Density Functions: (10 Hrs.)
CDF, PDF, Gaussian random variable, Uniform Exponential, Laplace, Gamma, Erlang, Chi-Square, Raleigh, Rician and Cauchy types of random variables
Operations on a Single R V: Expected value, EV of Random variables, EV of functions of Random variables, Central Moments, Conditional expected values.

Unit 3: Characteristic functions, (06 Hrs.)
Probability generating functions, Moment generating functions, Engg applications, Scalar quantization, entropy and source coding.

SECTION- II

Unit 4: Pairs of Random variables: (10 Hrs.)
Multiple Random Variables:Joint and conditional PMF, CDF, PDF, EV involving multiple Random variables, Gaussian Random variable in multiple dimension, Engg. Application, linear prediction.

Unit 5: Random Process: (04 Hrs.)
Definition and characterization, Mathematical tools for studying Random Processes, Stationary and Ergodic Random processes, Properties of ACF.

Unit 6: Example Processes: (06 Hrs.)
Term work:

*Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:


Solapur University, Solapur  

ELECTIVE-I : - MULTIMEDIA COMMUNICATION

Teaching Scheme  
Lectures – 3 Hrs. /Week  
Tutorial – 1 Hrs. /Week  

Examination Scheme  
Theory Credits – 3.0  
Tutorial Credit- 1.0

SECTION- I

Unit 1:  
Definition, Elements and Need of multimedia, Texture mapping, applications, image capture, compression, standards.  

Unit 2: Multimedia Communications:  
multimedia information representation, multimedia networks, network QoS and application QoS., Case study of OpenGL

Unit 3: Information Representation:  
text, images, audio and video compression, compression principles, video compression standards: H.261, H.263, P1.323, MPEG 1, MPEG 2, Other coding formats for text, speech, image and video..

SECTION- II

Unit 4: Detailed Study of MPEG 4:  
coding of audiovisual objects, MPEG 4 systems, MPEG 4 audio and video, profiles and levels. MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework, Significant features of JPEG 2000, MPEG 4 transport across the Internet.

Unit 5: Synchronization:  
Notion of synchronization, presentation requirements, reference model for synchronization, Introduction to SMIL, Multimedia operating systems, Resource management, process management techniques.

Unit 6: Multimedia Communication Across Networks:  
Layered video coding, error resilient video coding techniques, multimedia transport across IP networks and relevant protocols such as RSVP, RTP, RTCP, DVMRP, multimedia in mobile networks, multimedia in broadcast networks.
Term work:

Term work shall consist of minimum six assignments based upon above syllabus

Reference books:


Solapur University, Solapur  

ELECTIVE-I :- DSP PROCESSORS  

<table>
<thead>
<tr>
<th>Teaching Scheme</th>
<th>Examination Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures – 3 Hrs. /Week</td>
<td>Theory Credits – 3.0</td>
</tr>
<tr>
<td>Tutorial – 1 Hrs. /Week</td>
<td>Tutorial Credit- 1.0</td>
</tr>
</tbody>
</table>

SECTION- I  

Unit 1: Processors Fundamental  
Digital signal processing and DSP systems: Advantages of DSP, characteristics of DSP systems, DSP applications. DSP processors, architecture and instruction set. Speed of DSP Hardware, Resoultion

Unit 2: Floating point numbers:  
Numeric representations and arithmetic: floating point numbers, IEEE 754 standard for floating point numbers

Unit 3: Memory Architectures:  
Memory Architectures: memory structures wait states, extended memory interfaces, addressing mechanisms.

SECTION- II  

Unit 4: TMS320C6x processor:  
Architecture and instruction set of DSP processor Introduction to TMS320C64 processor, architecture, pipelining, linear and circular addressing modes, TMS320C64 instruction set, assembler directives, timers, interrupts, serial I/O, DMA, fixed and floating point data format.

Unit 5: Interrupt and Execution control:  
Execution control: Hardware looping, interrupts, stack, relative branch support Pipelining: pipelining and performance, pipelining depth, interlocking, branching effects, interrupt effects.

Unit 6: Peripherals:  
Peripherals: serial / parallel ports, timers, communication ports, on-chip A/D and D/A converters,-external interrupts, on-chip debugging facilities, power consumption, clocking.Application of DSP Processor-Adaptive filtering.
Term work:

*Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:

1. “DSP Processor Fundamentals: architectures and Features”, Phil Lapsley, Wiley
2. “DSP Applications using C and the TMS320C6x DSP”, Rulph Chassaing, Wiley
ELECTIVE- I: OPTICAL COMMUNICATION AND NETWORKS

Teaching Scheme

<table>
<thead>
<tr>
<th>Lectures – 3 Hrs. /Week</th>
<th>Examination Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory Credits – 3.0</td>
<td>Tutorial Credit- 1.0</td>
</tr>
</tbody>
</table>

Tutorial – 1 Hrs. /Week

SECTION- I

Unit 1: Fundamentals of Optical Communication: (08 Hrs.)
The basic optical communication system, communication components, modulation methods, transmitters- receivers, repeaters.

Unit 2: Optical Amplifiers: (06 Hrs.)
Basic concepts, semiconductor Laser amplifier, Raman Amplifier, erbium-Doped Fiber Amplifier

Unit 3: Multichannel Systems: (06 Hrs.)
Wavelength division multiplexing, time division multiplexing, channel multiplexing, subcarrier multiplexing

SECTION- II

Unit 4: Optical Networks: (08 Hrs.)
Basic networks, FDDI networks, SONET/SDH, storage area networks, broadcast networks, next generation networks.

Unit 5: Optical Fiber Measurements: (06 Hrs.)
Fiber attenuation measurement, fiber dispersion measurement, fiber Refractive index profile measurement, Optical Time Domain Reflectometry (OTDR)

Unit 6: DIGITAL TRANSMISSION SYSTEM: (06 Hrs.)
Term work:

Term work shall consist of minimum six assignments based upon above syllabus

Reference books:

1. Optical Fiber Communications Principles and Practice, John M. Senior, PHI 1992
5. Optical and Wire-less Communications, Matthew N. O. Sadiku, CRC Press
Solapur University, Solapur
M.E. (Electronics & Telecommunication Engg.-Digital Electronics & Communication System) Semester-II

RF & MICROWAVE CIRCUIT DESIGN

Teaching Scheme
Lectures – 3 Hrs. /Week
Practical – 2 Hrs. /Week

Examination Scheme
Theory Credits – 3.0
Practical Credit- 1.0

SECTION- I

Unit 1. Review of EM Theory : (10hrs)
Introduction ,Maxwell’s equations, Plane waves in dielectric & conducting media, Energy & Power, Transmission lines and its parameters, planar transmission lines, Lumped and Distributed Passive Elements.

Unit 2: RF and Microwave Circuit Design: (05hrs)
Single & multi port network, Basic definitions, Interconnecting networks, network properties & applications, scattering parameters. RF filter design, filter configurations, special filter realizations, filter implementation, coupled filter.

Unit 3: Active components: (05hrs)
Semiconductor basics, RF diodes, bipolar junction transistor, RF field effect transistors, High electron mobility transistors.
Active RF components modeling : Diodes models, transistor models, measurement of active devices, scattering parametric device characterization.

SECTION- II

Unit 4: Matching & biasing network: (04hrs)
Impedance matching using discrete components, micro strip line matching networks, amplifier class of operation, biasing networks.

Unit 5: RF transistor amplifier design: (06hrs)
Amplifier power relations, stability considerations, constant gain, noise figure circles, constant VSWR circles, broadband, high power & multistage amplifiers, Oscillators & Mixer: basic oscillator model, High Frequency oscillator configuration, basic characteristics of mixers.

Unit 6: Monolithic Microwave Integrated Circuits & Technology: (10hrs)
Introduction, History of Monolithic Microwave Integrated Circuits, Materials, Fabrication techniques of MMIC ,Microwave field effect Transistor(MESFET) and High Electron Mobility Transistors(HEMTS). Active & Passive Phase shifters.
Reference books:

1. Microwave engineering – Annapurna Das and sisir K Das (TMH) (Ref: Chapter1)


3. Microwave Devices and Circuits- Samuel Y. Liao, (PHI) (Ref: 12.0-12.2, 6.2-6.3)

4. Microwave Engineering-David M. Pozar (John Wiley & Sons)

5. Microwave Engineering- Sisodiya and Raghuvanshi, (PHI)

6. Microwave Devices & Circuit Design”- Gupta & Shrivastava (PHI)

Laboratory Experiments:
(Minimum 8 experiments can be conducted.)

(FEKO or Ansoft HFSS simulator can be used)

1. MATLAB Implementation to obtain radiation pattern of an antenna

2. Experimental study of radiation pattern of antenna and measurement of characteristics of antenna.

3. Survey on frequency independent antennas.

4. Simulation of RF filter for given specifications.

5. Measurement of unknown impedance using microwave bench.

6. Impedance matching of antenna using different methods.

7. Measurement of Phase shift of the wave in the waveguide.

8. Measurement of dielectric constant of a given dielectric.

9. Measurement of primary constants and transmission line parameters of given transmission line.

(Any other experiments can be added to support the theory)
Solapur University, Solapur  
M.E. (Electronics & Telecommunication Engg.-Digital Electronics & Communication System) Semester-II

HIGH SPEED DIGITAL DESIGN

Teaching Scheme | Examination Scheme
---|---
Lectures – 3 Hrs. /Week | Theory Credits – 3.0
Practical – 2 Hrs. /Week | Practical Credit- 1.0

SECTION- I

Unit 1.Introduction to high speed digital design.  
Frequency, time and distance, Capacitance and inductance effects, High speed properties of logic gates, Speed and power, Modelling of wires, Geometry and electrical properties of wires, Electrical models of wires, transmission lines, lossless LC transmission lines, lossy LRC transmission lines, special transmission lines.

Unit 2.Power distribution and noise  
Power supply network, local power regulation, IR drops, area bonding, on chip by pass capacitors, symbiotic bypass capacitors, power supply isolation, Noise sources in digital system, power supply noise, cross talk, intersymbol interference.

Unit 3.Signalling convention and circuits  
Signalling modes for transmission lines, signalling over lumped transmission media, signalling over RC interconnect, driving lossy LC lines, simultaneous bi-directional signalling, terminations, transmitter and receiver circuits.

SECTION- II

Unit 4. Design issues of high speed Electronics  
Simulation tools, Prototyping Circuits, Grounding in high speed systems.

Unit 5.Power supply issues  
Power supply noise reduction and filtering, Power supply conditioning, EMI/RFI considerations, Shielding concepts.

Unit 6. High Speed ADCs  
Fundamental of high speed sampling, Base band antialiasing filters, Study of Harmonic sampling and band pass sampling, Direct IF to digital conversion, Distortion and noise in an ideal N bit ADC, AD9220 12 bit ADC, Spurious free Dynamic Range, Measurement of Noise Power Ratio, Case study of AD9066, Study of latency of ADCs.
Term work:
Term work shall consists of minimum eight experiments based on syllabus using simulation tools.

Reference Books:
6. Handbook of Digital Techniques for High-Speed Design: Design Examples, Signaling and Memory Technologies, Fiber Optics, Modeling, and Simulation to Ensure ... (Prentice Hall Modern Semiconductor Design) by Tom Granberg
Solapur University, Solapur  
M.E. (Electronics & Telecommunication Engg.-Digital Electronics & Communication System) Semester-II  
ADVANCED EMBEDDED SYSTEMS

Teaching Scheme  
Lectures – 3 Hrs. /Week  
Practical – 2 Hrs. /Week

Examination Scheme  
Theory Credits – 3.0  
Practical Credit- 1.0

SECTION- I

Unit 1: Embedded System Hardware:  
(7 hrs)
Embedded systems overview, Hardware components like microcontroller, GPP, ASSP, AISP, SOC, Details of 32 bit ARM SOC architecture, Organization, Analog, Digital & High speed I/O for embedded systems

Unit 2: Memory management  
(5 hrs)
Interfacing SRAM, DRAM and flash memories with microcontroller, memory management, allocation of memory to program segments and blocks, memory maps.

Unit 3: Embedded System Software  
(8 hrs)
Techniques of writing efficient C code for microcontroller, C data types for ARM, Signed & unsigned data types, limitation of char & data types, storage class – static & extern, volatile keyword, operation on bits, functions, ARM Thumb procedural call standard, pointers & arrays, conditional statements – if else, switch, structure, conditional loops – for & while, preprocessing, compiling, cross compiling, compiler driver, startup code and board support packages, program segments calling assembly routines in C, interrupt handling in C, interrupt latency

SECTION- II

Unit 4: Uniprocessor Real Time Scheduling  
(7 hrs)
Real time systems, tasks and its states, task assignment & scheduling, scheduling algorithms – rate monotonic and earliest deadline first, inter-task communication, semaphore, priority inheritance protocol, priority ceiling protocol, real time operating system features, features of micro COS – II, RTOS
Unit 5: Embedded System Architecture & Design: (5 hrs)
Embedded system implementation aspects & estimation modeling, embedded system architecture, validation and debugging of embedded systems, hardware – software codesign in an embedded system.

Unit 6: Embedded processor: (8 hrs)
ARM 9 architecture, instructions and data handling; interfacing with memory; interrupts, timers, ARM bus, I/O devices, I/O controllers, simple & autonomous I/O controllers, parallel, multiplexed, tristate, and open-drain buses, bus protocols, serial transmission techniques & standards, wireless protocol, CAN & advanced buses

Term work:

*Term work shall consist of minimum eight experiments based upon above syllabus*

Reference Books:

2. Embedded Real-time Systems Programming by Iyer & Gupta, Tata McGraw Hill
3. ARM System on Chip Architecture by Furber, 2nd Ed, Pearson India
5. Scheduling in Real Time systems by Cottet, Delacroix & Mammeri, John Wiley & Sons
6. Embedded system design A Unified Hardware/software approach by Frank Valid & Tony Givangis, Publishing 1999
Teaching Scheme
Lectures – 3 Hrs./Week
Tutorial – 1 Hrs./Week

Examination Scheme
Theory Credits – 3.0
Tutorial Credit- 1.0

SECTION- I


Unit 2: Detection in a Rayleigh fading channel, time diversity, antenna diversity, frequency diversity, impact of channel uncertainty (6 hrs)

Unit 3: RAKE Receiver, Interleaving, Fundamentals of Channel Coding, Block Codes and Finite Fields, Convolution Codes, Coding Gain, Trellis Coded Modulation, Turbo Codes (8 hrs)

SECTION- II

Unit 4: MAC protocols for digital cellular systems such as GSM. MAC protocols for wireless LANs such as IEEE802.11 and HIPERLAN I and II. The near far effect. Hidden and exposed terminals. Collision Avoidance (RTS-CTS) protocols (8 hrs)

Unit 5: Mobile Networking: Mobile-IP, Ad-Hoc Networks and Ad-Hoc Routing, Wireless Protocols: Wireless TCP, Session Mobility Mobile network layer protocols such as mobile-IP, Dynamic Host Configuration Protocol (DHCP). Mobile transport layer protocols such as mobile-TCP, indirect-TCP. (8 hrs)

Term work:

*Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:

2. Fundamentals of Wireless Communication: David Tse, Cambridge
4. Computer Networks (Fourth Edition), A S. Tanenbaum, Publisher: Prentice Hall PTR
SECTION-I

Unit 1: Introduction: (8Hrs.)
Introduction, 2D sampling theory, Limitations in sampling & reconstruction, Quantization, Optimal quantizer, Compander, Visual quantization, Optical & Modulation transfer function, Spectral density function, fundamentals of Image perception.
Image Transforms: Applications of DCT, Slant, KLT, SVD, DWT transforms in Image processing

Unit 2: Image Representation by Stochastic Models: (4Hrs.)
Introduction, one-dimensional Causal models, AR models, Non-causal representations, linear prediction in two dimensions

Unit 3: Image Filtering & Restoration: (8Hrs.)
Review of spatial and frequency domain filtering, Image observation models, Smoothing splines and interpolation, Least squares filters, generalized inverse, SVD and Iterative methods, Maximum entropy restoration, Bayesian methods, Coordinate transformation & geometric correction, Blind de-convolution

SECTION-II

Unit 4: Image Analysis & Computer Vision: (7Hrs.)
Spatial feature extraction, Transform features, Edge detection, Boundary Extraction, Boundary representation, Region representation, Moment representation, Structure, Shape features, Texture, Scene matching & detection, Image segmentation, Classification Techniques.

Unit 5: Image Reconstruction from Projections: (5Hrs.)
Introduction, Radon Transform, Back projection operator, Projection theorem, Inverse Radon transform, Fourier reconstruction, Fan beam reconstruction, 3D tomography
**Unit 6: Image & Video Broadcasting Standards:** (8Hrs.)
Inter-frame coding, coding of two tone images, Image compression standards. Video compression: Compression efficiency, MPEG-4 AVC/H.264. Scalable video coding (SVC), Video over IPd video indexing

**Term work:**

*Term work shall consist of minimum six assignments based upon above syllabus*

**Reference books:**


Solapur University, Solapur
M.E. (Electronics & Telecommunication Engg.-Digital Electronics & Communication System) Semester-II

ELECTIVE- II :- CRYPTOGRAPHY & NETWORK SECURITY

Teaching Scheme
Lectures – 3 Hrs. /Week
Tutorial – 1 Hrs. /Week

Examination Scheme
Theory Credits – 3.0
Tutorial Credit- 1.0

SECTION-I

Unit 1: Overview: (4 Hrs.)

Unit 2: Block Ciphers and the Data Encryption Standard: (8 Hrs.)

Unit 3: Public Key Cryptography and RSA: (8 Hrs.)

SECTION-II

Unit 4: Hash Algorithms: (10Hrs.)

Unit 5: Electronic Mail Security: (5 Hrs.)
Unit 6: Web Security: (5 Hrs.)

Term work:

Term work shall consist of minimum six assignments based upon above syllabus

Reference books:


Teaching Scheme | Examination Scheme
--- | ---
Lectures – 3 Hrs. /Week | Theory Credits – 3.0
Tutorial – 1 Hrs. /Week | Tutorial Credit- 1.0

**SECTION-I**

**Unit 1: Antenna Fundamentals and Definitions:** (7Hrs.)

**Unit 2: Arrays:** (7 Hrs.)
Array factor for linear arrays, uniformly excited, equally spaced Linear arrays, pattern multiplication, directivity of linear arrays, non-uniformly excited -equally spaced linear arrays, Mutual coupling, multidimensional arrays, phased arrays, feeding techniques, perspective on arrays. Broad band Antennas: Traveling - wave antennas, Helical antennas, Biconical antennas, sleave antennas, and Principles of frequency - independent Antennas, spiral antennas, and Log - Periodic Antennas.

**Unit 3: Antenna:** (6 Hrs.)
Aperture Antennas: Techniques for evaluating Gain, reflector antennas - Parabolic reflector antenna principles, Axi -symmetric parabolic reflector antenna, offset parabolic reflectors, dual reflector antennas, Gain calculations for reflector antennas, feed antennas for reflectors, field representations, matching the feed to the reflector, general feed model, feed antennas used in practice.
SECTION-II

Unit 4: Antenna Synthesis: (6Hrs.)

Unit 5: Moments: (7Hrs.)
Method of Moments: Introduction to method of Moments, Pocklington’s integral equation, integral equations and Kirchoff’s Networking Equations, Source Modeling Weighted residuals formulations and computational consideration, calculation of antenna and scatter characteristics.

Unit 6: CEM for Antennas: (7Hrs.)
Finite Difference Time Domain Method Geometrical Optics Wedge diffraction theory, ray fixed coordinate system, uniform theory of wedge diffraction, E-Plane analysis of Horn antennas. Cylindrical parabolic antenna, radiation by a slot on a finite ground plane, radiation by a monopole on a finite ground plane, equivalent current concepts, multiple diffraction formulation, by curved surfaces, physical optics, method of stationary phase, physical theory of diffraction, cylindrical parabolic reflector antennas.

Term work:

Term work shall consist of minimum six assignments based upon above syllabus

Reference books: