B.TECH. II Semester-4	L	T	P	C
CS 401: Operating Systems	3	0	2	4

Unit - 1	10 Hours
Introduction: Operating Systems (OS) Objectives, Formal Definition, Evolution, Types, DMA & Multiprogramming, OS Interfaces,- The Command-less command interpreter systems , Device drivers – Examples *Processes, Threads, Scheduling*: Process Management: The process concept - Programs, Processes & Threads – Process Control Block – PCB as a data structure in contemporary operating systems - Process Hierarchy - System Calls - CPU Scheduling & algorithms metrics – Examples, Uniprocessor-Multiprocessor and Real-Time Scheduling, Case Study: Unix and its related System Calls.	
Unit - 2	**10 Hours**
Interprocess Synchronization & Communication: Concurrent Processes - The Critical Section & Mutual Exclusion problem - Algorithms - Semaphores, Critical Region, Conditional Critical Region, Monitors, Messages - Examples in Contemporary OS - Classical Process Co-ordination Problems. Deadlocks: Characterization - Prevention - Avoidance - Detection - Recovery - Combined Approach to Deadlock handling & Deadlock Handling in contemporary OS, Case Study: Unix and its related System Calls.	
Unit - 3	**10 Hours**
Memory Management: Memory Hierarchy, Static and Dynamic Memory Allocation, Overview of Swapping, Multiple Partitions Contiguous and Non-Contiguous Memory Allocation, Concepts of Paging, Segmentation, Case Study: Unix and its related System Calls. *Virtual Memory*: Virtual Memory Concepts - Demand paging - Performance - Fragmentation & Compaction. Page replacement and Allocation algorithms – Resident Set Management - Cleaning Policy - Memory Protection - System Calls – Linux/Windows Virtual Memory Techniques, Case Study: Unix and its related System Calls.	
Unit - 4	**12 Hours**
Device Management: Terminals & Capability Databases - Emulators - Virtual Terminals - Disk Devices - Device Independence - Free space management - Performance and Reliability - Storage hierarchy, Case Study: Unix and its related System Calls. *File Systems and Protection Mechanism*: Levels - File Systems in Disk Partitions - File-naming & File Access - Allocation strategies - Directory systems & their implementations - File Systems to device drivers - File Systems Reliability – Examples of fsck() and fsdb() utilities - File protection - Implementation issues, Case Study: Unix and its related System Calls. *Advanced Topics*	
Total Contact Time: 42 Hours	

Recommended Books

1. Silberschatz, Galvin and Gagne, “Operating System Concepts”, 8th Edition, John Wiley & Sons, 2014.
2. W. Stallings, “Operating Systems: Internals and Design Principles”, 7th Edition, Pearson Pub., 2014.
3. A. Tanenbaum & A. Woodhull, “Operating Systems - Design & Implementation”, 3rd Edition, PHI EEE,2006.
4. Crawley, “Operating Systems - An Design Oriented Approach”, 1st Edition, McGraw Hill,1998.
5. Kernighan and Pike, “UNIX programming Environment”, 2nd Edition, PHI-EEE,2001.
6. W. Richard Stevens, Stephen A. Rago, “Advanced Programming in the UNIX Environment”, 3rd Edition, Addison Wesley Professional,2013.

B.TECH. II Semester-4	L	T	P	C
CS 402: Computer Networks	3	0	2	4

Unit - 1	9 Hours
Introduction: Overview of network and data communication, Data Communications, Computer Networking, Protocols and Standards, types of Network, Network Topology, Protocol hierarchies, and design issues of layers, Interfaces and services. Reference Model: The OSI reference model, TCP/IP reference model, network standards and protocols. *Physical Layer*: Data and transmission techniques, Multiplexing, Transmission media, Asynchronous Communication, Wireless transmission, ISDN, ATM, Cellular Radio, Switching techniques issues.	
Unit - 2	**14 Hours**
Data Link Layer: Layer design issues, services provided to network layers, Framing, Error control and Flow control, Data link control and protocols – Simplex protocol, Sliding window protocol. *Medium Access Layer*: Channel Allocations, Multiple Access protocols- ALOHA, CSMA, CSMA/CD protocols, Collision free protocols, Limited contention protocols, LAN architectures, IEEE 802 and OSI, Ethernet(CSMA/CD), Bus, Token Ring, DQDB, FDDI, Bridges and recent developments.	
Unit - 3	**8 Hours**
Network Layer: Network Layer design issue, Routing algorithms and protocols, Congestion Control Algorithms, Internetworking, Addressing, N/W Layer Protocols and recent developments.	
Unit - 4	**11 Hours**
Transport Layer: Transport services, Design issues, transport layer protocols, Congestion Control, QOS and its improvement. *Application Layer*: Client Server Model , DNS, SMTP, FTP, HTTP, WWW and recent development *Advanced Topics*	
Total Contact Time: 42 Hours	

Recommended Books

1. Tanenbaum, “Computer Network”, 4th Edition, PHI,1996.
2. William Stalling: “Data and Computer Communication”, 8th Edition, Prentice Hall, 2006.
3. Douglas E. Comer:” Internetworking with TCP/IP Volume – I”, 3rd Edition, PHI, 1991.
4. W. Richard Stevens: “TCP/IP Illustrated Volume-I”, Addison Wesley, 1994.
5. B. Forouzan , ” Data Communication And Networking “, 5th Edition, TMH, 1997.

B.TECH. II Semester-4	L	T	P	C
EC 403: Analog Circuits	3	0	2	4

Prerequisite
The Ideal Op Amp, Inverting Configuration, The Noninverting Configuration, DC Imperfections, Effect of Finite Open-Loop Gain & Bandwidth on Circuit Performance, Large-Signal Operation of Op Amps

Linear Applications of OP-AMP	**6 hours**
Difference Amplifier, Instrumentation Amplifier, Integrator, Differentiator Current-to-Voltage Converters, Voltage-to-Current Converters, Current Amplifier	
Active Filters	**12 Hours**
First-Order and Second-Order Filter Functions, Second-Order Active Filters Based on Inductor Replacement, Second-Order Active Filters Based on the Two-Integrator-Loop Topology, Single-Amplifier Biquadratic Active Filters, Sensitivity	
Nonlinear Circuits, Signal Generators and Waveform-Shaping Circuits	**10 Hours**
Comparators: Zero-Level Detection, Nonzero-Level Detection, Effects of Input Noise on Comparator Operation, Output Bounding Voltage-Controlled Oscillator (566 function generator), Phase-Locked Loop: Introduction, Basic PLL Operation, Applications(565 IC: Frequency Demodulation, Frequency Synthesis, FSK Decoders) Op Amp–RC Oscillator Circuits, Bistable Multivibrators (Schmitt Trigger), Generation of Square and Triangular Waveforms Using Astable Multivibrators, Generation of a Standardized Pulse—The Monostable Multivibrator, Nonlinear Waveform-Shaping Circuits, Precision Rectifier Circuits	
Data Converters an Introduction	**8 Hours**
Digital Processing of Signals, Sampling of Analog Signals, Signal Quantization, The A/D and D/A Converters as Functional Blocks Performance Specifications D/A Converter Circuits: Basic Circuit Using Binary-Weighted Resistors, R-2R Ladders, A Practical Circuit Implementation, Current Switches A/D Converter Circuits: The Feedback-Type Converter, The Dual-Slope A/D Converter, The Parallel or Flash Converter, The Charge-Redistribution Converter	
Voltage Reference and Regulators	**6 Hours**
Voltage Regulation, Basic Linear Series Regulators, Basic Linear Shunt Regulators, Basic Switching Regulators, Integrated Circuit Voltage Regulators, Integrated Circuit Voltage Regulator Configurations	
Total Contact Time: 42 Hours	

Recommended Books

Text-Book

1. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, Oxford University Press, 7th Edition.

Reference Books

2. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, Oxford University Press, 5th Edition.

3. Thomas L. Floyd, "Electronic Devices", Prentice Hall, 9th Edition.

4. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", McGraw-Hill, 3rd Edition, Reprint 2007.

5. Coughlin and Driscol, "Op-Amps and Linear Integrated Circuits", PHI, 6th Edition, 2003.

6. Ramakant Gayakwad, "Op-Amps and Linear Integrated Circuits", PHI, 4th Edition, 2003.

7. Salivahanan S., "Linear Integrated Circuits", McGraw-Hill, 4th Edition Reprint, 2010.

B.TECH. II Semester-4	L	T	P	C
EC 404: Digital Communication	3	0	2	4

Prerequisite
Communication Engineering

Unit - 1	10 Hours
Digital Band-Pass Modulation Techniques: Some Preliminaries, Binary Amplitude-Shift Keying, Phase-Shift Keying, Frequency-Shift Keying, Summary of Three Binary Signaling Schemes, Noncoherent Digital Modulation Schemes, M-ary Digital Modulation Schemes, Mapping of Digitally Modulated waveforms onto Constellations of Signal Points, Theme Examples	
Unit - 2	**8 Hours**
Random Signals and Noise: Probability and Random Variables, Expectation, Transformation of Random Variables, Gaussian Random Variables, The Central Limit Theorem, Random Processes, Correlation of Random Processes, Spectra of Random Signals, Gaussian Processes, White Noise, Narrowband Noise	
Unit - 3	**10 Hours**
Noise in Analog Communications: Noise in Communication Systems, Signal-to-Noise Ratios, Band-Pass Receiver, Structures, Noise in Linear Receivers using Coherent Detection, Noise in AM Receivers using Envelope Detection, Noise in SSB Receivers, Detection of Frequency Modulation (FM), FM Pre-emphasis and De-emphasis	
Unit - 4	**14 Hours**
Noise in Digital Communications: Bit Error Rate, Detection of a Single Pulse in Noise, Optimum Detection of Binary PAM in Noise, Optimum Detection of BPSK, Detection of QPSK and QAM in Noise, Optimum Detection of Binary FSK, Differential Detection in Noise, Summary of Digital Performance, Error Detection and Correction *System and Noise Calculations*: Electrical Noise, Noise Figure, Equivalent Noise Temperature, Cascade Connections of Two-Port Networks, Free-Space Link Calculations, Terrestrial Mobile Radio	
Total Contact Time: 42 Hours	

Recommended Books

Text-Book

1. Simon Haykin, and Michael Moher, "Introduction to Analog and Digital Communication", John Wiley & Sons, 2nd Edition.

Reference Books

2. Lathi B. P., and Ding Zhi, “Modern Digital & Analog Communication Systems”, Oxford University Press, 4th Edition, 2010.
3. Proakis J., and Salehi M., “Fundamental of Communication Systems”, PHI/Pearson Education-LPE, 2nd Edition, 2006.
4. Carlson Bruce A., “Communication Systems- An Introduction To Signal And Noise In Electrical Communication”, McGraw-Hill, 5th Edition, 2009.
5. Leon W. Couch, “Digital & Analog Communication Systems”, Pearson Education-LPE, 6th Edition, 2004.

B.TECH. II Semester-4	L	T	P	C
EC 405: Microcontrollers	3	0	2	4

Prerequisite

Architecture of 8051 Microcontroller	8 hours
8051 Architecture, I/O Pins, Ports, External Memory, Counters & Timers, Serial Data Input/output, Interrupts.	
Programming of 8051 Microcontroller	**10 Hours**
Assembly Language: Moving Data, Logical Operations, Arithmetic Operations, Jump & Call Instructions, Embedded C Programming.	
Peripheral Interfacing to 8051 Microcontroller	**10 Hours**
8051 Microcontroller Design, Applications like Key Switched, Displays, Pulse Measurement, ADC & DAC, Serial Data Communication, Multi-processor Communications.	
AVR/PIC Microcontroller	**14 Hours**
Architecture, I/O Pins, Ports, Memory, Counters & Timers, Serial Data Input/output, Interrupts. Applications.	
Total Contact Time: 42 Hours	

Recommended Books

1. Kenneth J. Ayala, “The 8051 Microcontroller- Architecture, Programming And Applications”, Penram International, 2nd Edition,1996.
2. Mazidi A. M., Mazidi J. G. and McKinlay R. D., “The 8051 Microcontroller And Embedded Systems Using Assembly And C”, Pearson Education, 2nd Edition, 2008.
3. Jonathan W. Valvano, “Embedded Microcomputer Systems: Real Time Interfacing”, Thomson Learning, INDIA 2nd Edition, Reprint 2007.
4. Predko Michael, “Programming And Customizing The PIC Microcontroller”, TMH, 1st Edition, 1998.
5. Muhammad Ali Mazidi, Sarmad Naimi, and Sepehr Naimi, “AVR Microcontroller and Embedded Systems The: Using Assembly and C”, 2011.

B.TECH. II Semester-4	L	T	P	C
EC 406: Electromagnetics	3	0	0	3

Unit - 1	12 Hours
Electromagnetic Theorem: Divergence & Stoke's Theorem, Gauss Law, Laplace's & Poisson's Equation, Faradays Law & Ampere's work, Law in the differential vector form , Biot Savart's Law. *Maxwell's Equations*: Introduction, The Equation of Continuity For Time-Varying fields, Inconsistency of Ampere's Law, Maxwell's Equation, Condition at a Boundary surface.	
Unit - 2	**8 Hours**
Electromagnetic Waves: Solution for Free-Space conditions, Uniform Plane Waves & Propagation, The Wave Equations for a Conducting Medium, Sinusoidal Time Variations, Conductors and Dielectrics, Polarization, Reflection by a Perfect Conductor Normal Incidence & Oblique Incidence, Reflection by a Perfect Dielectric — Normal Incidence & Oblique Incidence, Reflection at The Surface of a Conductive Medium, Poynting Theorem.	
Unit - 3	**6 Hours**
Waveguides: Parallel plane waveguide, Transverse Electromagnetic Mode (TEM), Analysis of Waveguide, Rectangular Waveguide, Visualization of fields inside a waveguide, Surface current on the waveguide walls, Attenuation in a waveguide.	
Unit - 4	**16 Hours**
Radiation: Potential Functions and Electromagnetic Field, Potential Functions for Sinusoidal Oscillations, Alternating Current Element, Power Radiated by Current Element, Application to Short Antennas, Radiation from a Monopole or Dipole. *Antenna Fundamentals*: Fundamental parameters of antennas, Transmission Loss between Antennas, Space Communications, Two Element Array, Linear Arrays, Multiplication of Patterns, Binomial Array. *Propagation of Radio Waves*: Surface Wave Propagation, Wave Propagation through Ionosphere, Diffraction of Radio Waves from Ionospheric Irregularities, Tropospheric Waves and propagation.	
Total Contact Time: 42 Hours	

Recommended Books

1. R. K. Shevgaonkar, "Electromagnetic Waves", Tata McGraw Hill, 1st Edition2006.
2. Jordan E. C. and Balmain K. G., "Electromagnetic Waves And Radiating Systems", Prentice Hall, Reprint,2010.
3. Kraus John D., Marhefka Roland J. and Khan Ahmed S., "Antennas AndWave Propagation",Tata McGraw-Hill, 4th Edition, 2006.
4. Balanis Constantine A.,"Antenna Theory, Analysis And Design", John Wiley & Sons, 2nd Edition, 2001.
5. Raju G. S. N., "Antenna And Wave Propagation", Pearson Education, 1st Edition, 2005.
6. Harish A. R. and Sachindananda M., "Antennas and Wave Propagation", Oxford University Press, 1st Edition,2007.