B. Tech. II (ECE), Semester – IV	L	T	P	C
CS 401: OPERATING SYSTEMS	3	0	2	4

INTRODUCTION	(04 Hours)
Operating Systems (OS) Objectives, Formal Definition, Evolution, Types, DMA & Multiprogramming, OS Interfaces,- The Command-less command interpreter systems , Device drivers – Examples.	

PROCESSES, THREADS, SCHEDULING	(06 Hours)
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.	

INTERPROCESS SYNCHRONIZATION & COMMUNICATION	(10 Hours)
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-CombinedApproachtoDeadlockhandling&DeadlockHandlingincontemporary OS, Case Study: Unix and its related System Calls.	

MEMORY MANAGEMENT	(04 Hours)
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	(06 Hours)
Virtual Memory Concepts - Demand paging - Performance - Fragmentation & Compaction. Page replacementandAllocationalgorithms–ResidentSetManagement-CleaningPolicy-MemoryProtection -SystemCalls–Linux/WindowsVirtualMemoryTechniques,CaseStudy:UnixanditsrelatedSystem Calls.	

DEVICE MANAGEMENT	(04 Hours)
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	(04 Hours)
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	(04 Hours)
Practicals will be based on the coverage of the above topics separately.	(28 Hours)
(Total Contact Hours: 42 + 28 = 70)	

BOOKS RECOMMENDED
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 and A. Woodhull, "Operating Systems - Design and 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 (ECE), Semester – IV	L	T	P	C
CS 402: COMPUTER NETWORKS	3	0	2	4

INTRODUCTION	(03 Hours)
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	(06 Hours)
Data and transmission techniques, Multiplexing, Transmission media, Asynchronous Communication, Wireless transmission, ISDN, ATM, Cellular Radio, Switching techniques issues.	
DATALINK LAYER	(06 Hours)
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	(08 Hours)

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.

NETWORK LAYER	(08 Hours)
Network Layer design issue, Routing algorithms and protocols, Congestion Control Algorithms, Internetworking, Addressing, N/W Layer Protocols and recent developments.	
TRANSPORT LAYER	**(05 Hours)**
Transport services, Design issues, transport layer protocols, Congestion Control, QOS and its improvement.	
APPLICATION LAYER	**(03 Hours)**
Client Server Model , DNS, SMTP, FTP, HTTP, WWW and recent development	
Advanced Topics	**(03 Hours)**
Practicals will be based on the coverage of the above topics separately.	**(28 Hours)**
(Total Contact Hours: 42 + 28 = 70)	

BOOKS RECOMMENDED
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 (ECE), Semester – IV	L	T	P	C
EC 403 : ANALOG CIRCUITS	**3**	**0**	**2**	**4**

OPERATIONAL AMPLIFIER FUNDAMENTALS	(06 Hours)
Characteristic of operational Amplifier, Basic Op-Amp Configuration, An Op-Amp with Negative Feedback, Voltage Series and Voltage Shunt Configurations, Difference Amplifiers, Instrumentation Amplifier, Specification of an Op-Amp, Offset voltages and currents, CMRR, Slew Rate, PSRR,Frequency Response, GBW Product, Input Bias and Offset Currents.	
LINEAR APPLICATIONS	**(06 Hours)**

Summing, Scaling and Averaging Amplifiers Generalized Impedance Converter, Voltage to Current Converter with Floating and Grounded Load, Current to Voltage Converter, Gyrator, Integrator and Differentiator.

ACTIVE FILTERS AND OSCILLATORS	(08 Hours)

First Order Active Filters, Second-Order Active Filters, Multiple—Feedback Filters (Band Pass and Band Reject Filters), All Pass Filter, State Variable Filter, Cascade Design of Filters, Oscillators, Phase Shift and Wien Bridge Oscillators, Square, Triangular and Saw Tooth Wave Generators.

NON-LINEAR CIRCUITS	(05 Hours)

Schmitt Trigger, Voltage Comparator, Voltage Limiters, Window Detector, Clippers, Clampers, Peak Detector, Precision Rectifiers, Analog Switches.

SPECIALIZED IC APPLICATIONS	(06 Hours)

The 555 Timer, Application of 555 Timer Circuit, Phase Locked Loops, Voltage Controlled Oscillator.

D-A AND A-D CONVERTERS	(08 Hours)

Introduction, Analog and Digital Data Conversion, Specification of D/A Converter, Basic D/A Conversion Techniques, Sample and Hold Circuit, Performance Specifications of A/D Converters, Classification of A/D Converter, Parallel Comparator, Counter Type A/D, Successive approximation Conversion, Dual Slope A/D and High Speed A/D Converters, Microprocessors Compatible A/D Converters, ADC080X Series A/D Converters.

LINEAR POWER SUPPLIES	(03 Hours)

Introduction, Three-Terminal Regulator (Fixed Regulator), Voltage Adjustment and Current Boosting of Fixed Regulator, Merits And Drawbacks of Linear Regulators.

Practicals will be based on the coverage of the above topics separately.	(28 Hours)

(Total Contact Hours: 42 + 28 = 70)

BOOKS RECOMMENDED

1. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", McGraw- Hill, 3rd Edition, Reprint2007.
2. Coughlin and Driscol, "Op-Amps and Linear Integrated Circuits", PHI, 6th Edition,2003
3. Sedra and Smith, "Microelectronic Circuits", Oxford University Press, 5th Edition,2004.
4. GayakwadRamakant, "Op-Amps and Linear Integrated Circuits", PHI, 4th Edition,2003.
5. Gray and Meyer, "Analysis and Design of Analog Integrated Circuits"; John Wiley & Sons, 4th Edition,2005.
6. Salivahanan S., "Linear Integrated Circuits", McGraw-Hill, 4th Edition Reprint,2010.

B. Tech. II (ECE), Semester – IV	L	T	P	C
EC 404 : DIGITAL COMMUNICATION	3	0	2	4

BASEBAND TRANSMISSION TECHNIQUES	(08 Hours)
Sampling and Analog to Digital Conversion, Quantization Techniques- Uniform and Non-Uniform, A-law and mu-law, Pulse Code Modulation (PCM), Digital Telephony Example: PCM in T1/E1 Carrier System, Digital Multiplexing, DPCM and ADPCM, Delta Modulation.	
PRINCIPLES OF DIGITAL DATA TRANSMISSION	(08 Hours)
Digital Communication System, Line Coding, Pulse Shaping for Optimum Transmission, ISI and ISI-Free Signals, Band-limiting of Rectangular Pulses, Raised Cosine Filtering, Duo binary signaling, Scrambling, Regenerative repeaters, Matched filter and equalizers, Timing extraction, Eye diagrams: An important tool, M-ary baseband signaling for higher data rate.	
INTRODUCTION TO INFORMATION THEORY AND CODING	(12 Hours)
Measure of information, Source Encoding, Error-Free communication over noisy channel, Channel capacity of discrete as well as continuous memoryless channel, Shannon's Capacity Equation. Introductiontoentropyandsourcecodingtechniquesfordigitalsignal,Introductiontochannelcoding techniques and error correcting codes.	
BANDPASS SIGNAL TRANSMISSION-DIGITAL CARRIER SYSTEM	(08 Hours)
Representation of digital modulated signal, ASK, PSK, FSK, QAM with mathematics and constellation diagram, Spectral characteristics of digitally modulated signals. M-Ary Digital Carrier Modulation.	
BANDPASS SIGNAL RECEPTION	(06 Hours)
Synchronization, Decision theory, Band-pass Receiving Filter, Error Performance of Bandpass Systems, Performance Evaluation of Communication Systems, BER.	
Practicals will be based on the coverage of the above topics separately.	(28 Hours)
(Total Contact Hours: 42 + 28 = 70)	

BOOKS RECOMMENDED

1. Bhattacharya Amitabh, "Digital Communication", Tata McGraw-Hill, 1st Edition,2006.
2. Lathi B.P. and Ding Zhu, "Modern Digital and Analog Communication Systems", Oxford University Press, 4th Edition,2010.
3. Sklar Bernard, "Digital Communications — Fundamentals and Applications", Pearson Education-LPE, 2nd Edition,2009.
4. Proakis J. and Satoh' M., "Fundamentals of Communication Systems", PHI/Pearson Education- LPE, 2nd Edition,2006.
5. Leon W. Couch, "Digital and Analog Communication Systems", Pearson Education-LPE, 6th Edition,2004.
6. Glover Lan and Grant Peter, "Digital Communications", Pearson Education-LPE, 1st Edition,2008.

B. Tech. II (ECE), Semester – IV	L	T	P	C
EC 405 : MICROCONTROLLERS	3	0	2	4

ARCHITECTURE OF 8051 MICROCONTROLLER	(08 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	(12 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.	
Practicals will be based on the coverage of the above topics separately.	(28 Hours)
(Total Contact Hours: 42 + 28 = 70)	

BOOKS RECOMMENDED

1. Kenneth J. Ayala, "The 8051 Microcontroller- Architecture, Programming AndApplications", 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, Reprint2007.
4. PredkoMichael, "Programming And Customizing The PIC Microcontroller", TMH, 1st Edition, 1998.
5. MuhammadAliMazidi,SarmadNaimi,andSepehrNaimi,"AVR Microcontrollerand Embedded Systems The: Using Assembly and C", 2011.

B. Tech. II (ECE), Semester – IV	L	T	P	C
EC 406 : ELECTROMAGNETICS	3	0	0	3

ELECTROMAGNETIC THEOREM	(05 Hours)
Divergence &Stoke's Theorem, Gauss Law, Laplaces'&Poissons' Equation, Faradays Law &Ampere's work Law in the differential vector form , Biot Savart's Law.	

MAXWELL'S EQUATIONS	(04 Hours)
Introduction, The Equation of Continuity For Time-Varying fields, Inconsistency of Ampere's Law, Maxwell's Equation, Condition at a Boundary surface.	

ELECTROMAGNETIC WAVES	(08 Hours)
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.	

WAVEGUIDES	(06 Hours)
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.	

RADIATION	(06 Hours)
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	(07 Hours)

Fundamental parameters of antennas, Transmission Loss between Antennas, Space Communications, Two Element Array, Linear Arrays, Multiplication of Patterns, Binomial Array.	
PROPAGATION OF RADIO WAVES	**(04 Hours)**
Surface Wave Propagation, Wave Propagation through Ionosphere, Diffraction of Radio Waves from Ionospheric Irregularities, Tropospheric Waves and propagation.	
(Total Contact Hours: 42)	

BOOKS RECOMMENDED
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. BalanisConstantineA.,"AntennaTheory, AnalysisAndDesign",JohnWiley&Sons,2ndEdition,2001.
5. Raju G. S. N., "Antenna AndWave Propagation", Pearson Education, 1st Edition,2005.
6. Harish A. R. and Sachindananda M., "Antennas and Wave Propagation", Oxford University Press, 1st Edition,2007.