B.TECH. II Semester-3	L	T	P	C
CS 301: 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-3	L	T	P	C
EC 302: Electrical Networks	3	0	0	3

Prerequisite
Voltage and Current Laws, Circuit Analysis Techniques, Basic RL and RC circuits, The RLC Circuit

Sinusoidal Steady-State Analysis, AC Circuit Power Analysis	14 Hours
Characteristics of Sinusoids, Forced Response to Sinusoidal Functions, The Complex Forcing Function, The Phasor, Impedance and Admittance, Nodal and Mesh Analysis, Superposition, Source Transformations and Thévenin's Theorem, Phasor Diagrams Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power and Power Factor, Complex Power	
Polyphase Circuits, Magnetically Coupled Circuits, Complex Frequency & the Laplace Transform	**14 Hours**
Polyphase Systems, Single-Phase Three-Wire Systems, Three-Phase Y-Y Connection, The Delta (Δ) Connection, Power Measurement in Three-Phase Systems Mutual Inductance, Energy Considerations, The Linear Transformer, The Ideal Transformer Complex Frequency, The Damped Sinusoidal Forcing Function, Definition of the Laplace Transform, Laplace Transforms of Simple Time Functions, Inverse Transform Techniques, Basic Theorems for the Laplace Transform, The Initial-Value and Final-Value Theorems	
Circuit Analysis in the s-Domain, Frequency Response, Two-Port Networks	**14 Hours**
Z(s) and Y(s), Nodal and Mesh Analysis in the s-Domain, Additional Circuit Analysis Techniques, Poles, Zeros, and Transfer Functions, Convolution, The Complex-Frequency Plane, Natural Response and the s Plane, A Technique for Synthesizing the Voltage Ratio H(s) = Vout/Vin Parallel Resonance, Bandwidth and High-Q Circuits, Series Resonance, Other Resonant Forms, Scaling, Bode Diagrams One-Port Networks, Admittance Parameters, Some Equivalent Networks, Impedance Parameters, Hybrid Parameters, Transmission Parameters	
Total Contact Time: 42 Hours	

Recommended Books
1. "Engineering Circuit Analysis", W. H. Hyat, J. E. Kimmerly, S. M. Durbin, 8thEdition, TMH. 2. "Electric Circuits", Joseph A Edminister, SI (metric) edition, Schaum's outline series, McGraw hill, 2nd edition 1983. 3. "Network Analysis", Van Valkenburg M E, 3rd Edition, PHI, 2002. 4. "Basic electrical engineering", Kothari and Nagrath, 2nd edition, 2007, Tata McGraw-Hill Education

B.TECH. II Semester-3	L	T	P	C
EC 303: Electronic Circuits	3	0	2	4

Amplifiers	**(9+9) Hours**
Basic Principles: The Basis for Amplifier Operation, Obtaining a Voltage Amplifier, The Voltage-Transfer Characteristics (VTC), Obtaining Linear Amplification by Biasing the Transistor, The Small-Signal Voltage Gain, Determining the VTC by Graphical Analysis, Deciding on a Location for the Bias Point Q *Small-Signal Operation and Models*: MOSFET small-signal operation and models *Basic Configurations*: The Three Basic Configurations, Characterizing Amplifiers, The Common-Source (CS) Amplifier, The Common-Source Amplifier with a Source Resistance, The Common-Gate (CG) Amplifier, The Source Follower, Summary Tables and Comparisons, When and How to Include the Transistor Output Resistance r_0 *Biasing*: The MOSFET Case *Discrete-Circuit Amplifiers*: A Common-Source (CS) Amplifier, The Amplifier Frequency Response	
Introduction, IC Design Philosophy *IC Biasing*: The Basic MOSFET Current Source, MOS Current-Steering Circuits, Small-Signal Operation of Current Mirror *The Basic Gain Cell*: The CS Amplifier with Current-Source Load, The Intrinsic Gain, Effect of the Output Resistance of the Current-Source Load, Increasing the Gain of the Basic Cell *The Common-Gate Amplifier*: The CG Circuit, Output Resistance of a CS Amplifier with a Source Resistance, The Body Effect *The MOS Differential Pair*: Operation with a Common-Mode Input Voltage, Operation with a Differential Input Voltage, Large-Signal Operation, Small-Signal Operation, The Differential Amplifier with Current-Source Loads *Common-Mode Rejection*: The MOS case *DC Offset*: Input Offset Voltage of the MOS Differential Amplifier	
Frequency Response	**12 Hours**
Low-Frequency Response: Introduction, Low-Frequency Response of Discrete-Circuit Common-Source Amplifier, The Method of Short-Circuit Time-Constants *Internal Capacitive Effects and the High-Frequency Model*: The MOSFET *High-Frequency Response of the CS Amplifier*: The Common-Source Amplifier, Miller's Theorem, Frequency Response of the CS Amplifier When R_{sig} Is Low *Useful Tools for the Analysis of the High-Frequency Response of Amplifiers*: The High-Frequency Gain Function, Determining the 3-dB Frequency f_H, The Method of Open-Circuit Time Constants, Application of the Method of Open-Circuit Time Constants to the CS Amplifier *High-Frequency Response of the Common-Gate Amplifier, Source-Follower, and Resistively Loaded MOS Differential Amplifier*	
Feedback	**12 Hours**
Introduction *The General Feedback Structure*: Signal-Flow Diagram, The Closed-Loop Gain, The Loop Gain, Summary *Some Properties of Negative Feedback*: Gain Desensitivity, Bandwidth Extension, Interference Reduction, Reduction in Nonlinear Distortion *The Feedback Voltage Amplifier*: The Series-Shunt Feedback Topology, Examples of Series-Shunt Feedback Amplifiers, Analysis of the Feedback Voltage Amplifier Utilizing the Loop Gain, A Final Remark *Systematic Analysis of Feedback Voltage Amplifier*: The Ideal Case, The Practical Case *Other Feedback Amplifier Types*: Basic Principles, The Feedback Transconductance Amplifier (Series-Series), The Feedback Transresistance Amplifier (Shunt-Shunt), The Feedback Current Amplifier (Shunt-Series) *Summary of the Feedback Analysis Method* *The Stability Problem*: Transfer Function of the Feedback Amplifier, The Nyquist Plot	
Total Contact Time: 42 Hours	

Recommended Books

Text-Book

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

Recommended Books

2. Boylestad Robert L. and Nashlesky Louis, “Electronics Device & Circuits and Theory”, PHI, 10th Edition, 2009.
3. Millman Jacob, Halkias Christos C. and Parikh C., “Integrated Electronics”, McGraw-Hill, 2nd Edition, 2009.
4. Schilling Donald L. and Belove E., “Electronics Circuits - Discrete and Integrated”, McGraw-Hill, 3rd Edition, 1989, Reprint 2008.
5. "Electronic Principles", Malvin Albert & David J. Bates, Tata McGraw Hill, 7th edition, 2007.
6. "Pulse, Digital and Switching Waveforms", Millman J., Taub H. and Mothiki Suryaprakash, McGraw-Hill, 2nd Ed., 2007.

B.TECH. III Semester-3	L	T	P	C
EC 304: Signals & Systems	3	0	2	4

Unit - 1	8 Hours
Introduction: Signals, Systems, and Signal Processing, *Classification of Signals*, The Concept of Frequency in Continuous-Time and Discrete-Time Signals, Analog-to-Digital and Digital-to-Analog Conversion *Discrete-Time Signals and Systems*: Discrete-Time Signals, Discrete-Time Systems, Analysis of Discrete-Time Linear Time-Invariant Systems, Discrete-Time Systems Described by Difference Equations, Implementation of Discrete-Time Systems, Correlation of Discrete-Time Signals	
Unit - 2	**10 Hours**
Laplace Transform: Introduction, The Laplace Transform, Region of Convergence, Inverse Laplace Transform, Properties of Laplace Transform *z-Transform*: The z-Transform (Direct & Inverse), Properties of the z-Transform, Rational z-Transforms, Inversion of the z-Transform, Analysis of Linear Time-Invariant Systems in the z-Domain, The One-sided z-Transform	
Unit - 3	**12 Hours**
Frequency Analysis of Signals: Frequency Analysis of Continuous-Time Signals, Frequency Analysis of Discrete-Time Signals, Frequency-Domain and Time-Domain Signal Properties, Properties of the Fourier Transform for Discrete-Time Signals *Frequency-Domain Analysis of LTI Systems*: Frequency-Domain Characteristics of Linear Time-Invariant Systems, Frequency Response of LTI Systems, Correlation Functions and Spectra at the output of LTI systems, Linear Time-Invariant Systems as Frequency-Selective Filters, Inverse Systems and Deconvolution	
Unit - 4	**12 Hours**
Sampling and Reconstruction of Signals: Ideal Sampling and Reconstruction of Continuous-Time Signals, Discrete-Time processing of Continuous-Time Signals, Sampling and Reconstruction of Continuous-Time Bandpass Signals, Sampling of Discrete-Time Signals *The Discrete Fourier Transform*: Frequency-Domain Sampling: The Discrete Fourier Transform, Properties of the DFT, Linear Filtering Methods Based on the DFT, Frequency Analysis of Signals Using the DFT	
Total Contact Time: 42 Hours	

Recommended Books

Text-Book

1. "Digital Signal Processing: Principle, Algorithms, and Applications", Prokis John G., Pearson Educations, 4th Ed.

Recommended Books

2. "Signal and Systems", Oppenheim Alan V., Wilsky Alan S. and Nawab Hamid S., Pearson Educations, 3rd Ed., 2006.
3. "Linear Systems and Signals", Lathi B. P., Oxford University Press, 2nd Ed., 2007.
4. "Introduction to Signal and Systems", Stuller John Alan, Thomson India Edition, 1st Ed., 2007.
5. "Fundamental of Signals and Systems", Roberts M. J. and Govind Sharma, Tata McGraw- Hill, 2nd Ed., 2010.

B.TECH. II Semester-3	L	T	P	C
AS 305: Probability and Statistical Analysis	3	0	0	3

Probability	
Unit - 1	**9 Hours**
Introduction: Axiomatic definition, Properties, Conditional probability, Bayes rule and independence of events. *Random Variable*: Random Variables, Distribution function, Discrete and Continuous random variables, Probability mass and density functions, Expectation, Function of random variable, Moments, Moment generating function, Chebyshev's inequality. Transformation of Random Variable.	
Unit - 2	**16 Hours**
Special Discrete Distributions: Bernoulli, Binomial, Geometric, Negative binomial, Hypergeometric, Poisson, Uniform. Special continuous distributions: Uniform, Exponential, Gamma, Normal, Weibull, Reyleigh. Random vector: Joint distributions, Marginal and conditional distributions, Moments, Independence of random variables, Covariance, Correlation, Functions of random variables. Law of Large Numbers: Weak law of large numbers, Levy's Central limit theorem (i.i.d. finite variance case), Normal and Poisson approximations to Binomial.	
Statistics	
Unit - 3	**9 Hours**
Introduction: Population, Sample, Parameters. Point Estimation: Method of moments, Maximum likelihood estimation, Unbiasedness, Consistency. *Interval Estimation*: Confidence interval.	
Unit - 4	**8 Hours**
Tests of Hypotheses: Null and Alternative hypothesis, Type-I and Type-II errors, Level of significance, p-value, Likelihood ratio test, Chi-square goodness of fit tests. *Regression Problem*: Scatter diagram, Simple linear regression, Least square estimation, Tests for slope, prediction problem, Graphical residual analysis, Q-Q plot to test for normality of residuals.	
Total Contact Time: 42 Hours	

Recommended Books

1. Sheldon Ross, "A First Course in Probability", 8th edition, Pearson Prentice Hall, 2009.
2. V. K. Rohatgi and A. K. Saleh, "An Introduction to Probability and Statistics", 2nd Edition, Wiley interscience, 2000.
3. R. Hogg, J. McKen and A. Craig, "Introduction to Mathematical Statistics", Pearson, 2012.
4. S. M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Academic Press, 2014.
5. K. S. Trived, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition, Wiley India Private Limited, 2008.
6. A. M. Mood, F. A. Grabill and D. C. Boes, "Introduction to the Theory of Statistics", 3rd Edition, McGraw Hill, 1974.
7. D. P. Bertsekas and J. N. Tsitsiklis, "Introduction to Probability", 2nd Edition, Athena Scientific, 2008.

B.TECH. II Semester-3	L	T	P	C
HM 306: Economics and Business Management	2	0	0	2

Economics	14 Hours
Introduction to Economics, Micro & Macro Economics, Applications & Scopes of Economics, Demand Analysis, Demand Forecasting, Factors of Production, Types of Cost, Market Structures, Break Even Analysis Basic Economic Problems: Poverty, Unemployment, Inflation Money, Monetary policy, Fiscal policy Banking, Central Bank – RBI, CRR, bank rate, repo rate, reverse repo rate, SLR	
Management	**14 Hours**
Introduction to Management, Features of Management, Nature of Management, Development of Management Thoughts – Scientific Management by Taylor & Contribution of Henry Fayol, Coordination & Functions of Management, Centralization & Decentralization, Decision Making Fundamentals of Planning Objectives & MBO Types of Business Organizations: Private Sector, Public Sector & Joint Sector Theories of Motivation, Leadership Introduction To ERP, e – CRM, SCM, RE – Engineering, WTO, IPR Etc.	
Total Contact Time: 28 Hours	

Recommended Books

1. Prasad L.M., Principles & Practice of Management, Sultan Chand & Sons, 8th Edition,2015
2. Banga T. R. & Shrama S.C., Industrial Organisation & Engineering Economics, Khanna Publishers, 25th Edition, 2015
3. Everett E. Adam, Ronald J. Ebert, Production and Operations Management, Prentice Hall of India, 5th edition, 2012
4. Kotler P., Keller K. L, Koshi A.& Jha M., Marketing Management – A South Asian Perspective, Pearson, 14th Edition, 2014
5. Tripathi P.C., Personnel Management & Industrial Relations, Sultan Chand & sons, 21st Edition, 2013
6. Chandra P., Financial management, Tata McGraw Hill, 9th Edition, 2015