Proposed Syllabus Structure for 2007-11 (ECE Department)					
Semester V					
Code	**Name of the Subject**	**L**	**T**	**P**	**Total Credits**
EC 301	Integrated Circuits & applications	3	0	1	4
EC 302	Control System Engineering	3	1	1	5
EC 303	Digital Signal Processing	3	1	1	5
EC 304	Digital Communication	3	0	1	4
CS 304	Computer Networks	3	0	1	4
CS 312	Java Programming	2	0	2	4
	Total				**26**

EC301 INTEGRATED CIRCUITS & APPLICATIONS

L-T-P-C
3-0-1-4

Objective: *The objective of this course is for the students to introduce the workings of operational amplifier and their applications in building different practical circuits to design various engineering systems.*

Operational Amplifiers: Basic differential amplifier analysis, Op-amp configurations with feedback, Op-amp parameters, Characteristics and performance paionsrameters of an Op-Amp, Ideal Op-Amp, Equivalent circuit of an Op-Amp, Open loop configurations : Differential, Inverting & Non Inverting. Practical Op-Amp: Input offset voltage, Input bias current, Input offset current, Common Mode configuration and Common Mode Rejection Ratio. Frequency response of Op-amps, Closed loop frequency response, Slew rate, causes of slew rate and its effect on applications.

Operational Amplifier Applications: Inverting and Non-Inverting configuration, Integrating & differentiating amplifiers, Summing and Averaging Amplifier, Instrumentation Amplifier, Comparator , Voltage to Current and Current to Voltage converter, Log and Antilog Amplifier, Voltage Controlled Oscillators, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square wave generator, Triangular wave generator, Saw-tooth wave generator, Basic comparator, Zero crossing, detector, Schmitt trigger, Sample & Hold circuit.

Active Filters: Distinction between passive & active filter, Active filters- Low pass, High pass, Band pass & Band reject and All pass, Designing of second order filter using Butterworth approximation, High order & state variable filters.

Voltage Regulators: Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators, Voltage regulators using LM317.

Specialized IC Applications: Block diagram & schematic of IC 555, application of timer 555 as astable, monostable and bistable multivibrators.

Phase Lock Loops: Operation of phase lock loop system, transfer characteristics, lock range and capture range, study of PLL IC-LM 565 and its applications as AM detector, FM detector and frequency translator.

Reference:

1. Op Amps & Linear Integrated circuits by Ramakant Gayakwad.
2. Op Amps & Linear Integrated circuits by Coughlin

EC302 CONTROL SYSTEM ENGINEERING

L-T-P-C
3–1–1-5

Objective: *The objective of teaching this course to the students to provide sound knowledge in the basic concepts of linear control system analysis and to design controller to cater industrial control problems.*

Introductory Concepts : Introduction to control system, Basic building blocks of control system, Classifications, open loop & closed loop systems, Effect of feedback on sensitivity, stability and system gain.

Mathematical Modelling: Transfer function, relationship between transfer function and impulse response, derivation of transfer functions for electrical, mechanical & electromechanical systems, block diagram reduction technique, signal flow graphs, Mason's gain formula & its application.

Time Domain Analysis: Standard test signals, time response of first order systems to various standard inputs, time response of second order system to step input, relationship between location of roots of characteristics equation, time domain specifications of a generalized second order under-damped system, steady state error and error constants, concept of stability, pole zero configuration and stability, necessary and sufficient conditions for stability, Routh & Hurwitz stability criterion, Relative stability.

Root Locus Technique: Root locus concept, development of root loci for various systems, stability considerations.

Frequency Domain Analysis: Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.

Compensation Design Techniques: Necessity of compensation, design of lag, lead & lag-lead compensating networks, basic modes of feedback control, proportional, integral and derivative controllers and its effect on the closed loop output of the system.

State Variable Analysis: Introduction to state variable, Concept of state, State variable and state model, State equation of continuous data control system, Derivation of state model from transfer function and vice-versa, solution of state equation.

Control Components:
Synchros, AC and DC tacho-generators, servomotors, stepper motors & their applications.

Text Books.

1. Control System Engineering by I.J Nagrath and M.Gopal, New Age International Pub.
2. Automatic Control Systems by B.C Kuo, PHI Pub.
3. Modern Control Engineering by Katsuhik Ogata,Pearson Education.

Reference Books:

1. Control Systems by Smarajit Ghosh,Pearson Education
2. Modern Control Engineering by R.C Dorf, Addison Wesley Pub.
3. Linear Control Systems by U.A Bakshi and U. Bakshi,Technical Publication.
4. Modern Control System Theory by M.Gopal, New Age International Pub.

EC303 DIGITAL SIGNAL PROCESSING

L-T-P-C
3-1-1-5

Objective: *The objective of teaching this course to the students to introduce the concept of analyzing discrete time signals & system, transformation and processing of digital signal to be used for high speed speech & image processing applications.*

Introduction: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems, sampling of discrete time signals- decimation & interpolation.

Discrete Fourier Series: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT, Relation between Z-transform and DFS.

Fast Fourier Transforms: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N.

Realization of Digital Filters: Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function.

IIR Digital Filters: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations.

FIR Digital Filters: Characteristics of FIR Digital Filters, frequency response, Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

Finite Word Length Effect: Quantization of fixed point numbers and floating point numbers-Analysis of coefficient quantization effects in FIR filters - Need for scaling - Limit Cycle oscillations - Analysis of product round off error -Round off with calculation using MATLAB.

Application of DSP: Dual tone multi-frequency signal detection, musical sound processing, voice privacy systems, sub-band coding of speech and audio signals, discrete multi-tone transmission of digital data, implementation of echo canceller, software radio, modems and speech coders on DSP.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI
3. Digital Signal Processors – Architecture, Programming and Applications,, B.Venkataramani, M. Bhaskar, TATA McGraw Hill, 2002

Reference Books:

1. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
2. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
3. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
4. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
5. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill, 2006

EC 304 DIGITAL COMMUNICATION

L-T-P-C
3- 0-1-4

Objective: *The objective of this course is to introduce the working principles of digital communication system, source digitization, digital multiplexing and modulation, which will provide knowledge to customize and understand communication system as whole.*

Probability Theory & Random Variables : Probability, Conditional Probability and Independent Events, Discrete And Continuous Variable, CDF, PDF, Gaussian PDF, Threshold Detection, Joint distribution, conditional densities, Rayleigh Density, Statistical Average (Means), Chebyshev's Inequality, Central Limit Theorem, Correlation, Least mean square estimation, Random process and it's classification, autocorrelation function, power spectral density, multiple random process.

Sampling Theorem and Pulse Modulation: Sampling theorem, instantaneous, flat top & natural sampling, signal reconstruction, practical difficulties in signal reconstruction, generation and detection of PAM, PPM and PWM signals, comparison of PAM/PWM/PPM.

Pulse Code Modulation & Delta Modulation: Pulse code modulation, Quantization, quantization error, quantization noise, Non-uniform quantization, compandor, A-law & μ-law transmission bandwidth and the output SNR of PCM, Differential PCM , Delta modulation, transmission bandwidth and the output SNR of DM, Adaptive delta modulation, comparison of PCM and DM.

Digital Data Transmission: Digital communication system, Line coding- PSD Of Polar, On/Off Signal, Bipolar Signal, Pulse shaping- Nyquist criterion for zero ISI, scrambling, regenerative repeater, Eye diagram, Detection error probability for polar, On-off and Bipolar signals, M –ary communication

Digital Modulation Techniques: Optimum threshold detection, matched filter, Optimum Binary Receivers, Coherent and Non coherent digital modulation methods, Amplitude shift keying, Frequency shift keying, Phase shift keying, differential PSK, differentially encoded PSK, M-ary ASK, M-ary FSK, M-ary PSK, QAM, MSK, comparison of various digital modulation techniques, calculation of bit error probability for Coherent and Non coherent digital modulation methods.

Text Books:

1. Communication Systems, Fourth Edition, Simon Haykin, Wiley publication.
2. Electronic Communication Systems, Tomasi, 4th edition, Pearson Publications.
3. B. P. Lathi- "Modern analog & digital communication", OXFORD Publications

Reference Books:

1. Communication system by B. Carlson (TMH)
2. Modern Electronic Communication, (6th edition), by Gary M. Miller, Published by Prentice-Hall, 1999
3. Taub and schilling, “Principles of Communication Systems” TMH
4. Digital Communications/Mc Graw Hill 2nd Ed, Proakis J. J.

CS304 COMPUTER NETWORKS

L-T-P-C
3-0-1-4

Objective: *To understand the concepts of data communications and to study the functions of different layers. It also introduces IEEE standards employed in computer networking and familiarizes students with different protocols and network components.*

Introductory Concepts: Goals and Applications of Networks, Client Server Concepts, Basic Concept of layering & connection oriented & connection less services, Network structure and architecture, the OSI reference model, TCP/IP Architecture, Networks topology, Physical Layer design issues, Connecting Devices: Repeaters, Active & Passive Hubs, Head End, Bridges, Switches, Routers, Gateway

Medium Access Sub Layer: Channel allocations, Random Access overview, LAN protocols, Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, FDDI,

Data Link Layer: Elementary data link protocols, sliding windows protocols, error handling, Parity Bit Check, CRC, Checksum, Hamming Code, Hamming Distance. High Level Data Link Control (HDLC), Overview of Ethernet.

Network Layer: Point-to Point networks, X.25, Layers of X.25, Routing algorithms, congestion control algorithms, internetworking, TCP/IP packet, IP addresses, IPv6, Internet Control Protocol: ICMP, ARP, RARP, Interior Gateway routing Protocol: OSPF, Exterior Gateway Protocols: BGP.

Transport Layer: Design issues, connection management, User Datagram Protocol: UDP protocol & Header, Transmission Control Protocol: TCP protocol, TCP segment Header Format, TCP window Management, TCP Timer Management

Application Layer: WWW, Hyper Text Transfer Protocol, Domain Name System, Simple Network, Management Protocol, Electronic mail, File Transfer Protocol, TFTP, RTP, RTCP, Telnet Virtual Terminal and terminal handling.

VOIP: **SIP & H.323.**

Books:

1. A. S Tanenbaum, “Computer Networks, 3rd Edition”, PHI
2. Forouzan, A. Behrouz “Data Communication and Networking”, TMH, Special Indian Edition 2006
3. Comer, “Computer Networks & Internet”, PHI.
4. Comer, “Internetworking with TCP/IP”, PHI
5. W. R. Stevens, “TCP/IP illustrated, Volume 1: The protocols”, Addison Wesley, 1994.
6. G. R. Wright. “TCP/IP illustrated, Volume 2: The implementation”,Addison, Wesley 1995

CS312 JAVA PROGRAMMING

L-T-P-C
2-0-2-4

Objective: *To provide the knowledge required to describe the essential components of JAVA by providing high level overview of the key concept & technologies. It further provides the skill required to use JAVA libraries to develop efficient application*

The Genesis of Java: The importance of Java to Internet, Java's magic-the bytecode, the Java buzzwords, the continuing revolution, Java and HTML, using blocks of code, lexical issues, the Java libraries.

Data Types, Variables and Arrays: Java as a strongly typed language, the simple types, integers, floating-point types, characters, Booleans, a closer look at literals, variables, type conversion and casting, automatic type promotion in expressions. Operators: arithmetic operators, the assignment operator, the conditional operator, operator precedence, using parenthesis, control statements, jump statements.

Classes: Class fundamentals, declaring objects, assigning object reference variables, introducing methods, constructors, the this keyword, garbage collection, a stack class, overloading methods, using objects as parameters, argument passing, returning objects, recursion, introducing access control, understanding static, introducing final, arrays revisited, nested and inner classes, exploring string class, using command-line arguments.

Inheritance: Inheritance basics, using super, creating a multilevel hierarchy, when constructors are called, method overriding, dynamic method dispatch, using abstract, using final with inheritance, the object class. Package, Interfaces and Exception Handling: Packages, access protection, importing packages, interfaces, exception-handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built-in exceptions, creating your own exception subclasses using exceptions.

Multithreaded Programming: The Java thread model, the main thread, creating a thread, creating multiple threads, using Alive() and join(), thread priorities, synchronization, interthread Communication, suspending, resuming, and stopping threads, using multithreading.

I/O Streams and String Handling: I/O Basics, reading consol input, writing console output, the print writer class, reading and writing files, string constructors, string length, special string operations, character extraction, string comparison, searching strings, modifying a string, data conversion using valueof(), changing the case of characters within a string.

I/O Applets, Event Handling and AWT: applet fundamentals, Life cycle of an applet, passing parameters to an applet, the Delegation Event model, event classes, sources of events, event listener interfaces, fundamentals of AWT.

Books:

1. Herbert Schieldt, The Complete Reference:Java, TMH
2. Rich raposa, Learning Java, Wiley
3. Patrik Naughton, The Complete Reference Java, Tata Mcgraw Hill
4. Core Java(TM), Volume I--Fundamentals (8th Edition) (Sun Core Series) by Cay S. Horstmann and Gary Cornell
5. Java How to Program, 7th Edition by Harvey M. Deitel and Paul J. Deitel