

SCHEME AND SYLLABI

FOR

THIRD TO EIGHTH SEMESTERS

OF

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION
ENGINEERING

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

SCHEME FOR ECE BRANCH OF CALICUT UNIVERSITY – 2009

THIRD SEMESTER

Code	Subject	Hrs/week			Marks		Sem. End Duration - Hrs	Credits
		L	T	P/ D	Internal	Sem- End		
EN09 301	Engineering Mathematics-III	3	1	-	30	70	3	4
EN09 302	Humanities and Communication Skills	2	1	-	30	70	3	3
EC09 303	Network Analysis & Synthesis	4	1	-	30	70	3	5
EC09 304	Signals and Systems	3	1	-	30	70	3	4
EC09 305	Digital Electronics	3	1	-	30	70	3	4
EC09 306	Electrical Engineering	3	1	-	30	70	3	4
EC09 307(P)	Digital Electronics Lab	-	-	3	50	50	3	2
EC09 308(P)	Electrical Engineering Lab	-	-	3	50	50	3	2
TOTAL		18	6	6				28

FOURTH SEMESTER

Code	Subject	Hrs/week			Marks		Sem. End Duration - Hrs	Credits
		L	T	P	Internal	Sem- End		
EN09 401(B)	Engineering Mathematics IV	3	1	-	30	70	3	4
EN09 402	Environmental Science	2	1	-	30	70	3	3
EC09 403	Electronic Circuits	4	1	-	30	70	3	5
EC09 404	Analog Communication	3	1	-	30	70	3	4
EC09 405	Computer Organization & Architecture	3	1	-	30	70	3	4
EC09 406	Solid State Devices	3	1	-	30	70	3	4
EC09 407(P)	Electronic Circuits Lab	-	-	3	50	50	3	2
EC09 408(P)	Analog Communication Lab	-	-	3	50	50	3	2
TOTAL		18	6	6				28

FIFTH SEMESTER

Code	Subject	Hrs/week			Marks		Sem. End Duration - Hrs	Credits
		L	T	P	Internal	Sem-End		
EC09 501	Digital Signal Processing	4	1	-	30	70	3	5
EC09 502	Quantitative Techniques For Managerial Decisions	3	1	-	30	70	3	4
EC09 503	Electromagnetic Field Theory	3	1	-	30	70	3	4
EC09 504	Digital Communication	3	1	-	30	70	3	4
EC09 505	Microprocessors & Microcontrollers	3	1	-	30	70	3	4
EC09 506	Linear Integrated Circuits	2	1	-	30	70	3	3
EC09 507(P)	Microprocessors & Microcontrollers Lab	-	-	3	50	50	3	2
EC09 508(P)	Linear Integrated Circuits Lab	-	-	3	50	50	3	2
TOTAL		18	6	6				28

SIXTH SEMESTER

Code	Subject	Hrs/week			Marks		Sem. End Duration -Hrs	Credits
		L	T	P	Internal	Sem-End		
EC09 601	Basics of VLSI Design	4	1	-	30	70	3	5
EN09 602	Engineering Economics and Principles of Management	3	1	-	30	70	3	4
EC09 603	Radiation and Propagation	3	1	-	30	70	3	4
EC09 604	Control Systems	3	1	-	30	70	3	4
EC09 605	Optical communication	2	1	-	30	70	3	3
EC09 Lxx	Elective-I	3	1	-	30	70	3	4
EC09 607(P)	Digital Communication & DSP Lab	-	-	3	50	50	3	2
EC09 608(P)	Mini Project	-	-	3	50	50	3	2
TOTAL		18	6	6				28

Elective I

EC09 L01	Power Electronics
EC09 L02	Numerical methods for Engineers
EC09 L03	Entrepreneurship
EC09 L04	Speech & Audio Processing
EC09 L05	Satellite Communication.

SEVENTH SEMESTER

Code	Subject	Hrs/week			Marks		Sem. End Duration -Hrs	Credits
		L	T	P	Inter nal	Sem- End		
EC09 701	Information Theory and Coding	4	1	-	30	70	3	5
EC09 702	Microwave Engineering	3	1	-	30	70	3	4
EC09 703	Analog & Mixed MOS Circuits	2	1	-	30	70	3	3
EC09 704	Digital System Design	2	1	-	30	70	3	3
EC09 Lxx	Elective-II	3	1	-	30	70	3	4
EC09 Lxx	Elective-III	3	1	-	30	70	3	4
EC09 707(P)	Communication systems Lab	-	-	3	50	50	3	2
EC09 708(P)	VLSI Design Lab	-	-	3	50	50	3	2
EC09 709(P)	Project	-	-	1	100	-	-	1
TOTAL		17	6	7				28

EIGHTH SEMESTER

Code	Subject	Hrs/week			Marks		Sem. End Duration -Hrs	Credits
		L	T	P	Inter nal	Sem- End		
EC09 801	Data & Communication Network	4	1	-	30	70	3	5
EC09 802	Wireless Mobile communication	2	1	-	30	70	3	3
EC09 Lxx	Elective-IV	3	1	-	30	70	3	4
EC09 Lxx	Elective-V	3	1	-	30	70	3	4
EC09 805(P)	Seminar	-	-	3	100	-	-	2
EC09 806(P)	Project	-	-	11	100	-	-	7
EC09 807(P)	Viva Voce	-	-	-	-	100	-	3
TOTAL		12	4	14				28

ELECTIVES

EC09 L06	Soft Computing
EC09 L07	High Speed Digital Design
EC09 L08	Introduction to MEMS
EC09 L09	Multimedia Communication Systems
EC09 L10	Management Information systems
EC09 L11	Cryptography & Network security
EC09 L12	Antenna Theory & Design
EC09 L13	Microwave Active Devices & Circuits
EC09 L14	Internet technology
EC09 L15	Television & Radar Engineering
EC09 L16	Embedded systems
EC09 L17	Photonic Switching And Network
EC09 L18	Nano Technology
EC09 L19	Advanced semiconductor device technology
EC09 L20	Mobile computing
EC09 L21	Image & video Processing
EC09 L22	Advanced digital signal Processing
EC09 L23	Data Structures & Algorithms
EC09 L24	Electronic Packaging
EC09 L25	Biomedical Instrumentation

GLOBAL ELECTIVES

CE09 L25	Finite Element Analysis
ME09 L23	Industrial Safety Engineering
EE 09 L24	Mechatronics
EE 09 L25	Robotics & Automation
CS09 L23	Simulation & Modeling
CS09 L25	Pattern Recognition
IC09 L25	Aerospace Engineering and Navigation Instrumentation
IC09 L23	Bio-Informatics
AI09 L25	Probability and Random process
BM09 L24	Virtual Instrumentation

EC09 501: Digital Signal Processing

Teaching scheme

4 hours lecture and 1 hour tutorial per week

Credits: 5

Objectives

To impart basic ideas (i) in the transform used in digital domain (ii) in the design and hardware realization of digital filters

Module I (18 hours)

Review of Discrete Fourier series and Discrete Time Fourier Transform-Frequency domain sampling- Discrete Fourier Transform-Properties-Circular convolution-Linear convolution using DFT-Linear filtering of long data sequences- Overlap add and overlap save methods- Computation of DFT-Decimation in Time and Decimation in Frequency algorithms

Module II (18hours)

Structures for realization of discrete time systems-Signal flow graph representation-structures for FIR and IIR systems-direct form, cascade form, parallel form-lattice and transposed structures-representation of numbers & errors due to rounding and truncation-Quantization of filter coefficients-round off effects in digital filters-Limit cycle oscillations, scaling to prevent overflow.

Module III (18 hours)

Design of Digital filters-Types of digital filters -FIR and IIR filters-Specifications of digital filters-Design of FIR filters-Linear phase Characteristics-Window method, Optimal method and Frequency Sampling method-Design of IIR filters from analog filters-Impulse invariant and bilinear transformation methods- Frequency transformation in the analog and digital domains

Module IV (18hours)

Computer Architectures for signal processing-Harvard Architecture, Pipelining, Multiplier-Accumulator, Special Instructions for DSP, extended parallelism-General Purpose DSP Processors-Implementation of DSP Algorithms for various operations-Special purpose DSP hardware-Hardware Digital filters and FFT processors-Case study and overview of TMS320 series processor, ADSP 21XX processor

Text Books

1. Oppenheim A. V., Schafer R. W., Discrete-Time Signal Processing, Prentice Hall/Pearson.
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall of India Pvt. Ltd., 1997.
3. Emmanuel C. Ifeachor, Barry W. Jervis, Digital Signal Processing: A Practical Approach, Pearson Education, 2004.
4. Li Tan, 'DSP-Fundamentals & Applications', Elsevier, New Delhi, 2008
5. Roberto Cristi, Modern Digital Signal Processing, Cengage learning India pvt. Ltd., 2004, 4th Indian reprint 2009, New Delhi

Reference Books

1. Mitra S. K., Digital Signal Processing : A Computer Based Approach, Tata McGraw-Hill
2. B Venkataramani & M.Bhaskar, Digital Signal Processors-Architecture,
3. Programming and Applications, Tata McGraw Hill
4. Dag Strannbby & William Walker, 'DSP & Applications'. Elsevier, New Delhi, 2nd Ed. 2004
5. Vinay K Ingle, John G Proakis, DSP- A MATLAB based approach Cengage learning India pvt. Ltd., 2008, 1st Indian reprint 2009, New Delhi

Internal Continuous Assessment (*Maximum Marks-30*)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Regularity in the class

Note: One of the assignments shall be simulation of filters using MATLAB

University Examination Pattern

PART A: Short answer questions (one/two sentences)

5 x 2 marks=10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions

4 x 5 marks=20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions

4 x 10 marks=40 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

Note: More than 75% of the questions shall be analytical/problem oriented types.

EC09 502: Quantitative Techniques for Managerial Decisions

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

To impart basic ideas on various quantitative techniques for managerial decision making

Module 1 (14 hours)

Decision making- strategic and tactical decisions-strategy formulation-models of decision making-single stage decisions under risk-incremental analysis-multistage decision making-decision trees-decision making under uncertainty- baye's decision theory-

Network Techniques- basic concepts- network construction- CPM and PERT networks-algorithm for critical path-slacks and their significance-crashing-network flow problems-the shortest route problem-minimal spanning tree problem.

Module2 (14 hours)

Inventory control-functions of inventory-structure of inventory problems-relavant cost-opposing costs-selective control techniques-dynamic inventory models under certainty-calssical EOQ model with and without back logging-production lot size model-quantity discount- safety stock-probabilistic model-one time mode-P system and Q system.

Module 3 (13 hours)

Statement of the LP problem- slack and surplus variables-basic feasible solutions- reduction of a feasible solution to basic feasible solution-artificial variable-optimality conditions- unbounded solutions-charnes ' M method-two phase method-degeneracy-duality.

Module 4 (13 hours)

Transportation problem- coefficient matrix and its properties-basic set of column vectors-linear combination of basic vectors-tableau format-stepping stone algorithm-UV method-inequality constraints-degeneracy in transportation problems - assignment problem-hungarian method

Reference Books

1. Hadley.G Linear programming, Addison Wesley
2. Ravindran , Solberg, & Philips, Operations Research, John Wiley.
3. Riggs, Economic Decision models for Engineers and Managers , McGraw Hill International Students Edition.
4. Weist & Levy , A management Guide to PERT and CPM. Prentice hall of India
5. Starr & Miller , Inventory control –Theory and Practice- Prentice Hall of India

Internal Continuous Assessment (*Maximum Marks-30*)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences) 5 x 2 marks=10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions 4 x 5 marks=20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions 4 x 10 marks=40 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

EC09 503: Electromagnetic Field Theory

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- *To impart the knowledge of electric, magnetic fields and the equations governing them as well as time varying field*
- *To develop understanding about guided waves & transmission lines*

Module I (13hours)

Review of vector analysis: Cartesian, Cylindrical and Spherical co-ordinates systems- Co-ordinate transformations. Vector fields: Divergence and curl- Divergence theorem- Stokes theorem.

Static electric & Magnetic field: Electrical scalar potential- different types of potential distribution- Potential gradient- Energy stored-Boundary conditions Capacitance-Steady current and current density in a conductor-Equation of continuity- energy stored in magnetic fields-Magnetic dipole- Electric and Magnetic boundary conditions- vector magnetic potential-Magnetic field intensity.

Module II (13 hours)

Maxwell's equations and travelling waves: conduction current and displacement current- Maxwell's equations- Plane waves- Poynting theorem and Poynting vector- Plane electromagnetic waves- Solution for free space condition- Uniform plane wave-wave equation for conducting medium- Wave polarization- Poisson's and Laplace equations.

Module III (16 hours)

Guided waves between parallel planes- transverse electric and transverse magnetic waves and its characteristics- , linear elliptical and circular polarization, wave equations for conducting medium, wave propagation in conductors and dielectric, depth of penetration, reflection and refraction of plane waves by conductor and dielectric, Poynting vector and flow of power

Module IV (12hours)

Transmission lines & Waveguides: -Transmission line equations- transmission line parameters- Skin effect- VSWR- Characteristic impedance- Stub matching- Smith chart - Phase velocity and group velocity Theory of waveguide transmission-Rectangular waveguides- TE modes-TM modes- mathematical analysis- circular wave guide- modes of propagation- dominant modes- cut off wave length cavity resonators-applications

Text Books

1. Elements of Electromagnetics– Mathew N.O. Sadiku, Oxford Pub, 3rd Edition
2. Engineering Electromagnetics – W.H. Hayt, Tata Mc Graw Hill Edition, 5th Edition
3. Introduction to Electrodynamics– David J. Griffiths, Prentice Hall India, 3rd Edition

Reference Books

1. Electromagnetics: J. D. Kraus, Mc Graw Hill Publications.
2. Engineering electromagnetics: E. C. Jordan.
3. Field & Wave Electromagnetic: Cheng, Pearson Education.
4. Electromagnetics: Edminister, Schaum series, 2 Edn.

Internal Continuous Assessment (*Maximum Marks-30*)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences) 5 x 2 marks=10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions 4 x 5 marks=20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions 4 x 10 marks=40 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

EC09 504: DIGITAL COMMUNICATION

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- *To impart the basic concepts of various digital modulation schemes*
- *To develop understanding about digital transmitters & Receivers*

Module I (13hours)

Analog pulse modulation-generation and demodulation of PAM/TDM Systems, PPM and PWM- Sampling theorem for band limited and band pass signals-Signal Reconstruction-Practical difficulties in Signal Reconstruction- PCM- Quantization-Signal to noise ratio for quantized pulses-uniform and nonuniform quantization-companding- μ Law and A Law characteristics-DPCM,Delta modulation, Adaptive Delta modulation-Line codes-NRZ,RZ,Phase encoded, Multilevel binary

Module II (13 hours)

Pulse shaping-Inter symbol interference-Nyquist's Criterion for distortion less Base Binary Transmission-Signaling with duobinary pulses -eye diagram-Equalizer-Transversal Equalizer- Zero forcing Equalizer- Decision Feedback Equalizer-Preset and Adaptive Equalizer- Scrambling and descrambling- Geometric Representation of Signals-Schwarz inequality-Gram-Schmidt Orthogonalization Procedure

Module III (16 hours)

Optimum receiver-Conversion of continuous AWGN channel into a vector channel-Likelihood Functions-Maximum Likelihood receiver--Matched filter-correlation receiver-decision procedure- Optimum receiver of colored noise-carrier and symbol synchronization-Fundamental concepts of spread spectrum systems-pseudo noise sequence-performance of direct sequence spread spectrum systems-analysis of direct Sequence spread spectrum systems- the processing gain and anti jamming margin-frequency hopped spread spectrum systems -time hopped spread spectrum systems-time synchronisation

Module IV (12hours)

Digital modulation schemes- coherent binary schemes-ASK, FSK, PSK, MSK and coherent M-ary schemes -calculation of average probability error for different modulation schemes-power spectra of digitally modulated signals-performance comparison for different modulation schemes

Text Books

1. Taub&Schilling, Principles of Communication Systems', Tata McGraw Hill, New Delhi, 3rd Ed., 2008
2. Bernard Sklar, 'Digital Communication' Pearson education
3. John P Proakis & Masoud Salehi, "Communication system Engg", PHI, New Delhi, 2nd Ed. 2006
4. Wayne Tomasi, 'Advanced Electronic Communication Systems' PHI, 6th Ed. 2008

Reference Books

1. Simon Haykin, 'Digital Communication', Wiley India
2. Bruce Carlson, Communication Systems; McGraw Hill
3. Sam Shanmugam- Digital and Analog Communication systems; Wiley Student Edition McGraw Hill, New Delhi, 2003

Internal Continuous Assessment (*Maximum Marks-30*)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences)

5 x 2 marks=10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions

4 x 5 marks=20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions

4 x 10 marks=40 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

EC09 505: Microprocessors and Microcontrollers

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To introduce the student with knowledge about architecture, interfacing and programming with 8086 microprocessors and 8051 microcontrollers. It gives a brief introduction to ARM 7 and ARM 9 micro controllers.
- After studying this subject, the student should be able to design microprocessor/controller based system for any relevant applications.

Module I (13hours)

Software architecture of the 8086/8088 microprocessors-Address space, Data organization, registers, memory segmentation and addressing, stack, I/O space, Assembly language programming and program development.

Module II (14 hours)

8086/88 microprocessor architecture-min/max mode- Coprocessor and Multiprocessor configuration - hardware organization of address space-control signals and I/O interfaces- Memory devices, circuits and sub system design – various types of memories, wait state and system memory circuitry.

Module III (14hours)

I/O interfacing circuits –Hand shaking, serial and parallel interfacing-Address decoding-Interfacing chips-Programmable peripheral interfacing (8255)-Programmable communication interface(8251)-Programmable timer(8253)-DMA controller(8237/8257)-Programmable interrupt controller(8259)-Keyboard display interface(8279)

Module IV (13hours)

Intel 8051 microcontroller-CPU operation-Memory space-Software overview-Peripheral overview-Interrupt- timers parallel port inputs and outputs-serial port-low power special modes of operation-Introduction to ARM processors –features of ARM 7 and 9 processors

Text Books

1. Triebal W A & Singh A., The 8088 and 8086 microprocessors McGraw Hill
2. David Calcutt, Fred Cowan & Hassan,'8051 Microcontrollers-an application based introduction'.Newnes-Elsevier,Indian Reprint 2008
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D Mckinlay.' The 8051 Microcontrollers and Embedded Systems using Assembly and C “ 2nd Edition PHI Publishers
4. Andrew .N.Sloss,Dominic Sysmes,Chris Wright - Arm System Developers Guide-Designing and Optimizing System software, Morgan Kaufmann Publishers.

Reference Books

1. Intel Data Book vol.1, Embedded Microcontrollers and Processors
2. Hall D.V., Microprocessors and Interfacing McGraw Hill
3. Mohammed R.,Microprocessor& Microcomputer based system design,Universal Book stall

Internal Continuous Assessment (*Maximum Marks-30*)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences)

5 x 2 marks=10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions

4 x 5 marks=20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions

4 x 10 marks=40 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

EC09 506: LINEAR INTEGRATED CIRCUITS

Teaching scheme

2 hours lecture and 1 hour tutorial per week

Credits: 3

Objectives

- To develop the skill of analysis and design of various circuits using operational amplifiers*
- To develop design skills to design various circuits using different data conversion systems*

Module I (9 hours)

Various stages of an operational amplifier - simplified schematic circuit of op-amp 741 - need for compensation - lead, lag and lead-lag compensation schemes - typical op-amp parameters - slew rate - power supply rejection ratio - open loop gain - unity gain bandwidth - offset current & offset voltage

Linear Op-Amp circuits – basic configurations-ideal Op-Amp circuit analysis –The 741 Op-Amp circuit parameters-DC analysis –small signal analysis –Gain, frequency response and slew rate of the 741 –summing and different amplifiers-Differentiator and integrator –I-V and V-I converters-Instrumentation amplifier, isolation amplifier - log and antilog amplifiers analog multipliers – Voltage Comparators-Schmitt trigger

Module II (9 hours)

Signal generators-Phase shift and Wien Bridge Oscillators-Astable and Monostable Circuits-Linear sweep circuits.

Active filters-filter transfer function-Butterworth and Chebyshev filters-First order and second order function for low-pass high-pass band –pass band-stop and all –pass filters- Sallen-key LPF and HPF-Delyiannis-Friend band Pass filters-twin –tee notch filter-Second order LCR Resonator and realizations of various types-Filters based on inductor replacement-switched capacitor filters

Module III (9 hours)

Timer IC 555 – internal diagram – working - multivibrators with timer IC 555

Data converters-definitions and specifications – DAC - Weighted resistor and R-2R DAC-Bipolar DAC

ADC - flash, integrating type, Counter Ramp, pipeline, tracking and Successive approximation, dual slope & oversampling ADCs - sigma - delta ADC

Linear voltage regulators- protection mechanisms-LM 723 Functional-diagram-Design of voltage regulator using 723-Three terminal Voltage regulators-functional operation of 78xx series IC and design of fixed and adjustable regulators

Module IV (9 hours)

Phase locked loops- operation of first and second order PLLs-Lock and Capture range-LM565PLL-Application of PLL as AM/FM/FSK/ detectors, frequency translators, phase shifter, tracking filter, signal synchronizer and frequency synthesizer. Voltage controlled oscillator

Text Books

1. Sergio Franco , *Design with Operational Amplifiers & Analog integrated Circuits* ; McGraw Hill
2. Jacob Baker R., Li H.W. & Boyce D.E., '*CMOS- Circuit Design, Layout & Simulation*', PHI
3. Fiore J.M., *Operational Amplifiers and Linear Integrated Circuits*, Jaico Publishing House
4. Gayakwad, *Operational Amplifiers*, Jaico Publishing House

Reference Books

1. Coughlin R.F. & Driscoll F.F., *Operational Amplifiers and Linear Integrated Circuits*, Pearson Education
2. Schumann & Valkenberg, *Design of Analog Filters*, Oxford University Press
3. Gray & Meyer, *Analysis and Design of Analog Integrated Circuits*; John Wiley
4. James Cox, *Linear Electronic circuits & Devices*, Cengage learning India pvt. Ltd., 2002, 1st Indian reprint 2009, New Delhi

Internal Continuous Assessment (*Maximum Marks-30*)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Regularity & Participation in the class

Note: One of the assignments shall be simulation of OP-AMP circuits using any SPICE tool.

University Examination Pattern

PART A: Short answer questions (one/two sentences)

5 x 2 marks=10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions

4 x 5 marks=20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions

4 x 10 marks=40 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

EC09 507(P) MICRO PROCESSOR & MICROCONTROLLER LAB

Teaching scheme

3 hours practical per week

Credits: 2

1. 8086 kit familiarization and basic experiments
2. Programming exercise using BCD and Hexadecimal numbers
3. Programming exercise : sorting ,searching and string
4. Interfacing with A/D and D/A converters
5. Interfacing with stepper motors
6. IBM PC programming : Basic programs using DOS and BIOS interrupts
7. Interfacing with PC: Serial communication and Parallel printer interfacing

Interfacing experiments using 8051

1. Parallel interfacing I/O ports(Matrix keyboards)
2. Serial communication with PC
3. Parallel interfacing –LCD
4. Interfacing with serial EEPROM

Note: Minimum of **10** experiments must be conducted

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical and record
30% - Test/s
10% - Regularity in the class

Semester-End Examination (Maximum Marks-50)

70% - Procedure and tabulation form, Conducting experiment, results and inference
20% - Viva voce
10% - Fair record

EC09 508(P) LINEAR INTEGRATED CIRCUITS LAB

Teaching scheme

3 hours practical per week

Credits: 2

1. Measurement of op-amp parameters-CMRR,slew rate,open loop gain ,input and output impedances
2. Inverting and non inverting amplifiers,integrators,and differentiators-Frequency response, Comparators-Zero crossing detector Schmitt trigger-precision limiter
3. Instrumentation amplifier-gain, CMRR & input impedance
4. Single op-amp second order LFF and HPF - Sallen-Key configuration Narrow band active BPF -Delyiannis configuration
5. Active notch filter realization using op-amps
6. Wein bridges oscillator with amplitude stabilization
7. Generation and demodulation of PWM and PPM
8. Multipliers using op-amps - 1,2 & 4 quadrant multipliers
9. Square , triangular and ramp generation using op-amps
10. Astable and monostable multivibrators using op-amps
11. Log and Antilog amplifiers
12. Voltage regulation using IC 723
13. Astable and monostable multivibrators using IC 555
14. Design of PLL for given lock and capture ranges& frequency multiplication
15. Applications using PLL
16. Realisation of ADCs and DACs

Note: Minimum of **10** experiments must be conducted

Internal Continuous Assessment (Maximum Marks-50)

- 60% - Laboratory practical and record
- 30% - Test/s
- 10% - Regularity in the class

Semester-End Examination (Maximum Marks-50)

- 70% - Procedure and tabulation form, Conducting experiment, results and inference
- 20% - Viva voce
- 10% - Fair record