

UNIVERSITY OF CALICUT

SCHEME AND SYLLABI

FOR

FIFTH SEMESTER

OF

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS & COMMUNICATION ENGG.

FROM 2004 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

EC: ELECTRONICS & COMMUNICATION ENGINEERING**FIFTH SEMESTER**

Code	Subject	Hours/week			Sessional Marks	Uni Exam	
		L	T	P		Hours	Marks
EC04 501	Signals and Systems	3	1	-	50	3	100
EC04 502	Mechanical Engineering	3	1	-	50	3	100
EC04 503	Linear Integrated Circuits	3	1	-	50	3	100
EC04 504	Electromagnetic Field Theory	3	1	-	50	3	100
EC04 505	Electronic Instrumentation	3	1	-	50	3	100
EC04 506	Microprocessors & Microcontrollers	3	1	-	50	3	100
EC04 507(P)	Linear Integrated Circuits Lab	-	-	3	50	3	100
EC04 508(P)	Analog Communication Lab	-	-	3	50	3	100
TOTAL		18	6	6	400	-	800

FIFTH SEMESTER

EC04 501: SIGNALS AND SYSTEMS
(Common with AI 04 501, IC 04 501 and BM04 501)

3 hours lecture and 1 hour tutorial per week

Objectives

- To impart the basic concepts of continuous and discrete signals and systems
- To develop understanding about frequency domain approaches used for analysis of continuous and discrete time signals and systems.
- To establish the importance of z-transform and its properties for analysing discrete time signals and systems.

Module I (12 hours)

Introduction to signals and systems-classification of signals-basic operations on signals-elementary signals-concept of system-properties of systems-stability, invertibility, time invariance, linearity, causality, memory, time domain description-convolution-impulse response-representation of LTI systems-differential equation and difference equation representation of LTI systems

Module II (15 hours)

Fourier representation of continuous time signals- Fourier transform-existence of the Fourier integral-FT theorems-energy spectral density and power spectral density-frequency response of LTI systems-correlation theory of deterministic signals-condition for distortionless transmission through an LTI system-transmission of a rectangular pulse through an ideal low pass filter-Hilbert transform-sampling and reconstruction

Module III (13 hours)

Fourier representation of discrete time signals- discrete Fourier series and discrete Fourier transform-Laplace Transform analysis of systems-relation between the transfer function and differential equation-causality and stability-inverse system- determining the frequency response from poles and zeroes

Module IV (14 hours)

Z-transform-definition- properties of the region of convergence- properties of the Z-transform- analysis of LTI systems-relating the transfer function and difference equation-stability and causality-inverse systems-determining the frequency response from poles and zeroes

Text Books

1. S. Haykin and B. V. Veen, *Signals and Systems*, John Wiley & Sons, N. Y., 2002
2. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, *Signals & Systems*, 2nd ed., Prentice Hall of India, New Delhi, 1997

Reference Books

1. C. L. Philips, J. M. Parr, E. A Riskin, *Signals, Systems and Transforms*, 3rd ed., Pearson Education, Delhi, 2002
2. R. E. Zeimer, W. H. Tranter, and D. R. Fannin, *Signals and Systems: Continuous and Discrete*, 4th ed., Pearson Education, Delhi, 1998
3. M. J. Roberts, *Signals and Systems: Analysis using Transform methods and MATLAB*, Tata McGraw Hill, New Delhi, 2003

Internal work assessment

60% - Test Papers (Minimum 2)

30% - Assignments/Term Project/ any other mode decided by the teacher.

10% - Other measures like regularity and participation in class.

Total marks = 50.

University examination Pattern

Q1 – 8 Short type questions of 5 marks, 2 from each module.

QII – 2 questions A and B of 15 marks from module I with choice to answer any one.

QIII – 2 questions A and B of 15 marks from module II with choice to answer any one.

QIV – 2 questions A and B of 15 marks from module III with choice to answer any one.

QV – 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 502: MECHANICAL ENGINEERING

3 hours lecture and 1 hour tutorial per week
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Objectives: After studying this paper students should be aware of the basic principles of thermodynamics and areas where it can be applied.

Module I (13 hours)

Thermodynamics - thermodynamics systems - thermodynamic properties and processes - heat and work - equation of state - properties of ideal gases - properties of pure substances Zeroth law of thermodynamics - temperature scales - first law of thermodynamic - heat, work and energy of closed and open systems - concept of internal energy - enthalpy - second law of thermodynamics - concept of entropy - availability of work and energy

Module II (13 hours)

Engineering applications of thermodynamics - air cycles - Carnot cycle - otto and diesel cycles - principle of operation of 2 stroke and 4 stroke engines vapour power cycles - Mollier diagram - ranking cycle

Module III (13 hours)

Heat transfer - basic modes of heat transfer - conduction, convection and radiation - conduction - Fourier law of conduction - general conduction equation - convection - forced and free convection - heat transfer relations - radiation - laws of radiation - concepts of black body

Module IV (13 hours)

Fluid mechanics - laws of fluid motion, continuity, momentum and energy equations - Bernoulli's equation and its application to flow and velocity measuring devices - capillary flow and viscous flow

Text books

1. Rajendra Prakash & Gupta, *Engineering Thermodynamics*
2. Holman J.P., *Heat Transfer*, McGraw Hill

Reference books

1. Michael saad, *Thermodynamics for Engineers*, Prentice Hall
2. Spalding & Cole, *Engineering Thermodynamics*, Edward Arnold

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QV – 2 questions A and B of 15 marks from module IV with choice to answer any one.

3 hours lecture and 1 hour tutorial per week
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Objectives: To enable the student for designing efficient practical circuits using Op_Amps, timer, PLL, VCO and Voltage regulator chips.

Module – 1

Linear Op-Amp circuits – basic configurations – ideal Op-Amp circuit analysis – The 741 Op-Amp circuit, various stages and parameters – DC analysis – small signal analysis – Gain, frequency response and slew rate of the 741- summing and difference amplifiers – Differentiator and integrator – I-V and V-I converters – Instrumentation amplifier – log and antilog amplifiers – analog multipliers – Voltage Comparators – Schmitt trigger – Signal generators – Phase shift and Wien bridge Oscillators – Astable and Monostable Circuits – linear sweep circuits.

Module - 2

Active filters – filter transfer function – Butterworth and Chebyshev filters – First order and second order functions 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 – 3

Data converters – definitions and specifications – D/A converters – Weighted resistor and R-2R DAC – Bipolar DAC – A/D converters – Counter, Ramp, tracking, Successive approximation, Integrating type and flash ADCs. Linear voltage regulators – protection mechanisms – LM723 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 - 4

Phase locked loops – operation of first and second order PLLs – Lock and Capture range – LM565 PLL – Application of PLL as AM/FM/FSK detectors, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer. Voltage controlled oscillator – Functional diagram & operation of IC 566 – Applications of 566 – Timer IC 555 – functional diagram – applications – design of Monostable and Astable multivibrators using 555.

Text Book

1. Sergio Franco – Design with Operational Amplifiers & Analog integrated Circuits
2. Adel S Sedra & Kenneth C Smith Micro Electronic Circuits Fifth Edition
3. Gayekwad

References

1. Gobind Daryanani, 'Principles of Active Network Synthesis & Design', John Wiley
2. Sedra A.S. & Smith K.C., 'Microelectronic Circuits', Oxford University Press
3. Coughlin R.F. & Driscoll F.F., 'Operational Amplifiers and Linear Integrated Circuits', Pearson Education
4. Horenstein M.N., 'Microelectronic Circuits & Devices', PHI
5. K.R Botkar Integrated Circuits

Internal work assessment

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30% - Assignments/Term Project/ any other mode decided by the teacher.

10% - Other measures like regularity and participation in class.

Total marks = 50.

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Objectives: To make the student introduced with the concepts of field theory and fundamental equations. This paper is a pre-requisite for the “Radiation and propagation” and “Microwave engineering” in further semesters.

Module 1 (13 hours)

Coordinate systems –Vector fields and theorems— Electrostatics – Coulomb’s Law - Gauss’ Law - Electric potential, Electric dipole - *Materials and properties in electric field - Energy stored - Boundary conditions - capacitance –parallel plate cylindrical and spherical capacitors - Poisson and Laplace equations - Boundary value problems - Method of Images

Module 2 (13 hours)

Steady electric currents and current density – equation of continuity – Joules law – boundary conditions for current density – Magnetostatics - Biot-Savart Law, Amperes’ law - magnetic vector potential, magnetic field intensity — magnetic materials & properties - boundary conditions for magnetic fields – energy in magnetic fields —forces and torques.

Motional electromotive force - Faradays Law of electromagnetic induction

Module 3 (13 hours)

Maxwells’ Equations – derivation from basic laws - boundary conditions - time harmonic fields – Poynting theorem - Plane waves propagation - General wave equations -

Plane electromagnetic waves Plane waves in free space, dielectric and conducting media - surface resistance – Wave polarization – linear, elliptic and circular - Normal and oblique incidences of uniform plane waves at conducting and dielectric boundaries.

Module 4 (13 hours)

Parallel wire transmission line – analysis – input impedance, quarterwave and halfwve lines – standing waves – VSWR – impedance matching – Smith chart- transmission lines– transients in transmission lines – Skin effect and resistance -

Waveguides – wave equations in Cartesian Coordinates – TM and TE modes –Waveguide Cavity resonators.

Text Book,

1. Guru & Hiziroglu – *Electromagnetic Field Theory*

References.

1. Kraus J.D., *Electromagnetics*, McGraw Hill
2. Matthew N.O., Sadiku, *Elements of Electromagnetics*, Addison Wesley
3. Cheng D.K., *Field and Wave Electromagnetics*, Addison Wesley
4. Hayt W.H., *Engineering Electromagnetics*, McGraw Hill, Kogakusha
5. Premlet B., *Electromagnetic Theory with Applications*, Phasor Books

Internal work assessment

60% - Test Papers (Minimum 2)

30% - Assignments/Term Project/ any other mode decided by the teacher.

10% - Other measures like regularity and participation in class.

Total marks = 50.

University examination Pattern

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QV – 2 questions A and B of 15 marks from module IV with choice to answer any one.

3 hours lecture and 1 hour tutorial per week

Objectives: To study the basic principles of electronic measurements and instrumentation techniques. With this paper, students should be able to come up with techniques for measuring values of passive components and quantities like temperature, pressure, voltage, current, frequency, phase difference, distortion, spectral parameters etc.

Module 1 (13 Hours)

Measurement errors –classification of errors—accuracy, precision, resolution, significant figures—error combinations—basics of statistical analysis- Sensing elements—Potentiometers—resistance thermometers-strain gauges—capacitive sensing elements—electromagnetic sensing elements—thermoelectric sensing elements static and dynamic characteristics of piezo electric sensing elements

Module 2 (13 Hours)

Analog Electronic Volt-Ohm-Milliammeters—Transistor, OPAMP and FET based circuits—multimeter probes-DVMs. Frequency meters-frequency accuracy, time and ratio measurements-counter meters.

Module 3 (13 Hours)

Resistance measurements – various methods, bridges—Inductance and capacitance measurements— ac bridges, digital R L C meters - Signal generators—low frequency, function, pulse and R F generators, sweep frequency generators, arbitrary waveform generators -Graphic recording instruments— strip chart and XY recorders, plotters, digital waveform recorders and analyzers.

Module 4 (13 Hours)

Storage oscilloscopes—various controls and measurement techniques, oscilloscope probes, Waveform analyzing instruments—distortion meter, spectrum analyzer. Thermocouple instruments—peak response voltmeter—true RMS meters, low level voltmeter/ammeter

Text Book:

(Module1): John P Bentley: *Principles of Measurement systems*, Pearson Education

(Modules 2,3,4): David A Bell: *Electronic Instrumentation and measurements*, PHI

References:

1. Oliver B M & Cage: *Electronic Measurements & Instrumentation*, TMH
2. Cooper W: *Electronic Instrumentation and Measurement Techniques*, PHI
3. Joseph J Carr: *Elements of Electronic Instrumentation and Measurement*, Pearson

Internal work assessment

60% - Test Papers (Minimum 2)

30% - Assignments/Term Project/ any other mode decided by the teacher.

10% - Other measures like regularity and participation in class.

Total marks = 50.

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3 hours lecture and 1 hour tutorial per week
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Objectives: To introduce the student with knowledge about architecture, interfacing and programming with 8086 and 8051. With this paper, the student should be able to design microprocessor/microcontroller based system (both hardware and software) for any relevant application.

Module 1 (13 Hours)

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

Module 2 (13 Hours)

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

Module 3 (13 Hours)

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

Module 4 (13 hours)

Intel 8051 microcontroller - CPU operation - Memory space - Software overview - Peripheral overview - Interrupts - timers – parallel port inputs and outputs - Serial port – Low power Special modes of operation

Text books

1. Hall D.V., *Microprocessors & Interfacing*, McGraw Hill
2. Hintz K.J. & Tabak D., *Microcontrollers-Architecture, Implementation & Programming*, McGraw Hill

Reference books

1. Intel Data Book Vol.1, *Embedded Microcontrollers and Processors*
2. Tribel W.A. & Singh A., *The 8088 and 8086 Microprocessors*, McGraw Hill
3. Mohammed R., *Microprocessors & Microcomputer Based System Design*, Universal Bookstall

Internal work assessment

60% - Test Papers (Minimum 2)

30% - Assignments/Term Project/ any other mode decided by the teacher.

10% - Other measures like regularity and participation in class.

Total marks = 50.

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EC04 507(P): LINEAR INTEGRATED CIRCUITS LAB

3 hours practical per week

Objective : To Design and set up different Electronic Circuits using operational amplifiers

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
3. Comparators- Zero crossing detector- Schmitt trigger- precision limiter
4. Instrumentation amplifier - gain, CMRR and input impedance
5. Single op-amp second order LFF and HPF - Sallen-Key configuration
6. Narrow band active BPF - Delyiannis configuration
7. Active notch filter realization using op-amps
8. Wein bridge oscillator with amplitude stabilization
9. Astable and monostable multivibrators using op-amps
10. Square, triangular and ramp generation using op-amps
11. Voltage regulation using IC 723
12. Astable and monostable multivibrators using IC 555
13. Design of PLL for given lock and capture ranges & frequency multiplication
14. Log and Antilog amplifiers

Internal work assessment

60%-Laboratory practical and record

30% - Test/s

10% - Other measures like regularity and participation in class

Total Marks = 50

EC04 508(P): ANALOG COMMUNICATION LAB

3 hours practical per week

Objective: To design and setup circuits for Analog communication

1. AM generation
2. AM detection with simple and delayed AGC
3. Balanced modulator for DSB-SC signal
4. Mixer using JFET/BJT
5. FM generation (reactance modulator)
6. FM demodulation
7. PAM generation and demodulation
8. Generation and demodulation of PWM and PPM
9. Implementation of intermediate frequency amplifier
10. FM demodulation using PLL
11. AM generation and demodulation using opamps /IC multipliers
12. SSB generation and demodulation using integrated circuits

Internal work assessment

60%-Laboratory practical and record

30%- Test/s

10%- Other measures like regularity and participation in class

Total Marks = 50