

UNIVERSITY OF CALICUT
Faculty of Engineering
Curriculum, Scheme of Examinations and Syllabi for B.Tech Degree Programme with
effect from Academic Year 2000-2001

EC: Electronics & Communication Engineering

FOURTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
EC2K 401	Engineering Mathematics IV	3	1	-	50	3	100
EC2K 402	Pulse Circuits	3	1	-	50	3	100
EC2K 403	Signals & Systems	3	1	-	50	3	100
EC2K 404	Electronic Circuits	3	1	-	50	3	100
EC2K 405	Micro Processors & Micro Controllers	3	1	-	50	3	100
EC2K 406	Electronic Instrumentation	3	1	-	50	3	100
EC2K 407(P)	Electronic Circuits Lab	-	-	3	50	3	100
EC2K 408(P)	Digital Electronics Lab	-	-	3	50	3	100
TOTAL		18	6	6	400	-	800

EC2K 401 : ENGINEERING MATHEMATICS IV

(same as AI2K 301, CH2K 401, CE2K 401, EE2K 401, IC2K 401, ME2K 401, PE2K 401, PM2K 401)

3 hours lecture & 1 hour tutorial per week

Module I: Functions of a complex variable & applications I (13 hours)

Functions of a complex variable - analytic functions - Cauchy-Riemann equations - elementary functions of z - conformal mapping - bilinear transformation - Schwarz-Christoffel transformation - transformation by other functions

Module II: Functions of a complex variable & applications II (13 hours)

Integration in the complex plane - Cauchy's integral theorem - Cauchy's integral formula - series of complex terms - Taylor's series - Laurent's series - residue theorem - evaluation of real definite integrals - complex inverse integral

Module III: Ordinary differential equations & special functions (13 hours)

Power series method of solving ordinary differential equations - theoretical preliminaries - series solution of Bessel's equation - modified Bessel functions - equations solvable in terms of Bessel functions - identities for Bessel functions - orthogonality of Bessel functions - applications - Legendre polynomials

Module IV: Partial differential equations (13 hours)

Derivation of equations - D'Alembert's solution of the wave equation - characteristic and the classification of partial differential equations - separation of variables - orthogonal functions and the general expansion problem - further applications - Laplace transform methods

Text book

Wylie C.R. & Barrett L.C., *Advanced Engineering Mathematics*, McGraw Hill

Reference books

1. Churchill R.V., Brown J.W. & Verhey R.F., *Complex Variables & Applications*, McGraw Hill

2. Kreider D.L., Kuller R.G., Ostberg D.R & Perkins F.W., *An Introduction to Linear System Analysis*, Addison Wesley
3. Kreyszig E., *Advanced Engineering Mathematics*, John Wiley
4. Pipes L.A & Harvill L.R., *Applied Mathematics for Engineers & Physicists*, McGraw Hill
5. Sokolnikoff I.S. & Redheffer R.M, *Mathematics of Physics & Modern Engineering*, McGraw Hill

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

- Q I - 8 short type questions of 5 marks, 2 from each module
- Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
- Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
- Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
- Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

EC 2K 402 : PULSE CIRCUITS

4 hours lecture per week

Module I (13 hours)

RC circuit as integrator and differentiator - compensated attenuators - pulse transformer - pulse response switching characteristics of a BJT - BJT switches with inductive and capacitive loads - non saturating switches - emitter follower with capacitive loading - switching characteristics of a MOS inverter - resistive load & active load configurations - CMOS inverter - dynamic power dissipation

Module II (13 hours)

Monostable and astable multivibrators - collector coupled monoshot - emitter coupled monoshot - triggering the monoshot - collector coupled and emitter coupled astable multivibrator - astable - monostable and bistable operations using negative resistance devices - multivibrators with 555 IC timer

Module III (13 hours)

Digital phase locked loops - phase detector (XOR & phase frequency detectors) - voltage controlled oscillator (current starved & source coupled CMOS configurations) - loop filter - analysis of PLL - typical applications of PLL - voltage and current time base generators - linearization - miller & bootstrap configurations

Module IV (13 hours)

Digital to analog converters - R-2R ladder - binary weighted - current steering - charge scaling - cyclic & pipeline DACs - accuracy - resolution - conversion speed - offset error - gain error - integral and differential nonlinearity - analog to digital converters - track and hold operation - track and hold errors - ADC conversion techniques - flash converter - two step flash - pipeline - integrating - staircase converter - successive approximation converter - dual slope & oversampling ADCs - sigma - delta ADC

Text books

1. Millman J. & Taub H., *Pulse, Digital & Switching Waveforms* , Tata McGraw Hill
2. Baker R.J., Li H.W. & Boyce D.E., *CMOS - Circuit Design, Layout & Simulation* , Prentice Hall of India

Reference books

1. Taub & Schilling, *Digital Integrated Electronics* , McGraw Hill
2. Sedra A.S.& Smith K.C., *Microelectronic Circuits* , Oxford University Press

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EC2K 403 : SIGNALS & SYSTEMS

(common with AI2K 403, IC2K 403)

3 hours lecture & 1 hour tutorial per week

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, invertability, time invariance - linearity - causality - memory - time domain description - convolution - impulse response - representation of LTI systems - differential equation and difference equation representations 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 zeros

Module IV (12 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 zeros

Text books

1. Haykin S. & Veen B.V., *Signals & Systems*, John Wiley
2. Oppenheim A.V., Willsky A.S. & Nawab S.H., *Signals and Systems*, Tata McGraw Hill
3. Taylor F.H., *Principles of Signals & Systems*, McGraw Hill

Reference books

1. Lathi B.P., *Modern Digital & Analog Communication Systems*, Oxford University Press
2. Haykin S., *Communication Systems*, John Wiley
3. Bracewell R.N., *Fourier Transform & Its Applications*, McGraw Hill
4. Papoulis A., *Fourier Integral & Its Applications*, McGraw Hill

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EC2K 404 : ELECTRONIC CIRCUITS

4 hours per week

Module I (13 hours)

BJT amplifiers: biasing - load line - bias stabilization - stability factor - bias compensation - analyses and design of CC, CE and CB configurations - RC coupled and transformer coupled multistage amplifiers - high frequency response

Module II (13 hours)

FET amplifiers: biasing of JFET - self bias and fixed bias - biasing of MOSFETS - feedback biasing and fixed biasing for enhancement and depletion mode MOSFETS - analyses of common source - common drain and common gate amplifier configurations

Module III (13 hours)

Feedback - effect of feedback on amplifier performance - voltage shunt - voltage series - current series and current shunt feedback configurations - positive feedback and oscillators - analysis of RC phase shift, wein bridge, Colpitts, Hartley and crystal oscillators - stabilization of oscillations

Module IV (13 hours)

Power amplifiers - class A, B, AB, C, D & S power amplifiers - harmonic distortion - efficiency - wide band amplifiers - broad banding techniques - low frequency and high frequency compensation - cascode amplifier - broadbanding using inductive loads

Text books

1. Millman & Halkias, *Integrated Electronics*, McGraw Hill
2. Sedra A.S & Smith K.C., *Microelectronic Circuits*, Oxford University Press
1. Boylestad R. & Nashelsky L., *Electronic Devices & Circuit Theory*, Prentice Hall of India

Reference books

1. Hayt W.H., *Electronic Circuit Analysis & Design*, Jaico Pub.
2. Bogart T.F., *Electronic Devices & Circuits*, McGraw Hill
3. Horenstein M.N., *Microelectronic Circuits & Devices*, Prentice Hall of India
3. Schilling D.L. & Belove C., *Electronic Circuits*, McGraw Hill
4. Baker R.J., Li H.W & Boyce D.E., *CMOS - Circuit Design, Layout & Simulation*, Prentice Hall of India

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EC2K 405 : MICROPROCESSORS & MICROCONTROLLERS

(common with AI2K 405)

3 hours lecture & 1 hour tutorial per week

Module I (15 hours)

Intel 8086 processor - architecture - memory addressing - addressing modes - instruction set - assembly language programming - assemblers - interrupts - pin configuration - timing diagrams - minimum and maximum mode - multiprocessor configuration

Module II (12 hours)

Interfacing - address decoding - interfacing chips - programmable peripheral interface (8255) - programmable communication interface (8251) - programmable timer (8253) - DMA controller (8259) - programmable interrupt controller (8257) - keyboard display interface (8279)

Module III (12 hours)

Introduction to 80386 - memory management unit - descriptors, selectors, description tables and TSS - real and protected mode - memory paging - special features of the pentium processor - branch prediction logic - superscalar architecture

Module IV (13 hours)

Intel 80196 microcontroller - CPU operation - memory space - software overview - peripheral overview - interrupts - PWM timers - high speed inputs and outputs - serial port - special modes of operation

Text books

1. Hall D.V., *Microprocessors & Interfacing*, McGraw Hill
2. Brey B.B., *The Intel Microprocessors - Architecture, Programming & Interfacing*, Prentice Hall
3. Liu Y.C. & Gibsen G.A., *Microcomputer System: The 8086/8088 Family*, Prentice Hall of India
4. 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
4. Intel Data Book *EBK 6496 16 bit Embedded Controller Handbook*
5. Intel Data Book, *EBK 6485 Embedded Microcontrollers Data Book*
6. Intel Data Book, *EBK 6486 Embedded Applications Book*

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EC2K 406 : ELECTRONIC INSTRUMENTATION

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Basic concept of measurements - accuracy - precision - error - linearity voltage and current measurements - basic principles of electronic voltmeters - ammeters - principles of digital multimeters

Module II (13 hours)

Transducers - principles of piezo electric - photo electric - thermo electric and magneto electric type transducers - strain gage - thermister - pressure and flow transducers typical instrumentation system

Module III (13 hours)

Principles and applications of digital storage oscilloscope - spectrum analyser - IC tester - synthesised signal generator - electronic LCR meter - Power meter - Q meter

Module IV (13 hours)

Frequency and time measurements - digital frequency and time interval counters - principles and applications - microprocessor based Instrumentation - temperature control system - data acquisition system - logic analyser

Text book

Oliver B.M. & Cage, *Electronic Measurements & Instrumentation*, Tata McGraw Hill.

Reference books

1. Cooper W., *Electronic Instrumentation & Measurement Technique*, Prentice Hall of India
2. Sonde B.S., *Transducers & Display Systems*, Tata McGraw Hill
3. Rangan C.S. et al, *Instrumentation*, Tata McGraw Hill

Sessional work assessment

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EC2K 407(P) : ELECTRONIC CIRCUITS LAB

[common with AI2K 407(P)]

3 hours practicals per week

1. Feed back voltage regulator with short circuit protection
2. Voltage regulation with Zener diode and pass transistor
3. Emitter follower with & without complementary transistors - frequency and phase response for a capacitive load
4. Phase shift oscillator using BJT/FET
5. Hartley / Colpitts oscillator using BJT/FET
6. Power amplifier - Class A
7. Power amplifier - Class AB
8. Cascode amplifier - frequency response
9. 2 stage RC coupled amplifier - frequency response
10. Active load MOS amplifier
11. Wide band single BJT/MOS voltage amplifier with inductance
12. Single BJT crystal oscillator
13. Narrow band, high gain tuned amplifier

Sessional work assessment

Lab practicals & record	= 30
2 tests	2x10 = 20
Total marks	= 50

EC2K 408(P) : DIGITAL ELECTRONICS LAB

[common with AI2K 408(P), IC2K 408(P)]

3 hours practicals per week

List of experiments

1. Feed back voltage regulator with short circuit protection
2. Voltage regulation with Zener diode and pass transistor
3. Emitter follower with & without complementary transistors - Frequency and phase response for a capacitive load
4. Phase shift oscillator using BJT/FET
5. Hartley / Colpitts oscillator using BJT/FET
6. Power amplifier - Class A
7. Power amplifier - Class AB
8. Cascode amplifier - Frequency response
9. 2 stage RC coupled amplifier - Frequency response
10. Active load MOS amplifier
11. Wide band single BJT/MOS voltage amplifier with inductance
12. Single BJT crystal oscillator
13. Narrow band, high gain tuned amplifier

Sessional work assessment

Lab practicals & record	= 30
2 tests	2x10 = 20
Total marks	= 50