CURRICULUM, SCHEME OF EXAMINATIONS

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# SYLLABI

## (FOURTH SEMSTER)

B-Tech Degree Course of

## CALICUT UNIVERSITY

## MEA Engineering College

*Vengoor P.O, Perinthalmanna, Malappuram DT, Kerala*

*Prepared by*
*Abdul Jaseem (2008-'12 ECE)*

# EN 04 401 A ENGINEERING MATHEMATICS-IV

(Common for all B.Tech. programmes except CS and IT)

3 hours lecture and 1 hour tutorial per week and 1 Hour Tutorial per week

**Module I**

***Functions of a Complex Variable I:***

Functions of a complex variable- Derivatives and analytic functions- Cauchy-Reimann equations- Laplace equation- Conformal mapping- Exponential functions- Trigonometric functions- Hyperbolic functions- Logarithm- Linear functional transformations.

**Module II**

***Functions of a Complex Variable II:***

Line integral in the complex plane-Cauchy's integral theorem (Proof of existence of indefinite integral to be omitted-Cauchy's integral formula-Derivatives of analytical functions (proof to be omitted)-Taylor series-Laurent series-Singularities and zeros- Residues and residue theorem-evaluation of real integrals.

**Module III**

***Series Solutions of Differential Equations:***

- Power series method for solving ordinary differential equations- Legendre's equation and Legendre polynomials- Rodrigue's formula- Generating functions-Relations between Legendre polynomials- Orthogonality property of Legendre polynomials( proof omitted)
- Frobenius method for solving ordinary differential equations- Bessel's equation- Bessel functions-Generating functions- Relations between Bessel functions- Orthogonality properties of Bessel functions (proof omitted).

**Module IV**

***Partial Differential Equations:***

Basic concepts- Classification of linear PDE's-Derivation of the one dimensional wave equation and the one dimensional heat equation- Solutions of these equations by the method of separation of variables- Solutions satisfying initial and boundary conditions- D'Alembert's solution of the one dimensional wave equation- Steady state two dimensional heat flow.

**Text Book;**

Ervin Kreyszig, Advanced Engineering mathematics (8th Edition) John Wiley & Sons

**Module I**

Sections: 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9

**Module II**

Sections: 13.1, 13.2, 13.3, 14.4, 15.1, 15.2, 15.3, 15.4

**Module III**

Sections: 4.1, 4.3, 4.4, 4.5

**Module IV**

Sections: 11.1, 11.2, 11.3, 11.4, 11.5

**REFERENCES**


1. C R Wylie & L C Barrett, *Advanced Engineering Mathematics (Sixth Edition)*, McGraw Hill.
2. Churchill R V, Brown J W & Verhey R F, *Complex Variables and Applications*, McGraw Hill.
3. Pipes L Ar& Harvill L R, *Applied Mathematics for Engineers & Physicists*, McGraw Hill
4. Michael D Greenberg, *Advanced Engineering Mathematics (Second Edition)* Pearson education Asia.
5. Sastry S S, *Engineering Mathematics – Volumes I & 2* Prentice Hall of India

# EN 04 402 ENVIRONMENTAL STUDIES

3 hours lecture and 1 hour tutorial per week

**Objective;**

The importance of environmental science and environmental studies cannot be disputed. Continuing problems of pollution, loss of forest, solid waste disposal, degradation of environment, loss of bio diversity
etc have made everyone aware of environmental issues. The objective of mis course is to create general awareness among the students regarding these environmental issues

**Module 1(12 Hours)**

**The multidisciplinary nature of environmental studies**

Definition- Scope and importance- need for public awareness.

**Natural Resources**

**Renewable and non renewable resources:**

Natural resources and associated problems- forest resources: use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their defects on forests and tribal people- water resources: Use and over utilization of ground and surface water, floods, drought, conflicts over water, dam benefits and problems- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies - Food resources: world food problems, changes caused by agriculture overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies - Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies - Land resources: Land as a resource, Land degradation, man induced landslides, soil erosion and desertification- role of an individual in conservation of natural resources- Equitable use of resources for sustainable life style.

**Module 2 (14 Hours)**

Ecosystem: Concept of an ecosystem- Structure and function of an ecosystem- producers, consumers and decomposers- Energy flow in the ecosystem- eco-
logical succession- Food Chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the following ecosystems: Forest ecosystem- grassland ecosystem - desert ecosystem -aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) Bio diversity and its conservation Introduction-definition: genetic, species and ecosystem diversity- bio geographical classification of India- value of bio diversity: consumptive use, productive use, social, ethical, aesthetic, and option values - Bio diversity at global, national, and local levels - India as a mega diversity nation - hot spots of Bio diversity- threads to bio diversity: habitat loss, poaching of wild life man- wildlife conflicts- endangered and endemic species of India - conservation of bio diversity : in-situ and ex-situ conservation of bio diversity

**Module 3 (11 Hours)**

Environmental pollution Definition-causes, effects and control measures of :-air pollution- water pollution- soil pollution- marine pollution- noise pollution-thermal pollution- nuclear hazards- solid waste management: causes, effects and control measures of urban and industrial wastes-role of an individual in prevention of pollution- pollution case studies - Disaster management: Floods, earth quake, Cyclone and Land slides- environmental protection act- air (prevention and control of pollution) act - water (prevention and control of pollution) act - wild life protection act- forest conservation act -issues involved in enforcement of environmental legislation- public awareness.

**Module 4 (10 Hours)**

**Social Issues and the environment**

From unsustainable to sustainable development- urban problems related to energy- water conservation, rain water harvesting, water shed management- resettlement and rehabilitation of people; its problems and concerns, case studies- Environmental ethics: Issues and possible solutions- climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies- waste land reclamation- consumerism and waste products

**Human population and the environment**

Population growth, variation among nations- population explosion- Family welfare program -Environment and human health- pollution hazards, sanitation and health- Human rights for clean environment- Value education- HIV/AIDS-social concern- Women and child welfare- Role of information technology in environment and human health- case studies.

**Textbooks**


- Clark, R.S. Marine Pollution. Clanderson Press Oxford
- MhaskarA.K, Matter Hazardous. Techno-science Publications
- Miller, T.G Jr. Environmental Science. Wadsworth Publishing Co.
- Townsend, C., Harper, J. and Michael Begon, Essential of Ecology. Blackwell Science
- Trivedi. R.K. and Goel. P.K. Introduction to air pollution. Techno -Science Publications

# EC 04 403 DIGITAL ELECTRONICS

3 hours lecture and 1 hour tutorial per week

**Objective:**

To provide a basic idea in Digital principles, combinational circuits, sequential circuits and design of the above circuits.

**Module 1 (13 Hours)**

Logic Circuits—truth tables —Boolean algebra—synthesis in standard forms— design examples—optimized implementation of logic functions-— Minimization techniques (Karnaugh map & Queen Mclusky methods)—Multi level synthesis and analysis -cubical representation and mimmizati0n-r~Number representation and arithmetic circuits—Signed and unsigned adder subtractors—fast adders -fixed point— floating point—and BCD representations—ASCII character code

**Module 2 (13 Hours)**

Introduction to logic families and their characteristics (TTL,ECL,CMOS) - Interfacing - Combinational circuit building blocks—multiplexers—decoders—encoders—code converters—Flip flops—SR, D, T, JKM/S & edge triggered flip flops—registers—counters—reset synchronization—BCD, ring, Johnson counters

**Module 3 (13 Hours)**

Synchronous sequential circuits—Mealy & More state models—Design Examples—State minimization—Design of counters using sequential circuit approach—Finite State Machine (FSM) as an arbiter circuit—Analysis of synchronous sequential circuit—Algorithmic state machine charts—Formal models

**Module 4 (13 Hours)**

Asynchronous sequential circuits — Analysis and synthesis — state reduction-transition diagram — Exploiting unspecified next state entries — state assignment using additional state variables — one hot sate assignment -Hazards — Static hazards — Dynamic hazards — Significance of Hazards

**Text Book:**

- Taub and Schilling *Digital Principles and applications*
- N N Biswas *Logic design Theory* PHI

**References:**

- John F Wakerly, *Digital Design- Principles and* /Vacft'ces (Third edition),Pearson
- Mano M M, *Digital Design,* PHI
- John M. Yarbrough, *Digital Logic - Applications and Design,* Thomson/Vikas PublishingHouse

# EC 04 404 COMPUTER ORGANIZATION AND ARCHITECTURE

3 hours lecture and 1 hour tutorial per week

**Module 1**

Design methodology — the register level components, devices and design — the processor level components and design — Processor basics - CPU Organization — Data Representation - Instruction set - Instruction formats— types and programming considerations

**Module 2**

Data path design— fixed point arithmetic — various operations—arithmetic & logic units — combinational and sequential ALUs. Floating point arithmetic -pipeline processing -Control design—Hardwired control—micro programmed control

**Module 3**

Memory Organization—memory technology—Device characteristics—Random access memories—serial access memories—Memory systems—multi level memories—Address translation memory allocation —- caches — features—address mappings—Structures versus performance

**Module 4**

System organization - communication methods - basic concepts, bus control— I/O and system control—Programmed I/O—DMA and interrupts; I/O processors- Parallel processing - Processor level parallelism—multiprocessors—shared bus systems

**Text Book:**

- John P Hayes: *Computer Architecture and Organization* (3rd Edition) Me Graw-Hill

**References:**

- William Stallings: *Computer Organization & Architecture (* 6th Edition) Pearson -
- M Morris Manor *Computer System Architecture^^.* Edition), PHI/Pearson
- Heuring & Jordan: *Computer Systems Design & Architecture,* Addison Wesley
- Patterson D A & Hennessy J L: *Computer Organization & Design,* Morgan Kaufman

# EC 04 405 ELECTRONI CIRCUITS II

3 hours lecture and 1 hour tutorial per week

**Module I (13 Hours)**

Differential Amplifiers – The B JT differential pair – Large and small signal operation – The MOS differential pair – Large and small signal operation – Non ideal characteristics of the differential amplifier – Differential amplifier with active load – Frequency response analysis. Two stage CMOS Op-Amp – circuit, Common mode range and output swing, voltage gain, frequency response, slew rate.

**Module 2 (13 Hours)**

RC differentiator and integrator circuits – Compensated attenuators – Pulse transformer – Blocking oscillator – Bistable multivibrator principles, analysis –fixed bias and self biased transistor bistable circuit – triggering methods – Schmitt trigger analysis of emitter coupled circuit.

**Module 3 (13 Hours)**

Monostable multivibrator – principle and analysis – collector coupled and emitter coupled versions – triggering – Astable multivibrators – collector coupled and emitter coupled circuits – analysis – sweep circuits – principles of miller and bootstrap circuits

Module 4 (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 – Broad banding using inductive loads

**Text books**


- Millman & Halkias, *Integrated Electronics,* McGraw Hill
- Millman J. & Taub H., Pulse, Digital & Switching Waveforms, Tata McGraw Hill
- Sedra A.S.& Smith K.C., *Microelectronic Circuits,* Oxford University Press


**Reference books**


- Taub & Schilling, *Digital Integrated Electronics,* McGraw Hill
- Hayt W.H., Electronic Circuit Analysis & Design, Jaico Pub.
- BogartTF., Electronic Devices & Circuits', McGraw Hill

# EC 04 406 ANALOG COMMUNICATIONS

3 hours lecture and 1 hour tutorial per week

**Module -1**

Linear continuous wave modulation - band pass signals and systems -Amplitude modulation - modulators and transmitters - SSB signals, spectra and generation — VSB — signal and spectra — frequency conversion and demodulation. Exponential continuous-wave modulation - FM & PM — narrow band case, tone modulation, multi tone periodic modulation. Transmission band width and distortion - various cases - Generation and detection of FM and PM - various approaches - interference, de-emphasis and pre-emphasis, capture effect.

**Module -2**

Receivers for continuous wave modulation - super-het direct conversion and special purpose receivers, receiver specifications, multiplexing systems — frequency division, Quadrate carrier and time division multiplexing — cross talk and guard time comparison of TDM and FDM.

Phase locked loop operation, synchronous detection and frequency synthesis FM detection, Television systems - video signals, resolution and band width -Monochrome transmitters and receivers, basic principles of color TV and HDTV.

**Module -3**

Review of probability models - Random signals and noise - Ensemble average
And correlation, Ergodic and stationary processes, Gaussian processes - power
Spectrum, super position and modulation, filtered
Random signals — noise - thermal noise white noise, noise equivalent band width
- base band signal transmission with noise - pulse measurements in noise

**Module-4**

Noise in analog modulation systems - band pass noise - system models, quadrature components, envelope and phase - linear continuous wave modulation with noise - synchronous detection, envelope detection and threshold effect -Exponential continuous wave modulation with noise — pos detection noise -destination S/N, FM threshold effect — comparison of continuous wave modulation systems. Sampling and reconstruction - pulse amplitude modulation, pulse time modulation-ideal sampling, practical sampling and aliasing.

**Textbook;**

- Bruce Carlson : Communication Systems, (Fifth Edition), McGraw Hill

**References.**


- Ziemer R.E. & Tranter W.H., *"Principles of Communication"*, JAICOP Publishing House
- Dennis Roddy, John Coolen, *"Electronic Communications"*, PHI
- Sam Shanmugam K., *"Digital and Analog Communication Systems"*, John Wiley
- Lathi B.P., *"Modern Digital and Analog Communication Systems"*, Oxford University Press.
- Tomasi, *Electronic Communication: Fundamentals Through Advanced*, Pearson Education

# EC04 407(P) ELECTRONIC CIRCUITS LAB

3 hours practical per week

1. Feedback voltage regulator with short circuit protection
2. Voltage regulation with Zener diode and pass transistor
3. RC coupled amplifier - design for gam - frequency response
4. FET amplifier -design for gain- frequency response
5. Feedback amplifiers - gain & frequency response
6. Emitter follower with and without complementary transistors frequency response
7. Phase shift oscillator using BJT/FET
8. LC Oscillators
9. Power amplifier
10. Cascode amplifier -frequency response
11. Active load MOS amplifier
12. UJT characteristics and relaxation oscillator
13. Narrow band high gain tuned amplifier

**Internal work assessment**

50%-Laboratory practical and record

40%- Test/s

10%- Other measures like regularity and participation in class

Total marks: 50

# EC 04 408 (P) DIGITAL ELECTRONICS LAB

3 hours practical per week

1. Characteristics of TTL gates
2. Code converters using basic gates
3. Combinational logic design using decoders and MUXs
4. Half and full adders and subtracters
5. Four bit adder, subtracter and BCD adder using adder ICs
6. Implementation of single cell Arithmetic Logic Unit and study of ALU ICs
7. Astable and monosatable multivibrators using CMOS gates
8. Study of flip flops
9. Ripple , Johnson and Ring counters
10. Synchronous counters, Random sequence generators
11. A sequence detector circuit
12. Interfacing and addressing memory chips
13. ADC circuits (counter ramp and dual slope) & ICs
14. DAC circuits & ICs

**Internal work assessment**

50%-Laboratory practical and record

40%- Test/s

10%- Other measures like regularity and participation in class

Total marks: 50