UNIVERSITY OF CALICUT

SCHEME AND SYLLABI

FOR

THIRD AND FOURTH SEMESTERS

OF

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS & COMMUNICATION ENGINEERING

FROM 2004 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

EC: ELECTRONICS & COMMUNICATION ENGINEERING

THIRD SEMESTER

Code	Subject	Hours/week			Sessional marks	University Examination	
		L	T	P/D		Hours	Marks
EN04 301A	ENGINEERING MATHEMATICS-III	3	1	-	50	3	100
EC04 302	COMPUTER PROGRAMMING IN C	2	-	2	50	3	100
EC04 303	ELECTRIC CIRCUITS & NETWORK THEORY	3	1	-	50	3	100
EC04 304	ELECTRICAL ENGINEERING	3	1	-	50	3	100
EC04 305	ELECTRONIC CIRCUITS I	3	1	-	50	3	100
EC04 306	SOLID STATE DEVICES	3	1	-	50	3	100
EC04 307(P)	**BASIC ELECTRONICS LAB**	-	-	3	50	3	100
EC04 308(P)	**ELECTRICAL ENGINEERING LAB**	-	-	3	50	3	100
TOTAL		**17**	**5**	**8**	**400**		**800**

FOURTH SEMESTER

Code	Subject	Hours/week			Sessional marks	University Examination	
		L	T	P/D		Hrs	Marks
EN04 401A	MATHEMATICS-IV	3	1	-	50	3	100
EN04 402	ENVIRONMENTAL STUDIES	3	1	-	50	3	100
EC04 403	DIGITAL ELECTRONICS	3	1	-	50	3	100
EC04 404	COMPUTER ORGANIZATION & ARCHITECTURE	3	1	-	50	3	100
EC04 405	ELECTRONIC CIRCUITS II	3	1	-	50	3	100
EC04 406	ANALOG COMMUNICATIONS	3	1	-	50	3	100
EC04 407(P)	**ELECTRONIC CIRCUITS LAB**	-	-	3	50	3	100
EC04 408(P)	**DIGITAL ELECTRONICS LAB**	-	-	3	50	3	100
TOTAL		**18**	**6**	**6**	**400**	**-**	**800**

SYLLABI OF THIRD SEMESTER

EN04 301A ENGINEERING MATHEMATICS

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

3 hours lecture and 1 hour tutorial per week

Module I

Linear Algebra: Vector spaces- linear dependence and impedance, and their computation- Bases and dimension- Subspaces- Inner product spaces- Gram-Schmidt orthogonalization process- Linear transformations- Elementary properties of linear transformations- Matrix of a linear transformation. (Proofs of theorems omitted)

Module II

Fourier Transforms: Fourier integral theorem (proof not required)- Fourier sine and cosine integral representations- Fourier transforms- Fourier sine and cosine transforms- Properties of Fourier transforms- Singularity functions and their Fourier transforms.

Module III

Probability Distributions: Random variables- Mean and variance of probability distributions- Binominal and Poisson distributions- Poisson approximation to binominal distribution- Hypergeometric and geometric distributions- Probability densities- Normal, uniform and gamma distributions.

Module IV

Theory of Inference: Population and samples- Sampling distributions of mean and variance- Point and interval estimations- Confidence intervals for mean and variance- Tests of hypotheses- Hypotheses concerning one mean, two mean, one variance and two variances- Test of goodness of fit.

TEXT BOOKS

For Module I

K. B. Datta, *Matrix and Linear Algebra for Engineers*, Prentice-Hall of India, New Delhi, 2003.
(Sections: 5.1, 5.2, 5.3, 5.4, 5.5, 5.8, 6.1, 6.2, 6.3)

For Module II

C R Wylie & L C Barrett, *Advanced Engineering Mathematics (Sixth Edition)*, McGraw Hill.
(Sections: 9.1, 9.3, 9.5)

For Module III

Richard A Johnson, *Miller & Freund's Probability and Statistics for Engineers*, Pearson Education, 2000.
(Sections: 4.1, 4.2, 4.3, 4.4, 4.6, 4.8, 5.1, 5.2, 5.5, 5.7)

For Module IV

Richard A Johnson, *Miller & Freund's Probability and Statistics for Engineers*, Pearson Education, 2000.
(Sections: 6.1, 6.2, 6.3, 7.1, 7.2, 7.4, 7.5, 7.8, 8.1, 8.2, 8.3, 9.5)

REFERENCES

1. Bernard Kolman & David R Hill, *Introductory Linear Algebra with Applications (Seventh Edition)*, Pearson Education, 2003.
2. Lipschutz S, *Linear Algebra – Schaum's Outline Series*, McGraw Hill
3. Erwin Kreyszig, *Advanced Engineering Mathematics (Eighth Edition)*, John Wiley & Sons.
4. Larry C Andrews & Bhimsen K Shivamoggi, *Integral Transforms for Engineers*, Prentice-Hall of India, 2003.
5. Ronald E Walpole, et al, *Probability and Statistics for Engineers and Scientists(Seventh Edition)*,

Pearson Education, 2004
6. Robert V Hogg & Elliot A Tanis, *Probability and Statistical Inference*, Pearson Education, 2003.
7. Chatfield C, *Statistics for Technology, Chapman & Hall*

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

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

EC04 302 COMPUTER PROGRAMMING IN C

(Common for all B.Tech. programmes except CS, IT & PT)

2 hours lecture and 2 hours practical per week

Module I (12 Hours)

Programming and problem solving- Basic computer organization- Developing algorithms- Flow charts- High level and low level languages- Compilers and interpreters- Steps involved in computer programming- Writing, compiling and executing a program- Debugging a program- Description of a programming language.

Module II (18 Hours)

Basics of C- Overview of C- Program structure- Lexical elements- Numerical constants- Variables- Arithmetic operators- Arithmetic Expressions- Arithmetic conversion- Increment and Decrement operators- Assignment expressions- Multiple assignments- Input and output- Format specifiers- Fundamental data types- Bit level operators and applications- Relational operators- Relational expressions- Logical operators- Logical expressions- Conditional operator- Precedence and associativity of operators.

Module III (16 Hours)

Compound statements- Conditional statements- if statement- if else statement- nested statement- switch statement- Loop control statements- While statement- do while statement- for statement- continue statement- break statement- goto statement- Functions- user defined functions- library functions- Recursion- Global, local and static variables.

Module IV (20 Hours)

Arrays- single dimensional- multi dimensional- Arrays in functions- Stacks- Strings- String processing- Bit-wise operators- Enumerated data types- Structures – Type def – Structures in Arrays- Arrays in structures- Unions- Pointers- Pointers and Arrays- Pointers and functions- Linear linked lists and list operations- Files- sequential files- unformatted files- text files.

Text books

Rajaraman V., Computer Programming in C, Prentice Hall of India

Reference Books:

1. Kernighan B. W., & Ritchie, D.M., The C Programming Language, Prentice Hall of India.
2. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill
3. Venugopal K.R & Prasad S.R., Programming with C, Tata McGraw Hill

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

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

EC04 303 ELECTRIC CIRCUIT & NETWORK THEORY
(Common with AI04 303)

3 hours lecture and 1 hour tutorial per week

Objectives:

- To expose the students to basic concepts of electric circuits and methods of circuit analysis in time domain and frequency domain
- To introduce the fundamentals of filter circuits

Module I (14 hours)
Review of Network theorems. Signal representation – Impulse, step, pulse and ramp functions. Laplace Transform-properties-solution of differential equation (review). Circuit analysis applications of Laplace Transform-Notions of impedance and admittance-Nodal and loop analysis in the s-domain. Use of Laplace Transform in the transient analysis of RC and LC networks with impulse, step, exponential, pulse and sinusoidal inputs. Initial and final value theorems, step input for RLC circuits.

Module II (12 hours)
Network functions – The concept of complex frequency – driving point and transfer functions – Impulse response – Poles and Zeros of network functions, their locations and effects on the time and frequency domain responses. Restriction of poles and zeros in the driving point and transfer function. Time domain behaviour from the pole – zero plot. Frequency response plots –Bode plot.

Module III (13 hours)
Parameters of two-port network – impedance, admittance, transmission and hybrid – Conversion formulae. Attenuators – propagation constant, types of attenuators – T, π and Bridged T. Analysis of interconnected two port networks-parallel, series, and cascade connections of 2 port networks –simple problems. Characteristic impedance and propagation constant.

Module IV (13 hours)
Filters- Introduction and basic terminology – types of filtering- L.P filter basics- Butterworth LP filter transfer characteristics- Basic passive realization of Butterworth transfer functions. Frequency transformations- transformations to high pass, band pass and band elimination. Chebyshev filters-characteristics- poles of the Chebyshev function.

Text Books

1. R. A. DeCarlo and P. Lin, *Linear Circuit Analysis,* Oxford University Press, New Delhi, 2001
2. D. R. Choudhary, *Networks and Systems*, New Age International, New Delhi, 2000

Reference Books

1. W. H. Hayt Jr, J. E. Kemmerly, and S. M. Durbin, *Engineering Circuit Analysis*, Tata McGraw-Hill, New Delhi, 2002
2. W. K. Chen, *Passive and Active Filters-Theory and Implementations*, John Wiley & Sons, New York, 1986
3. J. Edminister and M. Nahri, *Electric Circuits*, 3rd ed., Tata McGraw Hill, New Delhi, 1999.
4. M. E. Vanvalkenburg, *Network Analysis*, 3rd ed., Prentice Hall of India, New Delhi, 2001

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
(One assignment shall be based on simulation of simple electric circuits using any software -eg. PSPICE, EDSPICE, MULTSIM)
10% - Other measures like regularity and participation in class
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 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EC04 304 ELECTRICAL ENGINEERING
(Common with AI04 304)

3 hours lecture and 1 hour tutorial per week

Module I: DC machines (10 hours)
Types of DC machines - DC generators - emf equation - Open circuit and load characteristics of different types of DC generators - DC motors - Principle of operation - Types - Torque equation - Characteristics - Starters

Module II: Transformers (10 hours)
Principle of operation - emf equation - Phasor diagram - Equivalent circuit - OC and SC tests - Basic principles of auto transformer and three phase transformer

Module III: AC machines (17 hours)
Alternator - Rotating field - Frequency effect of distribution of winding - emf equation – Bsic principles of synchronous motor – Losses and Efficiency - Torque equation - Starting methods - Induction motor - Constructional features - Principle of operation of 3 phase induction motor - Vector diagram and equivalent circuits - Starting and speed control of squirrel cage and wound rotor induction motor

Module IV: Electrical measurements (15 hours)
Principle of Indicating instruments- moving coil, moving iron and dynamometer type instruments - Extension of range of voltmeter and ammeter - Measurement of 3 phase power by two wattmeter method – Principle and working of Induction type energy meter- DC slidewire, potentiometer - Wheat stone bridge - Kelvin's double bridge - AC bridges - Schering bridge, Maxwell's bridge

Text Book
E. Hughes, *Electrical & Electronic Technology*, 8th ed., Pearson Education, Delhi, 2002.

Reference Books
1. H. Cotton, *Advanced Electrical Technology*, Sir Isaac Pitman and Sons, London, 1974
2. E. W. Golding and F. G. Widdis, *Electrical Measurements and Measuring Instruments*, 5th ed., A H Wheeler & Company, Calcutta, 1993

Internal work assessment

60% - Tests (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
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

EC04 305 ELECTRONIC CIRCUITS-I

3 hours lecture and 1 hour tutorial per week

Module 1 (13 Hours)

The transistor as an amplifier—Derivation of expression for small signal parameters—the transconductance input resistance—small signal emitter resistance—Small signal equivalent models—the hybrid model and T Model of transistor.

Analysis of common emitter amplifier—CE amplifier with emitter resistance—the resistance reflection rule—Analysis of the common base and Common collector amplifiers--complete static characteristics--internal capacitances—the high frequency hybrid pi model—the cut off frequencies, unity gain bandwidth.

Module 2 (13 Hours)

JFET biasing – FET amplifiers - MOSFET Amplifier--The enhancement and depletion MOSFETs—static characteristics--DC analysis—Amplifier using MOSFET—Biasing in discrete circuits and biasing in IC--Small signal equivalent circuit models—analysis of common source and common gate amplifiers

Module 3 (13 Hours)

The amplifier gain function —Low frequency and high frequency responses—Use of open circuit and short circuit time constants in finding the cut-off frequencies—Low and high frequency response of common emitter amplifier, common source amplifier-

Emitter and source followers

Module 4 (13 Hours)

Feedback amplifiers—the general feedback structure—effects of negative feedback—Analysis of negative feedback amplifiers—Stability—Study of stability using Bode Plots.

Oscillators- RC phase shift, Wein Bridge, LC and Crystal Oscillators – analysis – UJT Characteristics and relaxation Oscillator

Textbook:

1. Millman & Halkias: *Integrated Electronics*, McGraw Hill
2. Sedra and Smith: *Microelectronic Circuits*, Oxford University Press

References:

1. Horenstein M N: *Microelctronic Circuits & Devices*, PHI
2. Spencer & Ghausi: *Introduction to Electronic Circuit Design*, Pearson
3. Sudhaker Samuel & Mahadevaswamy, *Electronic Circuits*, Sanguine Technical Publishers

Internal work assessment

60% - Tests (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

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

EC04 306 SOLID STATE DEVICES

3 hours lecture and 1 hour tutorial per week

Module 1 (13 Hours)

Conductivity property of solids--energy bands --semiconductors—direct and indirect semiconductors—charge carriers in semiconductors—effective mass –-Carrier concentrations—Fermi level—temperature dependence of carrier concentration—drift of carriers – mobility—excess carrier generation--Conductivity due to diffusion of excess carriers--carrier lifetime --diffusion process- continuity equation—steady state carrier injection—diffusion length – Quasi Fermi level.

Module 2 (13 Hours)

PN –Junctions-contact potential—equilibrium Fermi levels—space charge at a junction--Expression for Current flow through a junction –reverse bias current--break down mechanisms of the junction in reverse bias—rectifiers, Zener diode—Transient and ac conditions—time variation of stored charge, Switching diodes, capacitance of PN junction, The Varactor diodes—Effects of contact potential on carrier injection, graded junctions- Metal semiconductor junctions—Heterojunctions.

Module 3 (13 Hours)

Bipolar junction transistors—Minority carrier distribution and terminal currents—the coupled diode model –charge control analysis—switching –Drift in the base region, Base narrowing, Avalanche breakdown, Kirk effect—frequency limitations of transistor—capacitance and charging times—Hetero junction bipolar transistors.

Field effect transistors— various types of FETs— Junction FET, MESFET, Metal Insulator Semiconductor FET, MOSFET — Models, Characteristics and physical effects.

Module 4 (13 Hours)

Optoelectronic devices—Photo diodes—light emitting diodes –Semiconductor lasers—Power devices—PNPN diode—The Semiconductor Controlled Rectifier- Insulated Gate Bipolar Transistor-UJT- physical structure, characteristics and applications of each of the above devices.

Text Books:

1. Ben G Streetman and Sanjay Banerjee: *Solid State Electronic Devices*,(Fifth Edition) Pearson/ PHI

References:

1. Sze S M: *Physics of Semiconductor Devices*, Wiley eastern
2. Millman & Halkias: *Integrated Electronics*, McGraw Hill
3. Dilip K Roy: *Physics of Semiconductor Devices*, Universities Press
4. Dipankar Nagchoudhuri: *Microelectronic Devices*, Pearson
5. V.Suresh Babu: *Solid State Devices and Technology*, Sanguine Technical Publishers.

Internal work assessment

60% - Tests (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

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

EC04 307(P) BASIC ELECTRONICS LAB

3 hours practical per week

1. Measurements using CRO
2. Diode and Zener diode characteristics –DC and dynamic resistance
3. First order LPF/HPF with R & C for a given cut off frequency
4. Clipping and clamping circuits with diodes
5. Half wave rectifier with C, LC filters
6. Full wave rectifiers with C, LC filters
7. CE configuration determination of h-parameters
8. CB configuration determination of h-parameters
9. MOSFET/JFET characteristics Common Source and Common Drain modes
10. Series Voltage Regulator

Internal work assessment

50%-Laboratory practical and record
40%- Test/s
10%- Other measures like regularity and participation in class
Total marks: 50

EC04 308(P) ELECTRICAL ENGINEERING LAB

3 hours practical per week

1. Plot open circuit characteristics of DC shunt generator for rated speed - Predetermine O.C.C. for other speeds - Determine critical field resistance for different speeds
2. Load test on DC shunt generator - Plot external characteristics - Deduce internal characteristics
3. Load test on DC series motor - Plot the performance characteristics
4. OC and SC tests on single phase transformer - Determine equivalent circuit parameters - Predetermine efficiency and regulation at various loads and different power factors - verify for unity power factor with a load test
5. Load test on 3 phase cage induction motor - Plot performance curves
6. Resistance measurement using a) Wheatstone's bridge b) Kelvin's double bridge
7. Measurement of self inductance, mutual inductance and coupling coefficient of a) Transformer windings b) air cored coil
8. Power measurement in 3 phase circuit - Two wattmeter method
9. Extension of ranges of ammeter and voltmeter using shunt and series resistances
10. Calibration of Single phase energy meter by direct loading

Internal work assessment

50%-Laboratory practical and record
40%- Test/s
10%- Other measures like regularity and participation in class
Total marks: 50

SYLLABI OF FOURTH SEMSTER

EN04 401A ENGINEERING MATHEMATICS-IV

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

3 hours lecture 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:

(i) 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).

(ii) 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 (8^{th} 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 A & 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 1 & 2,* Prentice Hall of India

Internal work assessment

60% - Tests (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

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

EN04 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 this course is to create general awareness among the students regarding these environmental issues

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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 land slides, 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- ecological 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 programme- 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.

Field work (5 Hours)

- Visit to a local area to document environmental assets- river/forest/grassland/hill/mountain
- Visit to local polluted site- urban/rural/industrial/agriculture
- Study of common plants/insects/birds
- Study of simple eco systems- pond, river, hill slopes etc

Text books

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

Reference Books

1. Agarval. K.C.2001 Environmental biology. Nidi Publ. Ltd. Bikaner
2. Bharucha Erach, Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email: mapin@icenet.net
3. Brunner, R.C. 1989. Hazardous Waste Incineration. McGraw Hill Inc. 480p
4. Cunningham, W.P., Cooper, T.H., Gorhani, E & Hepworth, M.T. 2001Environmental encyclopedia Jaico publ. House Mumbai 1196p
5. De, A.K. Environmental Chemistry. Wiley Eastern Ltd.
6. Down to Earth, Centre for Science and Environment
7. Gleick, H.P. 1993. Water in crisis. Pacific Institute for Studies in Dev., Environment and security, Stockholm Env. Institute. Oxford Univ. Press. 473p
8. Hawkins, R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay
9. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.

10.Jadhav, H. & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi
11. Mckinney, M.L. & School, R.M. 1996. Environmental Science system & Solutions, Web enhanced edition, 639p.
12.Odum, E.P. 1971. Fundamentals of Ecology. W.B.Saunders Co. USA, 574p
13. Rao, M.N. & Datta, A.K 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p
14.Sharma, B.K. 2001. Environmental Chemistry. Goel Publ. House, Meerut.
15. Survey of the Environment, The Hindu (M)
16.Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II . Enviro Media
17.Wagner.K.D. 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p Magazine

Internal assessment:

2 Tests	= 20
Field work and Report (Internal Assessment)	= 25
Regularity	= 5
Total marks	= 50

UniversityExamination Pattern :

Q I- 16 short answer questions (4 from each module) of 5 marks each with a choice to answer any 12 (12X5)

Q II - 2 questions A and B of 10 marks from module I with choice to answer any one

Q III - 2 questions A and B of 10 marks from module II with choice to answer any one

Q IV - 2 questions A and B of 10 marks from module III with choice to answer any one

Q V - 2 questions A and B of 10 marks from module IV with choice to answer any one

EC04 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— Minimisation techniques (Karnaugh map & Queen Mclusky methods)—Multi level synthesis and analysis –cubical representation and minimization--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, JK-M/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:
1. Taub and Schilling *Digital Principles and applications*
2. N N Biswas *Logic design Theory* PHI

References:
1. John F Wakerly, *Digital Design- Principles and Practices*(Third edition), Pearson
2. Mano M M, *Digital Design*, PHI
3. John M. Yarbrough, *Digital Logic – Applications and Design*, Thomson/Vikas Publishing House
4. Thomas L Floyd, *Digital Fundamentals* (Eight edition), Pearson
5. Roth C H, *Fundamentals of Logic design*, Jaico
6. Salivahanan.S , *Digital Circuits and Design*, Vikas PublishingHouse

Internal work assessment

60% - Tests (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

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

EC04 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:

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

References:

1. William Stallings: *Computer Organization & Architecture* (6th Edition) Pearson
2. M Morris Mano: *Computer System Architecture*,(3rd Edition), PHI/Pearson
3. Heuring & Jordan: *Computer Systems Design & Architecture*, Addison Wesley
4. Patterson D A & Hennessy J L: *Computer Organization & Design*, Morgan Kaufman

Internal work assessment

60% - Tests (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

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

EC04 405 ELECTRONIC CIRCUITS – II

3 hours lecture and 1 hour tutorial per week

Module 1 (13 Hours)
Differential Amplifiers – The BJT 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 - Broadbanding using inductive loads

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

Reference books
1. Taub & Schilling, *Digital Integrated Electronics*, McGraw Hill
2. Hayt W.H., Electronic Circuit Analysis & Design, Jaico Pub.
3. Bogart T.F., Electronic Devices & Circuits', McGraw Hill

Internal work assessment

60% - Tests (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

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

EC04 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:

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

References.

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

Internal work assessment

60% - Tests (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

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

EC04 407(P) ELECTRONIC CIRCUITS LAB

3 hours practical per week

1. Feed back voltage regulator with short circuit protection
2. Voltage regulation with Zener diode and pass transistor
3. RC coupled amplifier – design for gain - frequency response
4. JFET 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

EC04 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 subtractors
5. Four bit adder, subtractor 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