Master of Technology - Electronics & Communication Engineering

Syllabus - First Semester

LOW POWER VLSI DESIGN

Course Code: ECE4101 **CreditUnits: 03**

Course Objective:
This course deals with the design issues of low power circuit in digital perspective. In this course, MOS transistor modeling is emphasized for low power applications. After completing this course the student have thorough knowledge of modeling of various MOS parameter and SPICE simulation for low power applications, correlation analysis in DSP systems, Monte Carlo simulation, low power memory design.

Course Contents:
Module I: Introduction to Low Power VLSI Design
Need for low power VLSI chips, Sources of power dissipation on Digital Integrated circuits. Emerging Low power approaches. Physics of power dissipation in CMOSdevices.

Module II: Device & Technology Impact on Low Power
Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

Module III: Simulation Power analysis
SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems. Monte Carlo simulation.
Probabilistic power analysis: Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy.

Module IV: Low Power Design
Circuit level: Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library
Logic level: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic.

Module V: Low power Architecture & Systems
Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

Module VI: Low power Clock Distribution
Power dissipation in clock distribution, single driver Vs distributed buffers, Zero skew Vs tolerable skew, chip & package co design of clock network Algorithm & architectural level methodologies:Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Gary K. Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002
- Rabaey, Pedram, "Low power design methodologies" Kluwer Academic, 1997

References:

- Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000

ADVANCED DIGITAL COMMUNICATION SYSTEMS

Course Code: ECE4102 **Credit Units: 03**

Course Objective:
The purpose of this course is to provide a thorugh knowledge of Advanced digital communications systems with in depth study of various digital modulation techniques, spread spectrum techniques, and information theory.

Course Contents:

Module I: Introduction
Geometric representation of modulation signals, Liner modulation technique, $\pi/4$ QPSK, Offset QPSK Constant envelop modulation technique, MSK, GMSK, Linear & constant envelop modulation techniqyes, M-ary PSK, M-ary QAM**.**

Module II
Spread spectrum system like DS-Sprad spectrum, Pseudo noise sequences, Performance of DS-SS, Frequency Hopping system, Modulation Error Performance for Binary signal in AWGN, Detection of M-ary orthogonal, M-aryorthogonaling with non-coherent detection.

Module III: Equalization
Adaptive equalizer, Linear Equalizer, Nonlinear Equalizer, ISI interference, RAKE receiver, Maximum likelihood sequence estimation (MLSE) equalizer.

Module IV
Railey fading distribution, Ricean fading distribution, Speed coding, Characterization of speech signals, Vector quantization, Adaptive quantization, Power spectrum for general memory less modulation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Book Haykin: Communication System, Wiley eastern Ltd. Ed. 1998
- J.Dassm S K Mullick& P K Chatterjee: Principle of Digital Communication, Wiley Eastern Ltd.
- Martin S. Roden: Digital and Data Communication System P.H.I London. Ed. 1998.
- Viterbi, A.I and J.K.Qmura : Principles of Digital Communication, McGraw Hill Company, New York.

STOCHASTIC METHODS

Course Code: ECE4103 **Credit Units: 03**

Course Objective:
This course deals with the comprehensive knowledge of Probability theory, probability distributions, transition probabilities, Markov Chains, birth and death processes, Network of queues, correlation and regression analysis and Analysis of variance.

Course Contents:

Module I: Random Variables
Probability Bay's rule, Distribution function, Discrete random vectors, different distributions, jointly distributed random variables. Order statistics, Distribution of sums, expectations, moments, transform methods mean time to failure, Inequalities and limit theorems, Mixture distribution, Conditional expectations, Imperfect fault coverage & reliability, Random sums.

Module II: Stochastic Processes
Classification Bernoulli process, Poisson process, Renewal processes, available analysis,. Random incidence, renewal model of program behavior.

Module III: Markov Chains
n-step transition probabilities, limiting distribution, distribution of times between state changes, irreducible finite chains with a periodic states, the m/g/I, queueing system discrete parameter, Birth Data Processes, Markov chains with absorbing states, Birth and death Processes, Non – Birth Death Processes.

Module IV: Network of Queues
Open and close queuing networks, Non exponential service item distributions and multiple job type, non product form networks. Correlation & Regression: Introduction, least squares curve fitting, Coefficient of determination, Confidence of intervals in linear regression, conclation analysis, non linear regression, Analysis of variance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Papoulis,A., Probability, Random Varibles and Stochstic Processes, Third Edition, McGraw-Hill
- K.S.Trivedi: Probability and Statistics, PHI, 3rd Ed.
- S.P.Gupta, Statistical Methods, Sultan Chand Sons
- V.K. Kapoor and S. C. Gupta Fundamentals of Statistics, Sultan Chand and Sons.

ADVANCED CONTROL SYSTEMS

Course Code: ECE4104 **Credit Units: 04**

Course Objective:
Course provides comprehensive and insight knowledge of Digital control systems. Objective of the course is to provide the students the core knowledge of Stability theory of Digital systems and State Variable analysis of Digital System

Course Contents:

Module I: Introduction
Configuration of the basic Digital Control Systems, types of sampling operations, Sample and Hold operations, Sampling theorem, Basic discrete time signals.

Module II: Stability Methods
Mapping between s-plane and z-plane, stability methods: Modified Routh Criterion, Jury's method, modified Schur-Cohn criterion.

Module III: Models of Digital Control Systems
Digital temperature control System, Digital position control system, stepping motors and their control. Design of Digital compensator using frequency response plots.

Module IV: Control Systems Analysis Using State Variable Methods
State variable representation, conversion of state variable models to transfer function and vice-versa, Eigen values and eigen vectors, Solution of state equations, Concepts of controllability and observability.

Module V: State Variable analysis of Digital Control Systems
State variable description of digital control systems, conversion of state variable models to pulse transfer function and vice versa, solution of state difference equations, controllability and observability.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- M. Gopal, Digital Control and State Variable Methods, Tata Mc-Graw-Hill.
- K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
- B.C Kuo , Digital Control Systems , Prentice Hall.
- I.J. Nagrath&M.Gopal , Control System Engg., John Wiley & sons.
- K.K. Aggarwal, Control System Analysis and Design, Khanna Publishers.

DIGITAL SIGNAL PROCESSING

Course Code: ECE4105 **Credit Units: 04**

Course Objective:
Digital Signal Processing gives a brief overview of the evolution of Digital Signal from its parent Analog Signal, it's processing in terms of detection, classification, quantization and discrete response them various hardware and software techniques. It also realizes the need of Analog signal construction three various complex mathematical operations on, unit impulse responses in any considerate measuring domain and preparing the synthesized signal for accurate, fast and pre-determinedly programmed digital converssion.

Course Contents:

Module I: Discrete – Time Description of Signals & Systems
Discrete – time sequences, response sequence, time invariant systems, stability and causality criterion for discrete – time systems, linear constant coefficient difference equation, properties of real valued sequences, convolution, correlation.

Module II: The Z – Transform
Sampling Definition of Z – Tranform, Properties of z-transform, The complex Z – plene, Region of convergence in the Z-Plane, evaluation of Z-Transform, Relation between FT & Z-transform, The Z-transform of Symmetric sequences, The Inverse Z-transform . The systems function of a digital filter.

Module III: The Discrete Fourier Transform (DFT)
Definition, its properties, DFT,IDFT pair , circular convolution, Computations for evaluating the DFT,FFT algorithm, Analytic derivation of the "decimation-intime FFT algorithm", Some general observation on the FFT.

Module IV: Infinite Impulse Response (IIR) Filter Design Techniques
Introduction, Analog filter system function & frequency response, Analog low pass filter design techniques for Butterworth, Chebyshev Type- I and Type –II filter, Impulse invariance and Bilinear Transformation methods to convert Analog filters into Digital Filters. Transformation for converting low pass filters into other types.

Module V: Finite Impulse Response (FIR) Filter Design Techniques
Introduction, Designing FIR filters by DFT method and frequency sampling method. Study of windows (rectangular, Triangular, Hamming and Kaiser).
Digital Filter Structure: The direct from I& II structure, Cascade & parallel combination of IInd order sections.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- J.G. Proakis and D.G. Manolakis: Digital Signal Processing, 1995 (PHI) III, Edition.
- A. Oppenheim, R. Schafer, and J. Buck: Discrete Time Signal Processing, 1996 (PHI) VI, Edition.
- L. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, 1975, Prentice Hall of India.

LOW POWER VLSI DESIGN LAB

Course Code: ECE4106 **Credit Units: 01**

Course Contents:

List of Experiments:

1) Layout of CMOS Inverter.
2) Layout of NAND & NOR Gates.
3) Design & Simulation of SR Latch using NAND & NOR Representations.
4) Design & Simulation of D Flip Flop using NAND & NOR Representations.
5) Design & Simulation of JK Flip Flop using NAND & NOR Representations.
6) Design & Simulation of T Flip Flop using NAND & NOR Representations.
7) Design & Simulation of Master Slave JK Flip Flop using NAND & NOR Representations.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED DIGITAL COMMUNICATION SYSTEMS LAB

Course Code: ECE4107 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To study carrier modulation techniques using Amplitude shift keying and frequency shift keying
2. To study carrier modulation techniques using binary phase shift and differential shift keying.
3. To study data coding and decoding for NRZ format (NRZ L, M&S)
4. To study data coding and decoding for phase encoding format (Biphase L, M&S).
5. To study data coding and decoding for unipolar to bipolar and vice versa (Rz, AMI, URZ)
6. To study slop overload and increased gain in data modulation.
7. To study delta modulation and demodulation with CVSD modulation.
8. To study compander and expander

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DIGITAL SIGNAL PROCESSING LAB

Course Code: ECE4108 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To design FIR Filter using Hamming window
2. To convert Analog filter into Digital Filter using bilinear transformation
3. To determine z and inverse z transform of a given sequence
4. To verify 7 points FFT algorithm in decimation in time (DIT) & decimation in frequency (DIF).
5. To deter main the filter coefficient using Ramaz exchange algorithm
6. To design an IIR digital filter and its parallel realization

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

INFORMATION THEORY AND CODING

Course Code: ECE4201 **Credit Units: 03**

Course Objective:
This course introduces how various coding takes place in communication and what type of different codes are used in communication system. It also introduces different entropies, channel capacity and prupsoe of encoding.

Course Contents:

Module I: Basic Concepts of Information Theory
A measure of Uncertainty, Binary Sources, Measure of Information for two – dimensional discrete finite probability Scheme, Noise charactererics of channel, Basic relationship among different entropies, Measure of mutual information channel capacity, Capacity of channel with symmetric noise structure BSC and BEC.

Module II: Element of Encoding
Propose of encoding separable binary codes, Shannon Fano encoding , Noiseless coding Theorem of decidability, Mc Millen's Theorem, Average length of encoding massage, Shannon's Binary encoding, Fundamental Theorem of discrete Noiseless coding, Huffman's Minimum Redundancy codes.
Coding for Reliable Digital Transmission & Storage
Introduction, types of codes, Modulation and Demodulation, Maximum likelihood decoding, types of error, error control strategies.

Module III: Introduction to Algebra
Groups, Fields Binary field Arithmetic, Construction of Galois field GF (2m), Basic Properties of Galois Field GF (2m), Vector Spacer, Matrices.
Linear Block Codes: Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, error detecting and Error correcting capability a block code Hamming Code.
Cyclic Codes: Description of Cyclic codes, Generator and parity cheek matrices of cyclic codes, encoding of cyclic codes syndrome computation & error detection decoding of cyclic codes, Error trapping decoding of cyclic codes, Goley Codes.

Module IV: BCH Codes
Description of codes, Decoding of BCH codes, Implementation of Galoes Field Arithmetic, Implementation of error connection,
Convolution Codes: Encoding of convolution codes, structural properties of Convolution codes, distance properties of Convolution codes, Distance Properties of convolution codes, Maximum likelihood decoding of convolution codes.
Automatics Repeat Request Strategies
Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- F.M. Reza: Information Theory, McGraw Hill
- ShuLin& J Costeib: Error Control Coding, (PHI)
- Dass, Mullick& Chatterjee : Digital Communication, John Wiley, Ed. 1992

ADVANCED COMPUTER NETWORKS

Course Code: ECE4202 **Credit Units: 03**

Course Objective:
This course gives a through understanding of the advanced concepts of Computer Network by giving in depth knowledge of protocol used at various layers of the references model. It also introduces the students with network topologies and applications of Computer Networks.

Course Contents:

Module I
Introduction to computer Networks, Evolution of Computer networks and its uses, references models, example networks
The physical layer: Theoretical basis for data communication, Transmission media, wireless transmission. Telecom infrastructure, PSTN, Communication satellites,
Mobiles telephone System

Module II: The data link layer
Data link layer design issues, Error detection and correction, data link protocols, sliding window protocols, example of data link protocols – HDLC, PPP Access

Module III: Medium access layer
Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, IEEE standard 802 for LAN and MAN, Bridges

Module IV: The network layer
Network layer concepts, design issues, static and dynamic routing, algorithm, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion control algorithm, internetworking, Ipv4

Module V: The transport layer
The transport services, elements of transport, TCP and UDP the application layer: Brief introduction to presentation and session layer, DNS, E-mail, WWW

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Tananbaum A.S., "Computer Networks", 3rd Ed, PHI, 1999.
- Laura Chappell (ed), "Introduction to Cisco Router Configuration", echmedia, 1999.

References:
- Black U., "Computer Networks-Protocols, Standards and Interfaces", PHI, 996.
- Stallings W., "Computer Communication Networks", PHI.
- Michael A. Miller, "Data & Network Communications", Vikas Publication.
- William A. Shay, "Understanding Data Communications & Networks".

ADVANCED MICROWAVE ENGINEERING

Course Code: ECE4203 **Credit Units: 03**

Course Objective:
This course provides the comprehensive knowledge of microwave frequencies; construction and characteristic of Transistor, FET at Microwave frequency, Microwave Devices, Concept of MICS, Materials used for fabrication in MICS, different fabrication techniques, concept of Transmission line on MICS. This course also deals with the study of microwave sources, detection diodes and applications of microwave in modern technology.

Course Contents:

Module I
Microwave frequencies, microwave transistor, microwave field effect transistor

Module II
Tunnel diode, backward diode, and MIS tunnel diode, Transferred electron devices-Gunn Diode, Avalanche Transit Time Devices: IMPATT Diode, BARRITT Diode, DOVETT Diode, and TRAPATT Diode.

Module III: Microwave Integrated Circuit
Introduction, Circuit Forms, Transmission lines for MICs, Lumped Elements for MICs, Material for MICs: Substrate, Conductor, dielectric and resistive Materials, Fabrication techniques, Typical example of fabrication, Hybrid fabrication.

Module IV: Microwave tubes
Klystron, Reflex Klystron and Magnetron, Traveling wave tubes, microwave detection diodes, application of microwave

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Microwave Devices and Circuits by S. Y. Liao, PHI
- Microwave Engineering and application by O.P. Gandhi, Maxwell Macmillan Pub.
- Microelectronic Devices by E. S. Yang, MGH
- Semiconductor Devices and Integrated Electronics by A. G. Milness, CBS Pub.

ADVANCED OPTICAL COMMUNICATION

Course Code: ECE4204 **Credit Units: 04**

Course Objective:
The objective of this course is to introduce the student to the fundamental basics and understanding of fiber optical communications. This includes the properties of optical fibers and how they are used to establish optical links for communication systems. The course also gives exposure of Advance Optial Communication use in present communications networks.

Introduction:
concepts of information, general communication systems, evolution of optical fiber communication systems, advantages, disadvantages of optical fiber, communication systems.

Course Contents:

Module I:Wave propagation in dielectric waveguide
snell's law, internal reflection, dielectric slab wave guide, numerical aperture, propagation of model & rays. step-index fibers, graded index fibers.

Module II:Attenuation in optics fibers
Fiber attenuation, connectors &splices, bending loses, Absorption, scattering, very low loss materials, plastic & polymer-clad-silica fibers.

Module III:Wave propagation in fibers
wave propagation in step index & graded index fiber, fiber dispersion, single mode fibers, multimode fibers, dispersion shifted fiber, dispersion flattened fiber, polarization.

Module IV:Optical sources & detectors
Principles of light emitting diodes (LED's) , design of LED's for optical fiber communications, semiconductor LASER for optical fiber communication system ,principles of semiconductor photodiode detectors, PIN photodiode, Avalance photodiode detectors.

Module V:Optical fiber communication system
Telecommunication, local distribution series, computer networks local data transmission & telemetry, digital optical fiber communication system, first &second generation system, future system.

Module VI: Advanced multiplexing strategies
Optical TDM, subscriber multiplexing (SCM), WDM
Optical networking: data communication networks, network topologies, MAC protocols, Network Architecture- SONET/TDH, optical transport network, optical access network, optical premise network.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Senior J., optical fiber communications, principles & practice, PHI.
- Keiser G., optical fiber communications, Mcgraw-hill.
- Gowar J., optical communication systems, PHI.
- William B. Jones jr., Introduction to optical fiber communication systems, Holt, Rinehrt and Winston, Inc.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: ECE4214 **Credit Units: 02**

Course Objectives: The course will enhance scientific , technical and research writing skills and impartknowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination**.**

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing , bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla,D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R.2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J.& Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montomery, Douglas C.(2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

ADVANCED COMPUTER NETWORKS LAB

Course Code: ECE4205 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Study of Router Configuration in interface mode. (Cisco 800 & Cisco 1751
2. Router Conferguration with LAN setup by using 1700 Series Router and using belnet modem.
3. Study of CISCO switch 5100 series (12 ports) and setup VLAN
4. Socket Programming with JAVA
5. Network Programming by using JAVA Program.
6. Router Configuration with ISDN Line.
7. To study wide area network through serial ports via DTF & DLE cable.
8. To interconnect different network through routers
9. To study Real (Lease Line Scenario) DCE devices using RAD Modems
10. Recovering ISCO router password.
11. To study ISDN (BRI & PRI)
12. To study accessing of router from different location using> For CCNA, ISDN is required & card is ISDN card Removable)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DEVICE MODELING AND SIMULATION LAB

Course Code: ECE4206 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Layout & Simulation of CMOS Inverter using CAD Tools.
2. Layout & Simulation of NAND & NOR Gates with Optimal Aspect Ratio.
3. Design & Simulation of SR Latch using NAND & NOR Representations.
4. Design & Simulation of JK Flip Flop using SR Latch.
5. Design & Simulation of Master Slave JK Flip Flop.
6. Design & Simulation of R2R Ladder DAC.
7. Design & Simulation of ADC using DAC.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED OPTICAL COMMUNICATION LAB

Course Code: ECE4207 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To study LASER free space Communication.
2. To study losses in optical fiber.
3. To measure the Numerical Aperture of the Fiber.
4. To characterize optical sources.
5. Design and evaluation of LD digital transmission system.
6. To study video transmission through optical fiber link.
7. To study WDM in optical fibers.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SATELLITE COMMUNICATION

Course Code: ECE4208 **CreditUnits: 03**

Course Objective:
This course contents topics related with technologies envolved with modern satellite communication systems. It also gives indeath knowledge about on board equipment use in Satellite Transponder and earth station. Various multiaccess techniques used in Satellite Communication alont with link engineering are also covered.

Course Contents:

Module I: Introduction
Satellite communication, Brief History, Orbits of satellite: Low, medium and geo-synchronous main characteristics, Angle period, Returning perio, Angle of Evaluation, Propagation Delay, Orbital spacing.

Module II Satellite Links
Delay transponder, Earth Stations, Antennas and Earth Coverage, Altitude and eclipses.

Module III: Earth space propagation effects
Frequency window, Free space loss, Atmospheric absorption, Rainfall Attenuation, Inosphericscintillatin, Telemetry, Tracking and command of satellites**.**
Detection: QPSK offset QPSK and MSK, Coherent and non-coherent detection, Error rate performance.

Module IV: Synchronization
Principal and techniques, Multiple Access Techniques, FDMA, SPADE system, TDMA system, Concept and configuration, system timing frames format, SSMA Basu Principles, VSAT, Random Access, space communication, link design descriptional of operational in TELSAT and INSAT system.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- J. Martin : Communication Satellite System, PH Englewood
- D.C. Aggarwal: Satellite Communication, Khanna Pub.
- Tri Ha Digital Satellite Communication Tata Mc Graw-Hill
- Harry and Vam Trees: Satellite Communication, IEEE Proceeding, 1979

BLUETOOTH TECHNOLOGY

Course Code: ECE4209 **Credit Units: 03**

Course Objective:
This subject provides Introduction to various wireless technologies with special emphasis on Bluetooth networking and Implementation.

Course Contents:

Module I: Introduction to wireless technologies
WAP services, Serial and Parallel Communication, Asynchronous and synchronous Communication, FDM, TDM, TFM, Spread spectrum Technology

Module II: Introduction to Bluetooth
Specification, Core protocols, Cable replacement protocol Bluetooth Radio: Type of Antenna, Antenna Parameters, Frequency hoping

Module III: Bluetooth Networking
Wireless networking, wireless network types, devices roles and states, adhoc network, scatternet Connection establishment procedure, notable aspects of connection establishment, Mode of connection, Bluetooth security, Security architecture, Security level of services,

Module IV: Profile and usage model
Generic access profile (GAP), SDA, Serial port profile, Secondary bluetooth profile.

Module V: Hardware
Bluetooth Implementation, Baseband overview, packet format, Transmission, buffers, Protocol Implementation: Link Manager Protocol, Logical Link Control, Adaptation Protocol, Host control Interface, Protocol Interaction with layers

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Bluetooth Technology by C.S.R. Prabhu and A.P. Reddi; PHI

CLUSTER AND GRID COMPUTING

Course Code: ECE4210 **Credit Units: 03**

Course Objective:
The basic objective of Cluster and Grid Computing is to provide introduction to Cluster Computing with special and details emphassion grid technologies and Applications execution.

Course Contents:

Module I: Cluster Computing
Introduction, Parallel systems, Cluster Architecture, Parallel Paradigms..

Module II: Programming
Parallel Programming with MPI, Resource management and scheduling.

Module III: Grid Computing
Introduction, Grids and Grid Technologies, Programming models and Parallelization Techniques, Standard application development tools and paradigms such as message-passing and parameter parallel programming, Grid Security Infrastructure, Data Management.

Module IV: Application Case Study
Molecular Modeling for Drug D5esign and Brain Activity, Analysis, Resource management and scheduling, Setting up Grid, deployment of Grid, software and tools, and application execution.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- R. Buyya (editor), High Performance Cluster Computing, Vol1. and Vol.2, Prentice Hall, USA, 1999.
- I. Foster and C. Kesselman (editors), The Grid: Blueprint for a New Computing Infrastructure, Morgan Kaufmann Publishers, 1999.
- R. Buyya, "Economic-based Distributed Resource Management and Scheduling for Grid Computing, Ph.D. Thesis, Monash University, Melbourne, Australia, April 2002

REAL TIME SYSTEMS AND SOFTWARE

Course Code: ECE4211 **Credit Units: 03**

Course Objective:
The basic objective of Real Time System and Software Engineering is to study different real time systems their application in time constraints software that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and accurate time limit.

Course Contents:

Module I: Introduction
Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues. Process and State-based Systems model, Periodic and Sporadic Process, Cyclic Executives, CE definitions and Properties, Foreground-Background Organiazations, Standard OS and Concurrency – Architectures, Systems Objects and Object-Oriented Structures, Abstract Data Types, General Object Classes.

Module II: Requirements and Design Specifications
Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timeing and clocks, Sementics Tools and Extensions, Statecharts-Concepts and Graphical Syntax, Semantics and Tools

Module III: Declarative Specifications
Regular Expressions and Extensions, Traditional Logics- Propositional Logic, Predicates, Temporal logic, Real time Logic Deterministic Scheduling: Assumptions and Candidate Algorithms, Basic RM and EDF Results,

Module IV
Process Interactions - Prority Inversion Inheritance Execution Time Prediction: Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Prediction by optimisation, System Interference and Architectural Complexities Timer Application, Properities of Real and ideal clocks, Clock Servers – Lamport's Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization-Centralized Synchronization, Distributed Synchronization

Module V: Programming Languages
Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and
Real-time Externsions, CSP and Occam

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Real – Time Systems and software by Alan C. Shaw ; John Wiley & Sons Inc

MEMS AND IC INTEGRATION

Course Code: ECE4212 **Credit Units: 03**

Course Objective:
This course gives the exposure of various techniques used in MEMS and IC Integration. RF and Optical MEMS are also covered.

Course Contents:

Module I
Overview of CMOS process in IC fabrication, MEMS system-level design methodology,

Module II
Equivalent Circuit representation of MEMS, signal-conditioning circuits, and sensor, noise calculation.

Module III
Pressure sensors with embedded electronics (Analog/Mixed signal): Accelerometer with transducer. Gyroscope, RF MEMS switch with electronics, Bolo meter design

Module IV
RF MEMS, and Optical MEMS MECS, thermo actuator MOEMS CILV, Digital
Micro mirror device Laser light.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Gregory T.A. Kovacs, Micromachined Transducers Sourecbook, The McGraw- Hill, Inc. 1998
- Stephen D. Senturia, Microsystem Design, Kluar Publishers, 2001
- NadimMaluf, An Introduction to Microelectro mechanical Systems Engineering, Artech House, 2000.
- M.H. Bao, Micro Mechanical Transducers, Volume 8, Handbook of Sensors and Actuators, Elsevier, 2000.
- Masood Tabib-Azar, Microactuators, Kluwer, 1998.
- LjubisaRistic, Editor, Sensor Technology and Devices, Artech House, 1994
- D. S. Ballantine, et. al., Acoustic Wave Sensors, Academic Press, 1997
- H. J. De Los Santos, Introduction to Microelectro mechanical (MEM) Microwave Systems, Artech, 1999.
- James M. Gere and Stephen P. Timoshenko, Mechanics of Materials, 2nd Edition, Brooks/Cole Engineering Division, 1984

Syllabus - Third Semester

ADVANCED INSTRUMENTATION

Course Code: ECE4301 **Credit Units: 03**

Course Objective:
The basic objective of this course is to provide the students the core knowledge of industrial instrumentaion so that they learn how to implement instrumentation techniques is industry.

Course Contents:

Module I: Transducers:
Classification of Transducers including analog and digital transducers, Selection of Transducers, Static and Dynamic response of transducer System.

Module II
Measurement of length & thickness, linear Displacement, Angular Displacement, force, weight, torque, Moisture, Level, Flow, pH & Thermal Conductivity, Measurement of Frequency, Proportional, Geigermuller& Scintillation Counters.

Module III: Telemetry
Basic Principles, Proximity & remote Action Telemetry systems, Multiplexing; Time Division and frequency division.

Module IV: Various types of Display Device
Digital Voltmeters, Dual Slope DVMS, Digital encoders, Analog and Digital encoders, Analog and Digital Data Acquisition System, A/D Converter.

Module V
Fibre Optic Technology for data transmission, Supervisory Control and Data
Acquisition Systems (SCADA), Q-meter. Electrical noise in control signals, its remedial measures.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- W.D. Cooper & A.D. Helfrick, Electronic Instrumentation and Measurement Techniques, PHI.
- B.C. Nakra and K.K. Chaudhary, Instrumentation Measurement Analysis, Tata McGraw-Hill.
- Instrument Transducers by Hermann, K.P. Neubert.
- Electrical Transducers for Industrial Measurement by pH Mansfleld.
- Instrumentation systems by Mani Sharma, Rangan.
- Principles & Methods of Telemetry by Borden &Thgnel.
- Telemetry Method by Foster.

NANO SCIENCE AND TECHNOLOGY

Course Code: ECE4302 **CreditUnits: 03**

Course Objective:
Introduction to nanoscience and nanotechnology includes concept of quantum electronics, nanoscale fabrication technology, nanomaterials, i.e CNT and fullerenes.

Course Contents:

Module I: Introduction to Nanoscale Science
Concept of quantum electronics, Molecules as building blocks of nanomaterials, band energy etc.

Module II: Introduction to Nanoscale Technology
Nanoscale fabrication techniques, Molecular self-assembly, wet chemical synthesis, top down and bottom up approaches

Module III: Nanostructured Materials
Buckballs, Nanoparticle preparation in emulsion and microemulsion, Nanostructures and nanoparticles in thin organic films, Amphiphiles and surfactants.

Module IV: Applications of Nanomaterials
Details of nanostructured materials, applications in Sensors, clothes, paints, health care, electronics, computers, and other industrial and consumer products.

Module V: Fullereness and Carbon Nanotubes
Importance, properties and application of CNT and Fullerenes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Introduction to nanotechnology, Charles P Poole, Jr. and Franks J Qwens
- Synthesis, Functionlization and surface treatment of Nanoparticle, Marie Isabella Buraton
- The Chemistry of Nanomaterials, CNR Rao, A K Cheethan
- Surface and Interface, M C Rastogi

ADVANCED IMAGE PROCESSING

Course Code: ECE4303 **Credit Units: 04**

Course Objective:
Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. Advance Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Advance Image Processing takes full advantage of the computational technology of Mathematica.

Course Contents:

Module I*:*Introduction and Digital Image Fundamentals
Human visual system and image perception, monochrome & color vision models, color representation; image sampling & quantization; 2-D systems; image transforms; image coding, stochastic models for image representation, some basic relationships like neighbours, connectivity, Distance measure between pixels, Imaging Geometry.
Histogram: Definition, decision of contrast basing on histogram, operations basing on histograms like image stretching, image sliding, Image classification. Definition and Algorithm of Histogram equalization.

Module II: Image enhancement, restoration & reconstruction
Image Transforms: Discrete Fourier Transform, Some properties of the two-dimensional fourier transform, Fast Fourier transform, Inverse FFT, Walsh, Hadamard , Discrete cosine, Haar, Slant, KL Transforms
Image Enhancement: SPATIAL Domain Methods: Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-Mean, Median, Mode filters, Comparative study, Edge enhancement filters – Directorial filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity & DIFF Filters, prewitt filter, Contrast Based edge enhancement techniques, Colour image processing.
Frequency Domain Methods: Design of Low pass, High pass, EDGE Enhancement, smoothening filters in Frequency Domain. Butter worth filter, Homomorphic filters in Frequency Domain, Advantages of filters in frequency domain, comparative study of filters in frequency domain and spatial domain.
Image Restoration: Degradation model, Diagnolization of Circulant and Block-Circulant Matrices, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration, Interactive Restoration, Restoration in Spatial Domain.

Module III: Image analysis using multiresolution techniques
Image Segmentation: Definition, characteristics of segmentation. Detection of Discontinuities, Thresholding, Pixel based segmentation method. Region based segmentation methods – segmentation by pixel aggregation, segmentation by sub region aggregation, histogram based segmentation, spilt and merge technique. Use of motion in segmentation (spatial domain technique only), Threshold detection methods, edge based image segmentation
Morphology: Dilation, Erosion, Opening, closing, Hit-and-Miss transform, Boundary extraction, Region filling, connected components, thinning, Thickening, skeletons, Morphological segmentation - particles segmentation and watersheds, particles segmentation.

Module IV: Wavelet Transform for Image Processing
Harr wavelets, Daubechies wavelets, Frequency analysis, Wavelet packet transforms, Continuous wavelet transforms, multi-resolution analysis, Image Restoration using Multiresolution Texture Synthesis

Module V: Image Compression
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Error free comparison, Lossy compression, Image compression standards.
Representation and Description: Representation schemes like chain coding, Polygonal Approximatiion, Signatures, Boundary Segments, Skeleton of region, Boundary description, Regional descriptors, Morphology.

Recognition and Interpretation: Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods, Interpretation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson Reprint, 2001.
- Anil K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall of India, New Delhi, 2001.

References:

- Maher A. Sid-Ahmed, "Image Processing Theory, Algorithms and Architectures", McGraw-Hill, 1995.
- William K. Pratt, "Digital Image Processing", Wiley-Interscience publication, Second Edition, 1991.
- RosefieldKak, "Digital Picture Processing",
- Fundamentals of Electronic Image Processing by Arthyr –R – Weeks, Jr. (PHI)
- Image processing, Analysis, and Machine vision by Milan SonkavaclanHalavac Roger Boyle, Vikas Publishing House.

MICROPROCESSOR ENGINEERING AND APPLICATION

Course Code: ECE4304 **Credit Units: 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is to give the students detailed knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Microprocessor
Intel 8085 - Introduction, register structure, memory Addressing, Addressing Modes,
Instruction Set, Timing Methods, CPU Pins and Associated Signals, Instruction timing and execution. programming I/O. Interrupt System, DMA, SID & SOD lines, Instruction set, 8085 based system design.

Module II: Intel 8086
Introduction, Architecture, Addressing modes, instruction set, memory
management, assembler dependent instructions, Input/Output, system design using 8086.

Module III: Pentium Processors
Internal Architecture of 8087, operational overview of 8087, Introduction to 80186,80286, 80386 & 80486 processors and Pentium Processors.

Module IV: Peripheral Interfacing
Parallel versus serial transmission, synchronous and asynchronous serial data transmission. Interfacing or hexadecimal keyboard and display unit, interfacing of cassette recorders and parallel, serial interface standards. Study of Peripheral Devices 8255, 8253,8257, 8251, 8259.

Module V: Microprocessor applications to Power Engg.
Protective Relaying: over-current, impedance, MHO, reactance, bi-directional relays.
Measurements: Frequency, power angle & power factor, Voltage and Current, KVA, KW, & KVAR, maximum demand. Resistance, Reactance, Temperature Controls.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Rafiquzzaman, M. Theory & Applications PHI Publications 1993.
- Gaonkar R. S. Microprocessor Architecture, Programming and Applications John Wiley 1989.
- Ram B. Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons 1995.
- Liu Yu Cheng and Gibson, G.A. PHI 1992.
- Leventhal, L.A. Introduction to Microprocessors: Software, Hardware, Programming.

ADVANCED INSTRUMENTATION LAB

Course Code: ECE4305 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Measurement of thickness & resolution of LVDI (Displacement measurement
2. Study of vibration measurement by stroboscope (natural frequency of a cantilever)
3. Measurement of angular frequency (speed of rotation objects) measurement by stroboscope.
4. Study of calibration of pressure transducer.
5. Measurement of free (Proving ring)
6. Study of torque cell.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED IMAGE PROCESSING LAB

Course Code: ECE4306 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Simulate all programs using MATLAB
2. To study about the basic image processing tools.
3. Write program for histogram processing.
4. Write program for filtering in frequency domain.
5. Write program for filtering in spatial domain.
6. Write programs for different compression schemes.
7. Write program image restoration.
8. Write program for performing different morphological operations.
9. Write program for image segmentation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MICROPROCESSOR ENGINEERING AND APPLICATION LAB

Course Code: ECE4307 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To load the numbers 49H and 53H ion memory location 9510 & 9511.
2. Respectively and add the contents of memory location 9601.
3. To write the Assembly Language Programming for 8 bit addition with and without carry.
4. To write the Assembly Language Programming for 8 bit subtraction with and without borrow.
5. To write the Assembly Language Programming for 8 bit Multiplication and Division.
6. To write the Assembly Language Programming for sorting an array of numbers in Ascending &Decending order.
7. To write the Assembly Language Programming with Additional Instructions.
8. To write and execute a program using Stacks.
9. To study and program the programmable Peripheral interface (8255 board).
10. To study and program the programmable interval timer (8253 board).
11. To study and program the programmable DMA Controller (8257 board).
12. To study and program the programmable Interrupt Controller (8259 board).
13. To study of programmable Serial Communication interface (8251 board).

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION

Course Code: ECE4335 **Credit Units: 06**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Acknowledgements-This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.
5. Abstract and **Keywords-**This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
7. Contents-This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
8. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
9. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment	**Final Assessment**
40 Marks	60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.

Examination Scheme:

Components	**V**	**S**	**R**	**PR**	**FP**
Weightage (%)	20	20	20	20	20

V – Viva, S – Synopsis, FP – Final Presentation, R – Report, PR-Progress Report

DISSERTATION-I

Course Code: ECE4337 **CreditUnits: 05**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in

contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7. *ClinMicrobiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

ata, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

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This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
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- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
  - Font: Arial (10 points) or Times New Roman (12 points)
  - Line spacing: 1.5
  - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

MOBILE COMPUTING

Course Code: ECE4308 **Credit Units: 03**

Course Objective:
The objective of this subject is to make students familiar about the basic and advance concepts of mobile technology, computing. The 3G and mobile services and global satellite communication is also covered.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling. GSM Additional services: Teletext, Facsimile, Videotext services.
General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes.

Module II: (Wireless) Medium Access Control
Motivation for a specialized
MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.
Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).
Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Module III: Database Issues
Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.
Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Module IV: Mobile Data Communication
W LANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).
Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module V: Global Mobile Satellite Systems
Mobile Satellite Systems (GEO, MEO and LEO), case studies of the IRIDIUM and GLOBALSTAR systems.
Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.
Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

References:

- "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
- "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
- "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

OPTIMIZATION TECHNIQUES

Course Code: ECE4309 **CreditUnits: 03**

Course Objective:
In a fast changing enviornment an undersating is required which will provide facility to implement a problem for minimum cost, greater efficiancy better customer service and higher quality. Optimization Techniques gives us help in solving such type of problems.

Course Contents:

Module I: Introduction to Optimization
Statement of an optimization problem, Classification of optimization problems, Optimization techniques, Engg. applications of optimization.

Module II: Classical Optimization Techniques
Single variable optimization, Multivariable optimization with no constraints, Multivariable optimization with equality constraints, Multivariable optimization with in equality constraints.

Module III: Linear Programming
Standard form of linear programming, Graphical solution, Simplex method, Twophase simplex method, Computer implementation of the simplex method, Duality theory.

Module IV: Transportation Problem
North-West Corner rule, Least cost method, Vogel approximation method, testing for optimality.

Module V: Non-Linear Programming: One–dimensional minimization methods
Unimodal function, Dichotomous search, Fibonacci search, Quadratic interpolation method, Cubic interpolation method .

Module VI: Non-Linear Programming-Unconstrained Optimization Techniques
Random search method, Steepest descent method, Conjugate gradient method,
Variable metric method.

Module VII: Non-Linear Programming - Constrained Optimization Techniques
Interior Penalty function method, Exterior penalty function method.
Further Topics in Optimization
Critical path method (CPM), Program evaluation and review technique (PERT).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
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Text & References:
- S.S. Rao, Optimization: Theory and applications, Wiley Eastern Ltd.
- G.V. Reklaitis, Engg. optimization Methods & applications, Wiley.

ADVANCED POWER ELECTRONICS

Course Code: ECE4310 **Credit Units: 03**

Course Objective:
The course aims to introduce them to the theory of operation, analytical, circuit models and basic design concepts of Electric Power components and system.

Course Contents:

Module I: Power Semiconductor Diodes
Diode V -I Characteristics, Reverse Recovery Characteristics, Power Diodes Types, Forward and Reverse Recovery Time. Series & Parallel Connected Diodes.

Module II: Thyristor
V-I Characteristics, Turn ON & Turn OFF Characteristics, di/dt and dv/dt protection, Series and Parallel Operation of Thyristors, Thyristor firing circuits, UJT and PUJT, Thyristor commutation Techniques.

Module III: Power Transistors
Bipolar Junction Transistors, their steady State & Switching Characteristics, Power
MOSFET'S and their steady state & switching characteristics, Gate drive SIT's & IGBTS's, Series & Parallel Operation, di/dt and dv/dt limitations,

Module IV: Controlled Rectifiers
Single Phase & Three Phase full Converters with R-L load, Single phase &: three phase dual converters, Power factor improvement technique.

Module V: A.C. Voltage Controllers
Principle of phase control, Single phase and three phase full controllers, Cycloconvertor, A.C. voltage Controllers with PWM Control, Effects of source & Load Inductances.

Module VI: D.C Choppers
Chopper Classification, Thyristor Chopper Circuits, Chopper Circuit Design.

Module VII: PWM Inverters
Principle of Operation, Performance parameters, single phase bridge invertors and their voltage Control, Harmonic Reduction, Inverter Circuit Design.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- M.H. Rashid , Power Electronics Circuits Devices application, PHI.1994
- P. C. Sen., Power Electronics TMH 1987.
- P S. Bimbhra., Power Electronics, Khanna Publishers 1993.
- Cyril W Lander, Power Electronics, MHL, 1993.
- M.D Singh & K.B. Khanchandani, Power Electronics, TMH.1998.

RADAR SYSTEMS

Course Code: ECE4311 **Credit Units: 03**

Course Objective:
This course builds basic knowledge of different types of Radar systems along with link designing & application. It also covers different modulation schemes & channels used.

Course Contents:

Module I: Introduction & basic working principle of radar
Basic radar, radar equation, its block diagram, frequencies, applications and origins
Different radar systems MTI and pulse Doppler radar, traking radar delay line cancellers, staggered pulse repetition frequencies Doppler filler banks digital MTI processing AMTI, tracking with radar, mono-pulse tracking limitation of tracking ADT.

Module II: Detection of signals in noise
Receiver noise and S/N ratio, probability density function probabilities of detection and false alarm, integrating radar pulses, radar cross section of targets, cross section fluctuations, PRF matched filter receiver, detectors, automatic detection, integrators, constant, pulse alarm rate receivers, radar operators, signal management

Module III: Radar signal processing & clutter
Basic radar measurement accuracy & radar measurement ambiguity diagram, pulse compression, target recognition. Introduction to radar clutter, surface clutter radar equation, land clutter, sea clutter, statistical models for surface clutter, weather clutter, non spherical clutter, detection of targets in clutter.

Module IV: Radar transmitter & receivers
Aspects of radar transmitters & receivers, linear beam power tubes solid state RF power sources.
Receiver noise figure, super heterodyne receiver duplexers and receiver protectors, radar displays.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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Text & References:
- Introduction to Radar System – M. I. Skolnik
- Radar Fundamentals – G.J Wheeler
- Radar Engineering – D. G. Rink

RELIABILITY ENGINEERING

Course Code: ECE4312 **CreditUnits: 03**

Course Objective:
The primary objective of this presentation is to share the experience gained in improving reliability and maintainability (R&M) features of the Advances Light Helicopter (ALH), designed and developed by the Hindustan Aeronautics Limited, Bangalore, India. The presentation briefly describes the advance technology features adopted and their impacty on R&M and outlines the reliability management aspects adopted during prototype development and poduction phases. The specific R&M features incorporated in design are elaborated. The failure reporting, analysis and corrective action system (FRACAS) established for R&M analysis is described and efforts made to improve R&M are illustrated with examples of held service data obtained from customers on initial production batches. The ALH experience reinforces the need for a well – established FRACAS and a system for customer inteaction to improve product R&M.

Course Contents:

Module I: Reliability Mathematics
Random experiments, probability, random variables, distribution functions, discrete distributions ,Continuous distributions.

Module II: Network Modelling and reliability evaluation of simple systems
Series systems, parallel system, series-parallel systems, partially redundant systems, standby redundant systems.

Module III: Networks and reliability evaluation of complex systems
Cut set method, Tie-set method, Connection matrix techniques, Event trees, Fault trees.

Module IV: Probability distributions in reliability Evaluation
General reliability function, Poisson distribution, normal distribution, exponential distribution.

Module V: Discrete Markov Chains
General modelling Concept, Stochastic transitional prob. matrix, Time dependent prob. evaluation, Limiting state Prob. evaluation, Absorbing States.

Module VI: Continuous Markov Processes:
General modeling concepts, state space diagrams, Stochastic transitional probability matrix, Evaluating limiting state probabilities.

Examination Scheme:

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Text & References:

- L.S. Srinath, Reliability Engineering, Affiliated East –West Press Pvt. Ltd., New Delhi
- E. Balagurusamy, Reliability Engineering, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- R. Billinton& Ronald N. Allan, Reliability Evaluation of Engg. Systems: Concepts & Techniques, Plenum Press, N.Y. and London.

Syllabus - Fourth Semester

DISSERTATION-II

Course Code: ECE4437 **CreditUnits: 15**

- Dissertation
- Seminar & Progress Report
- Comprehensive Viva

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.

- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
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(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	