

DEPARTMENT OF ELECTRONICS

Curriculum for B.S Electronics



UNIVERSITY OF PESHAWAR

***Scheme of Studies
For BS Electronics***

Semester I	Cr.Hrs	Semester II	Cr.Hrs
IS 311 Islamic Studies	2(2+0)	PS 321 Pakistan Studies	2(2+0)
ENG312 English Comprehension	2(2+0)	ENG 322 Communication Skills	2(2+0)
MATH 313 Calculus and Analytical Geometry	3(3+0)	MATH 323 Linear Algebra and Differential Equations	3(3+0)
PHY 314 Physics-1	3(2+1)	PHY 324 Physics-2	3(2+1)
ELEC 315 Introduction to Computer	3(2+1)	ELEC 325 Basic Electronics	4(3+1)
ELEC 316 Circuit Analysis	4(3+1)	ELEC 326 Digital Logic Design-1	4(3+1)
Total Credit Hours	17	Total Credit Hours	18
Semester III	Cr.Hrs	Semester IV	Cr.Hrs
MATH 431 Complex Variables and Transforms	3(3+0)	STAT 441 Probability and Statistics	3(3+0)
ELEC 432 English-III	3(3+0)	ELEC 442 Digital Logic Design-2	4(3+1)
ELEC 433 Amplifiers and Oscillators	4(3+1)	ELEC 443 Computer-Aided Electronic Design	2(0+2)
ELEC 434 Programming Language	3(2+1)	ELEC 444 Electromagnetic Field Theory	3(3+0)
ELEC 435 Solid State Electronics	3(3+0)	ELEC 445 Analog & Digital Communication	3(2+1)
Total Credit Hours	16	Total Credit Hours	15
Semester V	Cr.Hrs	Semester VI	Cr.Hrs
ELEC 551 Semiconductor Materials and Devices 3(2+1)		ELEC 561 Integrated Circuit Design and Applications	4(3+1)
MATH 552 Numerical Methods	3(3+0)	ELEC 562 Power Electronics	4(3+1)
ELEC 553 Signals and Systems	4(3+ 1)	ELEC 563 Control Systems	4(3+1)
ELEC 554 Microprocessor and Interfacing	4(3+1)	ELEC 564 Optoelectronics	3(3+0)
ELEC 555 Instrumentation and Measurements	4(3+1)	ELEC 565 Microcontroller and Embedded Systems	4(3+1)
Total Credit Hours	18	Total Credit Hours	19
Semester VII	Cr.Hrs	Semester VIII	Cr.Hrs
GOF 671 Project Management	3(3+0)	ELEC 681 Industrial Electronics	4(3+1)
ELEC 672 Digital Signal Processing	4(3+1)	ELEC 682 VLSI Design	4(3+1)
ELEC 673 Digital Instrumentation Systems	4(3+1)	ELEC 683 Micro-wave Communication	3(3+0)
ELEC 674 Data Communication & Networks	4(3+1)	ELEC 684 Final Year Project-2	4(0+4)
ELEC 675 Final Year Project-1	2(0+2)		
Total Credit Hours	17	Total Credit Hours	15

Total Credit Hours = 135

Details of Courses for
BS Electronics

SEMESTER I

ISL 311
2(2+0)

Islamic Studies (Comp-1)

Course Outline

Introduction to Quranic Studies

- 1) Basic Concepts of Quran
- 2) History of Quran
- 3) Uloom- ul-Quran

Study of Selected Text of Holy Quran

- 1) Verses of Surah Al-Bqra related to Faith (Verse No-284-286)
- 2) Verses of Surah Al-Hujrat related to Adab Ali- Nabi (Verse No-1-18)
- 3) Verses of Surah Al- Mumanoon related to Characteristics of faithful (Verse No-1-11)
- 4) Verses of Surah Al-Furqan related to Social Ethics (Verse No.63-77)
- 5) Verses of Surah Al- Inam related to Ihkam (Verse No-152-154)

Study of Selected Text of Holy Quran

- 1) Verses of Surah Al-Ihzab related to Adab al-Nabi (Verse No.6, 21, 40, 57, 58.)
- 2) Verses of Surah Al-Hashar (18,19,20) related to thinking, Day of Judgment
- 3) Verses of Surah Al-Saf related to Tafakar, Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W)

- 1) Life of Muhammad Bin Abdullah (Before Prophet Hood)
- 2) Life of Holy Prophet (S.A.W) in Makkah
- 3) Important Lessons derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) II

- 1) Life of Holy Prophet (S.A. W) in Madina
- 2) Important Events of Life Holy Prophet in Madina
- 3) Important Lessons Derived from the life of Holy Prophet in Madina

Introduction to Sunnah

- 1) Basic Concepts of Hadith
- 2) History of Hadith
- 3) Kinds of Hadith
- 4) Uloom-ul-Hadith
- 5) Sunnah & Hadith
- 6) Legal Position of Sunnah 45

Selected Study from Text of Hadith

Introduction to Islamic Law & Jurisprudence

- 1) Basic Concepts of Islamic Law & Jurisprudence
- 2) History & Importance of Islamic Law & Jurisprudence
- 3) Sources of Islamic Law & Jurisprudence
- 4) Nature of Differences in Islamic Law
- 5) Islam and Sectarianism

Islamic Culture & Civilization

- 1) Basic Concepts of Islamic Culture & Civilization
- 2) Historical Development of Islamic Culture & Civilization
- 3) Characteristics of Islamic Culture & Civilization
- 4) Islamic Culture & Civilization and Contemporary Issues

Islam & Science

- 1) Basic Concepts of Islam & Science
- 2) Contributions of Muslims in the Development of Science
- 3) Quran & Science

Islamic Economic System

- 1) Basic Concepts of Islamic Economic System
- 2) Means of Distribution of Wealth in Islamic Economics
- 3) Islamic Concept of Riba
- 4) Islamic Ways of Trade & Commerce

Political System of Islam

- 1) Basic Concepts of Islamic Political System
- 2) Islamic Concept of Sovereignty
- 3) Basic Institutions of Government in Islam

Islamic History

- 1) Period of Khlaft-E-Rashida
- 2) Period of Ummayyads
- 3) Period of Abbasids

Social System of Islam

- 1) Basic Concepts of Social System of Islam
- 2) Elements of Family
- 3) Ethical Values of Islam

Recommended Books

1. Ahmad Hasan, "Principles of Islamic Jurisprudence", Islamic Research Institute Islamabad, 1993, International Islamic University.
2. Bhatia, H.S, "Studies in Islamic Law, Religion and Society", Deep & Deep Publications. New Delhi, 1989.
3. Muhammad Zia ul Haq, "Introduction to Al Sharia Al Islamia", Allama Iqbal Open University, Islamabad, Pakistan, 2001.
4. Hameed Ullah Muhammad, "Introduction to Islam Mulana Muhammad Yousaf Islahi".
5. Hameed Ullah Muhammad, "Emergence of Islam", Islamabad, IRL.
6. Hameed Ullah Muhammad, "Muslim Conduct of State", Islamabad, Pakistan, Hussain Hamid Hassan, ULeaf Publication.
7. Mir Waliullah, "Muslim Jurisprudence and the Quranic Law of Crimes", Islamic Book Service, 1982.

Course Outline

Basics of Grammar
Parts of speech and use of articles
Sentence structure, active and passive voice
Practice in unified sentence
Analysis of phrase, clause and sentence structure
Punctuation and spelling

Comprehension

Answers to questions on a given text

Discussion

General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

Listening

To be improved by showing documentaries/films carefully selected by subject teachers

Translation skills

Urdu to English

Paragraph writing

Topics to be chosen at the discretion of the teacher

Presentation skills

Introduction

Note: Extensive reading is required for vocabulary building

Recommended Books

1. Functional English

a) Grammar

1. A.J Thomson and A.V. Martinet. , “A Practical English Grammar Exercises 1”, 3rd edition, Oxford University Press. ISBN 01943134922.
2. A.J Thomson and A.V. Martinet. , “A Practical English Grammar Exercise 2”, 3rd edition, Oxford University Press. ISBN 094313506.

b) Writing

1. [Marie-Christine Boutin](#), [Suzanne Brinand](#), [Françoise Grellet](#), “Writing: Intermediate (Oxford Supplementary Skills”, 4th Impression, Oxford University Press.

c) Reading/Comprehension

1. Brain Tomlinson and Rod Ellis, “. Reading. Upper Intermediate (Oxford Supplementary Skills), 3rd Impression, 1992, ISBN 0914534022

MATH 313
3(3+0)**Calculus and Analytical Geometry (Comp-3)****Course Outline**

Introduction to functions, Introduction to limit, Derivatives and their applications, Integral calculus with applications, Vector algebra, Vector calculus, Introduction to analytical geometry, Straight line in R³, Planes, Cylindrical and spherical coordinates, Surfaces, Cylinders and cones, Spheres, Spherical trigonometry.

Recommended Books

1. George B. Thomas and Ross L. Finney, "Calculus and Analytic Geometry", 9th Edition, Addison-Wesley, 1995.
2. George F. Simmons, "Calculus with Analytic Geometry", 2nd Edition, McGraw-Hill, 1996.
3. Gerald B. Folland, "Advanced Calculus", 1st Edition, Prentice Hall, 2002.
4. Monty J. Strauss, Gerald L. Bradley and Karl J. Smith, "Calculus", Prentice Hall, 2002.

PHY 314
3(2+1)**Physics-1(GRF-1)****Course Outline**

Measurements and Physical quantities. International system of units. Scalars and vectors. Newton's Laws of motion. Work and Energy. Centre of mass and traditional motion. Rotational Kinematics and Dynamics. Simple harmonic motion. Waves and particles. Waves in a stretched strings. Wave and frequency. Speed of traveling waves. Principal of superposition. Energy and power in traveling waves. Interference of waves. Beats. Doppler Effect, Heat, Laws of thermodynamics, Reversible and irreversible processes. The Control cycle and entropy.

Lab Outline**Recommended Books**

1. David Halliday, Robert Resnick, and Jearl Walker, "WIE Fundamentals of Physics", 7th Edition, John Wiley & Sons, 2005.
2. Arthur Beiser, "Schaum's Outline of Applied Physics", 4th Edition, McGraw-Hill, 2004.
3. F.J Keller, W.E.Getty and M.J. Skove, "Physics: Classical and Modern", 2nd Edition, McGraw-Hill, 1992.
4. D.C.Giancoli, "Physics for Scientists and Engineers", 4th Edition, Addison-Wesley, 2008.

ELEC 315
3(2+1)**Introduction to Computer (Comp-4)****Course Outline**

History, Classification, Basic components, CPU, Memory, Peripheral devices, Storage media and devices, Physical and logical storage, Data organization, File storage, Programs and software, System software, Application software, Operating Systems, Programming languages, Compilation and interpretation, Problem specification, Algorithms, Flow chart, Pseudo code, Social impact of computer age, Computers in office, industry and education. Number systems, Boolean algebra, Demorgan's theorem, Basic gates, Half adder, full adder.

Lab Outline

Computation of number system, implementation of Boolean functions, basic machines organization including motherboard, memory, I/O cards, networking devices, use of flow charts, introduction to office

tools, overview of different browsers including open-source browsers, introduction to various operating systems.

Recommended Books

1. Brian Williams and Stacey Sawyer, "Using Information Technology", 7th Edition, McGraw-Hill, 2007.
2. William Stallings, "Computer Organization and Architecture: Designing for Performance", 7th Edition, Prentice Hall, 2006.
3. David Evans, "Introduction to Computing: Explorations in Language, Logic, and Machines", 2nd Edition, Create Space Independent Publishing Platform, 2011

ELEC 316
4(3+1)

Circuit Analysis (Found-1)

Course Outline

Electric current, electromotive force (voltage), resistance, conventional current, Ohm's law, work, energy, power, conductance, efficiency, real and ideal sources, Kirchhoff's voltage and current laws, voltage-divider rule, current-divider rule, series and parallel connected sources, series and parallel connected resistor capacitor and inductor networks, bridges, voltage and current source conversions, mesh analysis, nodal analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, capacitance and capacitors, inductance and inductors, alternating current fundamentals, principle and operation of transformers, Resonant circuits, filter networks. transmission parameters, hybrid parameters, interconnection of two two-port networks.

Lab Outline

Study of Kirchhoff's current and voltage laws, current divider rule, voltage divider rule, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, simulation of basic electronic circuits using PSPICE. Frequency domain analysis and Bode plots, network analysis in s-domain, two port networks, circuit analysis techniques using PSPICE or other software.

Recommended Books

1. Thomas L.Floyd, Latest Edition, "Principles of Electronic Circuits" Prentice Hall. 2009
2. Edward Hughes, "Electrical and Electronic Technology", 9th Revised Edition, Prentice Hall, 2005.
3. William H. Hayt, Jack Kemmerly, and Steven M. Durbin, "Engineering Circuit Analysis", 7th Edition, McGraw-Hill, 2006.
4. Muhammad H. Rashid, "Introduction to PSpice Using OrCAD for Circuits and Electronics", 3rd Edition, Prentice Hall, 2003.

SEMESTER II

PS 321
2(2+0)

Pakistan Studies (Comp-5)

Course Outline

1) Historical Perspective

- a) Ideological rationale with special reference to Sir Syed Ahmad Khan. Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.
- b) Factors leading to Muslim separatism
- c) People and Land
 - i) Indus Civilization
 - ii) Muslim advent
 - iii) Location and geo-physical features.

2) Government and Politics in Pakistan

Political and Constitutional phases:

- a) 1947-58
- b) 1958-71
- c) 1971-77
- d) 1977-88
- e) 1988-99
- f) 1999 onward

3) Contemporary Pakistan

- a) Economic institutions and issues
- b) Society and social structure
- c) Ethnicity
- d) Foreign Policy of Pakistan and challenges
- e) Futuristic outlook of Pakistan

Recommended Books

1. Burki, Shahid Javed, "State & Society in Pakistan", The Macmillan Press Ltd. 1980
2. Akbar, S. Zaidi, "Issue in Pakistan's Economy", Karachi: Oxford University Press.2000.
3. S.M. Burke and Lawrence Ziring, "Pakistan's Foreign policy: An Historical analysis", Karachi: Oxford University Press, 1993.
4. Mehmood, Safdar, "Pakistan Political Rots & Development", Lahore, 1994
5. Wilcox, Wayne, "The Emergence of Bangladesh", Washington: American Enterprise, Institute of Pubic Research, 1972.
6. Mehmood, Safdar, "Pakistan Kayyun Toota", Lahore: Idara-e- aqafat-e-Islamia. Club Road.
7. Amin, Tahir, "Ethno- National Movement in Pakistan", Islamabad: Institute of Policy Studies, Islamabad.
8. Ziring, Lawrence, "Enigma of Political Development", Kent England: W m Dawson & Sons Ltd, 1980.
9. Zahid, Ansar, "History & Culture of Sindh", Karachi: Royal Book Company. 1980.
10. Afzal, M. Rafique, "Polotical parties in Pakistan", Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
11. Sayeed, Khalid Bin, "The Political System of Pakistan", Bostan: Houghton Mifflin, 1967.
12. Aziz, K.K.Party, "Politics in Pakistan, Islamabad", National Commission on Historical and Cultural Research, 1976.
13. Muhamad Waseem, "Pakistan under Martial Law", Lahore: Vanguard. 1987

14. Haq, Noor Ul, "Making of Pakistan: The Military Perspective", Islamabad; National Commission on Historical and Cultural Research, 1993.

ENG 322
2(2+0)

English-2 (Communication Skills) (Comp-6)

Course Outline

Objectives: Enable the students to meet their real life communication needs.

Paragraph Writing

Practice in writing a good, unified and coherent paragraph

Essay Writing

Introduction

CV and Job Application

Translation skills

Urdu to English

Study Skills

Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

Academic Skills

Letter/memo writing, minutes of meetings, use of library and internet

Presentation Skills

Personality development (emphasis on content, style and pronunciation)

Note: documentaries to be shown for discussion and review

Recommended Books

Communication Skills

a) Grammar

1. A.J Thomson and A.V. Martinet. , "A Practical English Grammar Exercise 2", 3rd edition, Oxford University Press, 1986. ISBN 094313506.

b) Writing

1. [Marie-Christine Boutin](#), [Suzanne Brinand](#), [Françoise Grellet](#), "Writing: Intermediate (Oxford Supplementary Skills)", 4th Impression, Oxford University Press, 1993. ISBN 019435405 7 (Pages 45-53, Notes Taking).
2. Rob Nolasco, "Writing: Upper-Intermediate (Oxford Supplementary Skills)", 4th 1992. ISBN 0194354065, (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).

c) Reading

1. Brain Tomlinson and Rod Ellis, “. Reading. Advanced (Oxford Supplementary Skills), 3rd Impression, 1992, ISBN 0914534031
2. John Langan, “ Reading and Study Skills” , 10th Edition, McGraw-Hill, 2012, ISBN: 0073533319
3. Riachard Yorky, “Study Skills”, McGraw-Hill 2002. ISBN: 0071213716

**MATH 323
3(3+0)**

Linear Algebra and Differential Equations (Comp-7)

Course Outline

Algebra of matrices; inverse of a matrix; Gauss-Jordan method for solution of a system of linear algebraic equations; vectors in the plane and in three dimensions; vector spaces; subspaces; span and linear independence; basis and dimension; homogeneous systems; coordinates and isomorphism; rank of a matrix, determinant; inverse of a matrix; applications of determinants; determinants from a computational point of view; properties of determinants; formulation, order, degree and linearity of differential equation; complementary and particular solutions; initial- and boundary-value problems; solution of ordinary linear differential equations of first order; Bernoulli’s differential equation; solution of ordinary differential equations of second order; origin and formulation of partial differential equations; solutions of first-, second- and higher-order partial differential equations; homogeneous partial differential equations of order one; Lagrange’s method of solution.

Recommended Books

1. Bernard Kolman and David Hill, “Elementary Linear Algebra”, 8th Edition, Prentice Hall, 2004.
2. Kenneth Hardy, “Linear Algebra for Engineers and Scientists Using Matlab”, 1st Edition, Prentice Hall, 2005.
3. Stephen Goode, “Differential Equations and Linear Algebra”, 2nd Edition, Prentice Hall, 2000.

**PHY 324
3(2+1)**

Physics-2 (GRF-2)

Course Outline

Electric charge and Coulomb law, Electric field, Gauss’s Law, Capacitors. Current, Resistance, Resistivity and Conductivity, Ohm’s Law, Microscopic models of resistance. Combination of resistances. Voltage and EMF. Magnetic field, Lorentz force, Biot-Savart Law, Ampere’s Law, Gauss law for Magnetism, Magnetic materials, Inductance, Reactance and impedance, Transformer. Galvanometer, Ammeter, Voltmeter, Cathode ray Oscilloscope.

Lab Outline

Electric fields, Gauss’ law, electric potential, capacitance and dielectrics, current and resistance, magnetic fields, sources of magnetic field, Faraday’s law, inductance, direct current circuits, alternating current circuits, nature of light, geometric optics, laws of geometric optics, interference of light waves, diffraction, polarization.

Recommended Books

1. David Halliday, Robert Resnick, and Jearl Walker, "WIE Fundamentals of Physics", 7th Edition, , John Wiley & Sons, 2005.
2. Arthur Beiser, "Schaum's Outline of Applied Physics", 4th Edition, McGraw-Hill, 2004.

ELEC 325

Basic Electronics (Found-2)

4(3+1)

Course Outline

Introduction to electronics, diodes: *pn* junction diode, forward and reverse characteristics of a diode, ideal diode, practical diode, equivalent circuit of a diode, current equation of a diode, diode as a switch. Types of diodes: Schottky diode, zener diode, tunnel diode, varactor diode, LED, laser diode. Applications of diodes: Half- and full-wave rectifiers, clipper and clamper circuits, voltage multipliers. Bipolar junction transistor: Operation, *npn* and *npn* transistors, unbiased transistor, DC biasing of a transistor, static characteristics, DC circuit analysis, load line, operating point and bias stabilization. Transistor as an amplifier. Transistor biasing configurations: Common emitter, common base, common collector. Field-effect transistor. FET biasing techniques: Common drain, common source and common gate, fixed bias and self bias configurations, voltage divider biasing. Universal JFET bias curve. Darlington pair.

Lab Outline

The emphasis is first on understanding the characteristics of basic circuits that use resistors, capacitors, diodes, bipolar junction transistors and field-effect transistors. The students then use this understanding to design and construct more complex circuits such as rectifiers, amplifiers and power supplies.

Recommended Books

1. Robert Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition, Prentice Hall, 2006.
2. Robert Painter, "Introductory Electronic Devices and Circuits: Electron Flow Version", 7th Edition, Prentice Hall, 2006.
3. Thomas L. Floyd, "Electronic Devices", 9th edition. Prentice Hall, 2011.

ELEC 326

Digital Logic Design-1 (Found-3)

4(3+1)

Course Outline

Basic concepts and tools to design digital hardware consisting of both combinational and sequential logic circuits, logic gates, combinational logic design, Encoders, Decoders, Multiplexers, Demultiplexers, code converters, sequential circuits and logic design, Different types of Flip Flops and its applications, D Flip Flop, J-K Flip Flop, RS Flip Flop, State Machine, Designing of synchronous and asynchronous counters, up-down counters, ring counters, random counters, Shift registers and its types. Serial in-parallel out, serial in-serial out, parallel in-serial out, parallel in parallel out. Bus organized computer systems.

Lab Outline

Basic logic gates; circuits such as MUX/DEMUX, encoder/decoder, arithmetic logic unit (ALU); Counters and shift registers.

Recommended Books

1. Thomas L. Floyd, "Digital Fundamentals", 6th edition. Pearson Education, 1996
2. Malvino Brown, "Digital Computer Electronics", 3rd Edition, McGraw-Hill, 1995
3. Morris Mano and Charles R. Kime, "Logic and Computer Design Fundamentals", 3rd Edition, Prentice Hall, 2003.
4. Roger L Tokheim, "Digital Electronics: Principles and Applications", Student Text with Multi SIM CD-ROM, 6th Edition, McGraw-Hill, 2002.

SEMESTER III

MATH 431
3(3+0)

Complex Variables and Transforms (GRF-III)

Course Outline

Introduction to complex number systems, Argand's diagram, modulus and argument of a complex number, polar form of a complex number, De Moivre's theorem and its applications, complex functions, analytical functions, harmonic and conjugate, harmonic functions, Cauchy-Riemann equations, line integrals, Green's theorem, Cauchy's theorem, Cauchy's integral formula, singularities, poles, residues, contour integration and applications; Laplace transform definition, Laplace transforms of elementary functions, properties of Laplace transform, periodic functions and their Laplace transforms, inverse Laplace transform and its properties, solutions of ordinary differential equations by Laplace transform, applications of Laplace transforms, Fourier transform definition, Fourier transforms of simple functions, magnitude and phase spectra, Fourier transform theorems, inverse Fourier transform, solutions of differential equations using Fourier transform.

Recommended Books

1. Erwin Kreyszig, "WIE Advanced Engineering Mathematics", 9th Edition, International Edition, John Wiley & Sons, 2005.
2. R.V. Churchill, J.W. Brown "Complex Variables and Applications", 5th Edition, McGraw Hill, 1989
3. J.H. Mathews and R.W. Howell, "Complex Analysis for Mathematics and Engineering", Norosa Publishing House, Dehli 2006.

ENG 432
3(3+0)

English-3 (Technical Report Writing) (Comp-8)

Course Outline

Objectives: Enhance language skills and develop critical thinking

Course Contents

Presentation Skills

Essay writing

Descriptive, narrative, discursive, argumentative

Academic writing

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

Technical Report writing

Progress report writing

Note: Extensive reading is required for vocabulary building

Recommended Books

Technical Writing and Presentation skills

a) Essay Writing and Academic Writing

1. Ron White, "Writing: Advanced (*Oxford supplementary skills*)", 3rd Impression, Oxford University Press, 1987. ISBN: 0194534073 (Particularly suitable for discursive, descriptive, argumentative and Report writing).
2. John Langan, "College Writing Skills", McGraw-Hill Higher Education, 2004
3. Laurie G. Kirszner and Stephen R. Mandell, "Patterns of College Writing", 4th Edition, St. Martin's Press

b) Presentation Skills

c) Reading

General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton, "The Mercury Reader: A Custom Publication", Compiled by Northern Illinois University. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

ELEC 433
4(3+1)

Amplifiers and Oscillators (Found-4)

Course Outline

Amplifier analysis: Transistor as an amplifier, hybrid model of a transistor, small-signal analysis, large-signal analysis, gain calculation of single-stage amplifier, cascading, multistage gain calculations. Classification of amplifiers on the basis of biasing: Class A amplifier, class B amplifier, class AB amplifier, class C amplifier, push-pull amplifier, complementary symmetry amplifier. Classification of amplifiers on the basis of coupling: RC-coupled amplifier, transformer-coupled amplifier, direct-coupled amplifier. Classification of amplifiers on the basis of frequency: Audio-frequency amplifier, radio-frequency amplifier, tuned amplifiers. Feedback: Feedback concept, feedback amplifiers, voltage feedback amplifier, current feedback amplifier. Effect of feedback on frequency response. Practical amplifier considerations: Input and output impedance, amplifier loading, impedance matching. Oscillators: Basic theory, tank circuit, damped and undamped oscillations, phase-shift oscillator, Colpitts oscillator, Hartley oscillator, Wein Bridge oscillator, Clapp oscillator.

Lab Outline

Transistor curve tracer, introduction to PSPICE and AC voltage dividers, characterization and design of emitter and source followers, characterization and design of AC variable-gain amplifier, design of test circuits for BJTs and FETs, design of FET ring oscillators, design and characterization of emitter-coupled transistor pairs, tuned amplifier and oscillator, design of oscillators.

Recommended Books

1. Thomas L. Floyd, "Electronics Fundamentals: Circuits, Devices, and Applications", 6th Edition, 2004, Prentice Hall.
2. Thomas L. Floyd and David Buchla, "Basic Operational Amplifiers and Linear Integrated Circuits", 2nd Edition, Prentice Hall, 1999.
3. Robert Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition, Prentice Hall, 2006.

ELEC 434
3(2+1)

Programming Language C (Found-5)

Course Outline

High Level Languages, Problem Analysis and Algorithm Development, Flow charting, Sequential Flow, Conditional Flow, Repetitive Flow, and Algorithm Logic, Program structure, pre-processor declaration, Looping and flow control in C, Functions and Structure Programming, standard data type, Branching and Nested flow of control, Array and string, pointers, Structure data types and Union, Input/output, Filling system in C, Graphics programming, Implementation using simple programs for basic arrays, single-dimensional arrays, two-dimensional arrays, algorithm implementations, implementation of simple data structures like array, implementation of stacks, queues and priority queues, linked list, doubly linked list, circular linked list, tree searching algorithms, hash algorithms implementation, simple sorting techniques including bubble sorting and selection sorting, advanced searching schemes including binary searching and quick searching.

Lab Outline

1. To write different Programs, e. g. Quadratic equation, Temp Conversion etc.
2. Project etc.

Recommended Books

1. Robert Lafore, "C Programming using Turbo C", 2nd Edition, Prentice Hall, 2003.
2. Robert Lafore, "Object-Oriented Programming in C++", 4th Edition, Prentice Hall, 2002.
3. Greg Perry and Dean Perry, "C Programming Absolute Beginner's Guide", 3rd Edition, Pearson, 2014.

ELEC 435
3(3+0)

Solid State Electronics (Found-6)

Course Outline

Introduction to Basic Quantum Mechanics, Particle in a Box, Kronning_ Penning Model and Energy Bands in Solids, Semiconductors Statistics, Intrinsic and Extrinsic Semiconductor, Shallow and Deep Impurities, Non _Degenerate and degenerate Semiconductors, Calculation of Doping Densities and the Fermi Level, Mobility, Conductivity and life Time of Carriers. The PN Junction: Homo and Hetro-unction Devices, Abrupt and Linearly Graded PN Junctions, Current Transport in the PN Junction PIN Diodes, SCR, DIAC & TRIAC.

Transistors: Bi-Polar Junction Transistors, Modes of Operations, Injunctions Efficiency, Gain etc, Transistor Modeling, Frequency Performance, HF Transistors, Metal Semiconductor Contacts, Field Effect Transistors, JFET, MESFET, MOS DIODE, MOSFETS Structures, Frequency Performance of Devices. Introduction to Fabrication of Semiconductor Devices and Integrated Circuits.

Recommended Books

1. Beng G. Streetman, "Solid StateElectronicDevices", 4th Edition, Prentice Hall International, 1995.
2. A .S. Grove Wiley, "Physics & Technology of Semiconductor Devices", John Wiley & Sons, 1967
3. A Barlieve, "Solid State Electronics", Prentice Hall, 1985.
4. M.S Tyagi Wiley, "Introduction Semiconductor Materials and Devices", John Wiley & Sons, 1991.

SEMESTER IV

STAT 441
3(3+0)

Probability and Statistics (GRF-IV)

Course Outline

Set theory, basic concepts of probability, conditional probability, independent events, Baye's formula, discrete and continuous random variables, distributions and density functions, probability distributions (binomial, Poisson, hyper geometric, normal, uniform and exponential), mean, variance, standard deviations, moments and moment generating functions, linear regression and curve fitting, limits theorems, stochastic processes, first and second order characteristics, applications.

Recommended Books

1. Susan Milton and Jesse C Arnold, "Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences", 4th Edition, McGraw-Hill, 2003.
2. William Mendenhall and Terry Sincich, "Statistics for Engineers and the Sciences", 5th Edition, Prentice Hall, 2007.
3. Douglas C. Montgomery and Geogre C. Runger, "Applied Statistics and Probability for Engineers", 5th Edition, John Wiley & Sons, 2010.

ELEC 442
4(3+1)

Digital Logic Design-2 (Found-7)

Course Outline

Introduction to Memories, Semiconductor and magnetic memories, SAP-1 (simple as possible computer 1), SAP-2 (simple as possible computer 2), SAP-3 (simple as possible computer 3), Introduction to PLD's, GAL and PAL, GAL22V10 and GAL16V8, Combinational logic application of PAL and GAL Devices, Programming of PLD's, Boolean Equation/ABEL Language, Sequential logic application of PAL and GAL, simple programmable logic devices (SPLDs), introduction to field programmable logic devices (FPLDs)/field programmable gate arrays (FPGAs), introduction to Verilog HDL (VHDL), gate-level and dataflow modeling, use of simulation software such as Veriwell Verilog Simulator.

Lab Outline

Practical experimentation with different units of SAP-1, i.e. Program Counter, Adder/Subtractor, Control Unit, Memory Unit and keyboard interface, Simulation of different types of Digital circuits using digital Simulator. Programming of PLD's like PAL and GAL, and use of Programmer. Verilog simulation and hardware implementation of sequential circuits such as flip-flops, registers, shift registers, counters; implementation of logic circuits using SPLDs; project solving a real-life problem.

Recommended Books

1. Malvino Brown, "Digital Computer Electronics", 3rd Edition, McGraw-Hill, 1992.
2. Samir Palnitkar, "Verilog HDL", 2nd Edition, Prentice Hall, 2003.
3. Thomas L. Floyd, "Digital Fundamentals", 6th Edition, Prentice Hall, 1996.
4. M. Morris Mano, "Digital Design & XILINX 6.3 XSE PKG", 1st Edition, Prentice Hall, 2005.

ELEC 443
2(0+2)

Computer-Aided Electronic Design (Found-8)

Lab Outline

Introduction to computer-aided design, OrCAD and Protel; Schematic design and layout design of circuit boards using software (OrCAD or Protel). Prototyping of electronic circuits, use of vero-board and bread-board, soldering of electronics circuits, physical manufacturing of PCB's.

Recommended Books

1. Muhammad H. Rashid, "Introduction to PSpice Using OrCAD for Circuits and Electronics", 3rd Edition, Prentice Hall, 2004.
2. [M. M. Shah](#), "Design of Electronic Circuits and Computer Aided Design", New Age International, 1993.
3. [Akram Hossain](#), "Computer-aided Electronic Circuit Board Design and Fabrication: Using OrCAD/SDT and OrCAD/PCB Software Tools", 4th Edition, Prentice Hall, 1996.

ELEC 444
3(3+0)

Electromagnetic Field Theory (Found-9)

Course Outline

Vector analysis, Coulombs law and electric field intensity, Gauss's law, flux density and divergence, energy and potential, conductor dielectric and capacitance, Poisson's and Laplace's equations, steady-state magnetic field, magnetic forces, materials and inductance, time-varying fields and Maxwell's equations, uniform plane waves.

Recommended Books

1. William Hayt and John A. Buck, "Engineering Electromagnetics", 7th Edition, McGraw-Hill, 2006.
2. Sadiku, Matthew N, "Elements of Electromagnetics", 2nd Edition, Oxford University Press, 1994.
3. Hearld J and W.Muller-Kristen, "Electrodynamics", 2nd Edition, World Scientific Publishing, 2011.

ELEC 445
4(3+1)

Analog and Digital Communication (Found-10)

Course Outline

Basic definitions; modulation and de-modulation techniques: amplitude, angle, pulse modulation, digital modulation techniques; information theory; error detection and correction; multiplexing techniques; noise and its effects on signal transmission; BER performance of various modulation techniques under noisy environment.

Lab Outline

Design and study of low-power AM and FM transmitters and receivers. Study of different signals behavior and its analysis-using computer simulated experiments and receivers. Study and construction of different digital communication systems. Multiplexing and Demultiplexing using digital ICs, line coding, design and construction and study of digital carrier systems. Study of TV system, Telephone system, digital switching systems.

Recommended Books

1. B. P. Lathi, "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford University Press, 1998.
2. Leon W. Couch, "Digital and Analog Communication Systems", 7th Edition, Prentice Hall, 2007
3. John G. Proakis and Masoud Salehi, "Communication Systems Engineering", 2nd Edition, Prentice Hall, 2002.

SEMESTER V

ELEC 551
3(2+1)

Semiconductor Materials and Devices (GRF-5)

Course Outline

Crystal Lattices, Unit Cells, Energy Bands. Conductors, Semiconductors, Insulators, Conductivity, Mobility, the Hall Effect, Diffusion and Drift Current. Laser and Superconductivity PN-Junctions Fabrication, Depletion, Diode Equation and its Application for Rectification Forward and Reverse Biased Characterization, Non Linear Behavior, Reverse Recovery of PN-Junction, Small Signal Analysis, Zener, Tunnel and Varactor Diodes and their Applications. Radioactive Transitions Light Emitting Diode (LED), Laser Diode, Photo Diode, Photo Transistor Characteristics and Applications, NPN and PNP Transistor Construction and Characteristics, JFET and MOSFET: Construction and Characteristics

Lab Outline

Study of forward and reverse bias characteristic, Study Characteristics, Zener Diode, LED, Tunnel Diode, Laser Diode, Photo Diode, Reverse of Recovery Times of Diode, PNP & NPN Transistor, Characteristics, Photo Transistor, JFET, MOSFET, Rectifiers (Half wave), Full, wave Centre Tape and Bridge Rectifier.

Recommended Books

1. Theodore F. Bogart and Jeffrey S. Beasley “Electronics Devices and Circuits”, 5th Edition, Prentice Hall 2000
2. [Robert T. Paynte](#), “Introduction to Electronic Devices and Circuits”. 4th Edition, Prentice Hall, 1996
3. Simon M. Sze and Ming-Kwei Lee, “Semiconductor Devices: Physics and Technology”, 3rd Edition, John Wiley & Sons, 2012.

MATH 552
3(3+0)

Numerical Methods (GRF-V)

Course Outline

Introduction, Solution of equations by Iteration, Interpolation, Splines, Numerical Integration and differentiation, Numerical methods in linear algebra, Gauss elimination, LU-Factorization, Matrix Inversion, Method of least squares, Matrix eigen value problems, Inclusion of matrix eigen values, Roots of polynomials, solutions of linear algebraic equations, solution of ordinary differential equations, modified Euler method, Runge Kutta method, error analysis and stability. Floating point number system, error analysis, solution of ordinary and partial differential equations.

Recommended Books

1. Erwin Kreyszig, “WIE Advanced Engineering Mathematics”, 9th Edition, International Edition, John Wiley & Sons, 2005.
2. Steven C. Chapra and Raymond P. Canale, “Numerical Methods for Engineers”, 5th Edition, McGraw-Hill, 2006.
3. Curtis F. Gerald, “Applied Numerical Analysis”, 7th Edition, Addison, Wesley, 2003.

ELEC 553
4(3+1)**Signals and Systems (Major-2)****Course Outline**

Types of signals, signal representation and models, system characterization, time domain analysis, frequency domain representation and analysis, continuous-time filters, sampled continuous-time signals, frequency domain representation and analysis of signals and systems.

Lab Outline

Study of various types of signals, analysis of signals, filter design, analog-to-digital converters, signal sampling using different parameters.

Recommended Books

1. Gordon. E. Carlson, "Signals and Linear System Analysis", 2nd Edition, John Wiley & Sons, 1998.
2. Simon Haykin, "Signals and Systems", 2nd Edition, John Wiley & Sons, 2003.
3. Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, "Signals and Systems", 2nd Edition, Prentice Hall, 1996.

ELEC 554
4(3+1)**Microprocessor and Interfacing (Major-3)****Course Outline:**

Study of Intel series of Microprocessors, 8088 to Pentium-4, and their comparative study. The 8088/8086 Microprocessors: Pin outs and the Pin Functions, Clock Circuitry, Bus Buffering and Latching, Bus Timing, Ready and the Wait State, Minimum Mode Versus Maximum Mode. Memory Devices, Address Decoding, 8088/8086 Memory Interface, Dynamic RAM Controllers, Memory Testing. Basic I/O Port Address Decoding, The 8255A Programmable Peripheral Interface, the 8279 Programmable keyboard/Display Interface, 8254 Programmable Interval Timer. Basic Interrupt Processing, Hardware Interrupts, Expanding the Interrupt Structure, 8259A Programmable Interrupt Controller. Introduction to DMA, the 8257_5 DMA Controller, and DMA Processed Printer Interface. Introduction, Analog to Digital Conversion Basics, Major Considerations for Data Acquisitions systems. Analog to Digital Converters, ADC Performance Parameters, ADC Code Sample & Hold Circuits, Analog Multiplexes, Analog Signal Isolation, Designing of a Data Acquisition system. Introduction to Digital Communications, Serial Communications Interface Adapters, The 825 IA Communications Interface Adapter, The RS_232C Interface Standard, Current Loops, Data Transmission Methods, Modems, IEEE 488, General Purpose Instrumentation Bus (GPIB), NEC 7210 GPIB Communication Interface.

Lab Outline

Study of 80386 Intel microprocessor ISA using its training boards, implementation of interfacing techniques (using gates, decoders, and SPLDs) to memory system and different I/O devices, learning and implementation of interrupt-driven I/O, learning and implementation of simple microcontroller based circuits, and a mini project.

Recommended Books

1. R.S.Gonkar, "Microprocessor Architecture, Programming & Applications", Wiley Eastern Ltd, 1993.
2. Douglas V. Hall, "Microprocessor and Interfacing", Revised 2nd Edition, Tata McGraw-Hill, 2005.
3. Barry B.Brey, "The Intel Microprocessors", Pearson Education, 2005.

Course Outline

Precision measurements terminologies including resolution, sensitivity, accuracy, and uncertainty; engineering units and standards; principles of different measurement techniques; instruments for measurement of electrical properties, pressure, temperature, position, velocity, flow rates (mass and volume) and concentration; systems for signal processing and signal transmission; modern instrumentation techniques; static and dynamic responses of instrumentation and signal conditioning; basic data manipulation skills using personal computers and graphs; data acquisition systems; principles of operation, construction and working of different analog and digital meters, oscilloscope, recording instruments, signal generators, transducers, and other electrical and non-electrical instruments; types of bridges for measurement of resistance, inductance, and capacitance; power and energy meters; high-voltage measurements.

Lab Outline

Design, construction, and analysis of measurement circuits, data acquisition circuits, instrumentation devices, and automatic testing; measurement of electrical parameters using different lab instruments; calibration of measurement instruments; use of data acquisition systems for presentation and interpretation of data; use of microcomputers to acquire and process data; use of simulation and instrumentation languages (LabView).

Recommended Books

1. Klaas B. Klaassen and Steve Gee, "Electronic Measurement and Instrumentation", Cambridge University Press, 1996.
2. Kevin James, "PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control", Newness, 2000.
3. Roman Malaric, "Instrumentation and Measurement in Electrical Engineering", Brown Walker, 2011.

SEMESTER VI

ELEC 561
4(3+ 1)

Integrated Circuit Design and Applications (Major-5)

Course Outline

Detailed design of pulse and switching circuits; switch; monostable, astable and bistable circuits; emitter-coupled flip-flop; noise margin; fan-out; propagation delay; Schmitt trigger; saturating and non-saturating logic families (DTL, TTL, ECL, I²L, CMOS); detailed study of timer ICs and their applications; analogue and digital circuit interface with applications; introduction to the fabrication of digital microelectronic PMOS, NMOS, CMOS, and BiCMOS circuits; epitaxy, ion implantation and oxidation; differential amplifiers: DC and AC analysis of differential amplifier; design of simple differential amplifier; level translator; current sources (simple current mirror, Widler and Wilson current source): output stage design; use of op-amp as a circuit element, offset and offset Compensation, op-amp with negative feedback, frequency response of an op-amp, DC and AC analysis of op-amp ICs; amplifier; linear and non-linear applications.

Lab Outline

Comparator analysis, inverting and non-inverting amplifiers, analog-to-digital and digital-to-analog converters, dual regulator, switched-capacitor voltage converter, op-amp DC characteristic measurement, op-amp speed, single-supply op-amp, function generator, phase locked-loop, frequency synthesizer.

Recommended Books

1. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits", 5th Edition, Oxford University Press, 2003.
2. Thomas L. Floyd and David M. Buchla, "Basic Operational Amplifiers and Linear Integrated Circuits", 2nd Edition, Prentice Hall, 1999.

ELEC 562
4(3+1)

Power Electronics (Major-6)

Course Outline

Introduction to power electronics; solid-state devices used in power electronics: power diode, power BJT, power MOSFET, SCR, GTO, IGBT, TRIAC, DIAC; semi-controlled, fully-controlled and uncontrolled rectifiers: single-phase and three-phase, six-pulse, twelve-pulse and twenty-four pulse rectifiers; single-phase and three-phase inverters; UPS; types of converters; switched mode power supplies, AC and DC motor drives.

Lab Outline

Design of converters; single-phase and three-phase uncontrolled, half-controlled and fully-controlled Rectifiers; buck, boost and polarity inverting converters; flyback converter.

Recommended Books

1. Cyril W. Lander, "Power Electronics", 3rd Edition, McGraw-Hill UK, 1993.
2. Muhammad H. Rashid, "Power Electronics: Circuits, Devices and Applications", 3rd Edition, Prentice Hall, 2004.
3. Ned Mohan, William P. Robbins and Tore M. Undeland, "Power Electronics: Converters, Applications and Design", Media Enhanced, 3rd Edition, John Wiley & Sons, 2003.

ELEC 563
4(3+1)

Control Systems (Major-7)

Course Outline

Introduction to control systems; open-loop and closed-loop systems, and their transfer functions, block diagrams, signal flow graphs; introduction to modeling; formation of differential equations of electrical, mechanical and other systems, transfer functions; stability, Routh's stability criterion, types and analysis of feedback control systems; root locus, Bode plots, polar plots, Nyquist stability criterion, gain and phase margins, Nichol's chart; steady-state and transient response of first-order, second-order and higher-order systems; introduction to state-space concepts and design techniques, formation and solution of state equations, eigenvalues and eigenvectors, transfer function matrices; PID controllers and compensators.

Lab Outline

Familiarization with MATLAB Control System tool box and MATLAB-SIMULINK tool box; simulation of step response and impulse response with unity feedback using MATLAB; determination of root locus, Bode plot, and Nyquist plot using MATLAB; determination of PI, PD and PID controller action of first-order simulated process.

Recommended Books

1. Katsuhiko Ogata, "Modern Control Engineering", 4th Edition, Prentice Hall, 2002.
2. Benjamin C. Kuo, "Automatic Control Systems", 8th Edition, John Wiley & Sons, 2003.

ELEC 564
3(3+0)

Optoelectronics (Major-8)

Course Outline

Nature of light, basic laws of light, optical fiber, types of optical fiber, fiber material, fabrication and components, laser, threshold condition, laser losses, population inversion and threshold conditions, laser modes, classes of lasers, semiconductor light sources, light emitting diodes, semiconductor laser diodes (SLDs), optical transmitter, optical receivers, wavelength division multiplexing (WDM), FDM versus WDM, WDM multiplexer, benefits of WDM, dense wavelength division multiplexing, optical networks. Introduction to fiber optics, Physics of light, Principles of Fiber optics light propagation, total internal reflection, mode propagation, skew waves, acceptance angle and numerical aperture. Fiber Characteristics: Fiber losses, Material losses, Scattering, Wave-guide and Microbend losses. Intermodal dispersion, Intermodal dispersion. Step index fiber multi-mode fiber, graded index fiber, step index fiber single mode, other fibers, Principles of Fiber Optic Communication, Modulation and Multiplexing, fiber Optics Components.

Lab Outline

Optical sources, optical detectors, optical amplifiers, optical transmitters, optical receivers, optical transceivers, optical fibers, propagation of light through an optical fiber, losses in fiber optic elements, optical modulation, multiplexing, optical systems.

Recommended Book

1. Harold Kolimbris, "Fiber Optics Communications", 1st Edition, Prentice Hall, 2004.
2. Emmanuel Rosencher and Borge Vinter, "Optoelectronics", 1st Edition, Cambridge University Press, 2002.

Course Outline

Introduction to Microcontrollers, Comparison of PIC, 8051, 68HC11 Microcontrollers, 8051 Microcontroller hardware Architecture, Programming in assembly and C51, Timers/Counters, Serial Port and serial communication, Interrupts, Advanced programming techniques, interfacing different devices with Microcontroller, keypad, LCD module, real time clock DS12887, DS1307, Dot matrix display, stepper motor, temperature sensor, ADC, DAC.

Lab Outline

Introduction to KEIL software, making hex file, debugging of programs, hardware Emulators, And interfacing different devices with Microcontroller, keypad, LCD module, real time clock DS12887, DS1307, Dot matrix display, stepper motor, temperature sensor, ADC, DAC.

Recommended Book

1. Muhammad Ali Mazidi, Janice Mazidi and Rolin McKinlay, "8051 Microcontroller and Embedded Systems", 2nd Edition, Prentice Hall, 2005
2. Scott Mechenzie, "8051 Microcontroller", 4th Edition, Prentice Hall, 2006.
3. Raj Kamal, "Microcontroller Architecture Programming, Interfacing, & System Design", 1st Edition, Pearson Education, 2007.

SEMESTER VII

ELEC 671

Project Management (GOF-1)

3(3+0)

Course Outline

Role of projects in organization's competitive strategy, standard methodologies for managing projects, project life cycle, design implementation interface, estimating, contractual risk allocation, scheduling: PBS and WBS, integration of scope, time, resource and cost dimensions of a project; evaluation of labor, material, equipment, and subcontract resources; scheduling techniques such as CPM/PERT and GERT, critical chain, solving real-world project schedules, cost budgeting, cost baseline, cash flow analysis, earned value analysis, cost control, proposal presentation, application of software for project management.

Recommended Books

1. Avraham Shtub, Jonathan F. Bard and Shlomo Globerson, "Project Management: Processes, Methodologies, and Economics", 2nd Edition, Prentice Hall, 2005.
2. Ed Stark, "Project Management for Beginners", 1st Edition, Clyde Bank Media, 2014.

ELEC 672

Digital Signal Processing (Major-10)

4(3+1)

Course Outline

Discrete Fourier transform and its properties, fast Fourier transform algorithms, inverse transform techniques, implementation of discrete-time systems, analysis and design of FIR and IIR Filters, frequency transformation, design of digital filters based on least square methods, multi-rate digital signal processing, power spectrum estimation.

Lab Outline

MATLAB-based simulation tool box for signal processing, simulation and development of basic signal processing algorithms, study of general signal processing concepts such as sampling, aliasing, quantization, and internal arithmetic operations, signal generation, spectrum estimation and fast transforms, sampling rate conversion and multi-rate processing.

Recommended Books

1. John G. Proakis and Dimitris K. Manolakis, "Digital Signal Processing", 4th Edition, Prentice Hall, 2006.
2. Sen M. Kuo, "Digital Signal Processors: Architecture, Implementation and Applications", 1st Edition, Prentice Hall, 2005.

ELEC 673

Digital Instrumentation Systems (Elective-1)

4(3+1)

Course Outline

Advanced instrumentation techniques; microprocessor-based instrumentation; analog-to-digital and digital-to-analog converters; PC-based instrumentation systems: interfacing techniques, data acquisition software, and virtual Instruments; intelligent instrumentation systems.

Lab Outline

Laboratory activities include the design, construction, and analysis of microprocessor-based measurement circuits, data acquisition circuits, instrumentation devices, and automatic testing. Use of data acquisition systems for presentation and interpretation of data. Use of microcomputers to acquire and process data. Use of simulation and Instrumentation languages (Lab View).

Recommended Books

1. Ronald Tocci, Neal Widmer and Greg Moss, "Digital Systems: Principles and Applications", 10th Edition, Prentice Hall, 2007.
2. William J. Dally and John W. Poulton, "Digital Systems Engineering", Cambridge University Press, 1998.

ELEC 674
3(2+1)

Data Communication and Networks (Major-10)

Course Outline

Introduction to Networks, Data Communications principles, Data Signaling Formats Channel Bandwidth and Capacity. The Physical Layer, Noise and Error Detection Methods Queuing Systems. The Continuous Time Discrete Event Process. The M/G/I Queuing System, Application of the M/G/I Queue Networks of Queues Synchronous Time Division Multiplexing, Frequency Division Multiplexing, Synchronous Time Division Multiplexing, The Data Link Layer and X .25, Routing in Packet Switched Network, Flow and Congestion Control, Multiple Access Communication Protocols, Fixed Assignment Schemes, Random Access Techniques, Centralized Demand Assignment Schemes, Distributed Demand Assignment schemes. Local Area Network Protocols and Standards. Token Bus, Distributed Queue Dual Bus, Fiber Distributed Data Interface, Network Interconnection through Bridges and Routers. Transport Protocols, Users Datagram protocol, Transport Protocols. Datagram protocol, Transport Protocols. Integrated Services Digital Networks (ISDN) Switching Techniques and Fast Packet Switching. Digital Circuit Switching, Advances in Switching Techniques, Photonic Switching.

Lab Outline

Configuration of different operating systems i.e. windows2000 Professional and windows XP, for a network environment, Hands on experience of different Network devices, i.e. Hubs, Bridges, Switches, Routers, making network cables, cross cables and direct cables, Establishishing a local area network (LAN), using different software tools regarding LAN

Recommended Books

1. Behrouze A. Forouzan, "Data Communications and Networking", 3rd Edition, Tata McGraw Hill, 2003.
2. Joe Casad and Dan Newland, "MCSE Networking Essentials", New Rider Publisher, 1997.
3. W. Stallings, Macmillan, "Data and Computer Communication", 4th Edition, Prentice Hall, 1994.

ELEC 675
2(0+2)

Final Year Project-1 (Elective-4)

Course Outline

This course enables the students to enhance their technical capabilities by implementing their theoretical and practical knowledge in the field of research and development. Students should complete background study and simulation/design of the project.

SEMESTER VIII

ELEC 681
4(3+1)

Industrial Electronics (Elective-2)

Course Outline

Mechanical Devices, Sensors Switches, Operational Amplifiers and other ICs, for industrial Applications, time Delay Circuits, phase and power control circuits .DC and AC Motors, Stepper Motors, Motor Control Circuits, Transducers, Industrial Process Control, Digital Sequences Control, Speed control of DC, AC, and servo motors. Process control. Measurement of non-electrical quantities: Temperature, displacement, pressure, time, frequency; digital industrial measuring systems. Ultra-sonic generation and application. X-ray applications in industry. Photo-electric devices. Industrial control using PLC's. Data acquisition. Distributed control system in process industries.

Pulse Modulation in Industrial Telemetry and Data Communication, Segmental Power Control, Programmable Logic Controllers (PLC) and its programming, Automation and Robotics.

Lab Outline

Experimentation with different sensors, ADC, DAC, speed control of DC, AC, stepper and servo motors, power control devices.

Recommended Books

1. [Frank D. Petruzella](#), "Industrial Electronics", McGraw-Hill, 1995.
2. [James T. Humphries](#) and [Leslie P. Sheets](#), "Industrial Electronics", 4th Edition, Delmar Cengage Learning, 1993.
3. Frank D. Petruzella, "Programmable Logic Controllers", 3rd Edition, McGraw-Hill, 2005.
4. Frank D. Petruzella, "Industrial Electronics", 1st Edition, McGraw-Hill, 1995.

ELEC 682
4(3+1)

VLSI Design (Elective-3)

Course Outline

Introduction to integrated circuits, IC fabrication, monolithic integrated circuits, introduction to MOS technology, basic electrical properties of MOS and BiCMOS circuits, basic digital building blocks using MOS transistors basic circuit concepts, ultra-fast VLSI circuits and systems and their design.

Lab Outline

Implementation of VLSI design techniques using VHDL and /or Verilog HDL.

Recommended Book

1. Zainalabedin Navabi, "Verilog Computer-Based Training Course", 1st Edition, McGraw-Hill, 2002.
2. [Debaprasad Das](#), "VLSI Design", 1st Edition, Oxford University Press, 2011.
3. Douglas A. Pucknell and Kamran Eshraghian, "Basic VLSI Design", 2nd Edition, Pearson Education, 1987.

ELEC 683
3(3+0)

Microwave Communication (Major-11)

Course Outline

Microwave components: waveguides, waveguide junctions, directional couplers, isolators, circulators, resonators. Microwave generators: microwave tubes, two cavity klystron, reflex klystron, TWT, magnetron. Microwave semiconductor devices. Gunn diode, Impact diode, PIN diode, Mixers, Detectors. Microwave measurements, measurement of frequency, VSWR, power, noise and impedance.

Recommended Book

1. Kennedy, "Electronic Communication Systems", 4th Edition, McGraw Hill 1992.
2. [William D. Stanley](#), "Electronic Communication Systems", 1st Edition, Reston Pub Co, 1982.
3. [B. P. Lath](#) and [Zhi Ding](#), "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2009.

ELEC 684
4(0+4)

Final Year Project-2 (Elective-4)

Outline

Hardware and software implementation of project design completed in the previous semester, testing and debugging, project report submission and presentation.