DEPARTMENT OF ELECTRONICS

Curriculum for B.S Electronics

UNIVERSITY OF PESHAWAR
<table>
<thead>
<tr>
<th>Semester I</th>
<th>Cr.Hrs</th>
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<td>IS 311</td>
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<tr>
<td>ENG312</td>
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Details of Courses for
BS Electronics

SEMESTER I

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>ISL 311</td>
<td>Islamic Studies (Comp-1)</td>
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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-Baqara 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 Ihtimam (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

Total Credit Hours = 135
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 Khilaft-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

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.
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**


   b) **Writing**


   c) **Reading/Comprehension**

### MATH 313 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**

### PHY 314 Physics-1(GRF-1)

**Course Outline**

**Lab Outline**

**Recommended Books**

### ELEC 315 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**


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**ELEC 316**  
**Circuit Analysis (Found-1)**  
**4(3+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**

SEMESTER II

PS 321  Pakistan Studies (Comp-5)
2(2+0)

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 Polities 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


ENG 322  
English-2 (Communication Skills) (Comp-6)  
2(2+0)

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  

b) Writing  
MATH 323  Linear Algebra and Differential Equations (Comp-7)
3(3+0)

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

PHY 324  Physics-2 (GRF-2)
3(2+1)

Course Outline

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

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 \( pnp \) 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

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

**SEMESTER III**

**MATH 431**
Complex Variables and Transforms (GRF-III)
3(3+0)

**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**

**ENG 432**
English-3 (Technical Report Writing) (Comp-8)
3(3+0)

**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


b) Presentation Skills

c) Reading

General Editiours: 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 Amplifiers and Oscillators (Found-4)

4(3+1)

Course Outline


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

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

Course Outline

Recommended Books
SEMESTER IV

STAT 441  Probability and Statistics (GRF-IV)
3(3+0)

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

ELEC 442  Digital Logic Design-2 (Found-7)
4(3+1)

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


**ELEC 443**  
Computer-Aided Electronic Design (Found-8)  
2(0+2)

**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 breadboard, soldering of electronics circuits, physical manufacturing of PCB’s.

**Recommended Books**


**ELEC 444**  
Electromagnetic Field Theory (Found-9)  
3(3+0)

**Course Outline**  
Vector analysis, Coulomb’s 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**


**ELEC 445**  
Analog and Digital Communication (Found-10)  
4(3+1)

**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**

**SEMESTER V**

**ELEC 551**  
Semiconductor Materials and Devices (GRF-5)  
3(2+1)

**Course Outline**  

**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**

**MATH 552**  
Numerical Methods (GRF-V)  
3(3+0)

**Course Outline**  

**Recommended Books**
ELEC 553  
Signals and Systems (Major-2)  
4(3+1)  

**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**  

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ELEC 554  
Microprocessor and Interfacing (Major-3)  
4(3+1)  

**Course Outline:**  

**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**  
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
**SEMESTER VI**

**ELEC 561  Integrated Circuit Design and Applications (Major-5)**
4(3+ 1)

**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, Widlar 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**

**ELEC 562  Power Electronics (Major-6)**
4(3+1)

**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**
**ELEC 563    Control Systems (Major-7)**
4(3+1)

**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**

**ELEC 564    Optoelectronics (Major-8)**
3(3+0)

**Course Outline**

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

**Recommended Book**
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
### 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**

### 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**

### 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


ELEC 674 Data Communication and Networks (Major-10)
3(2+1)

Course Outline


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

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 Industrial Electronics (Elective-2)
4(3+1)

Course Outline
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

ELEC 682 VLSI Design (Elective-3)
4(3+1)

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
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


Outline

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